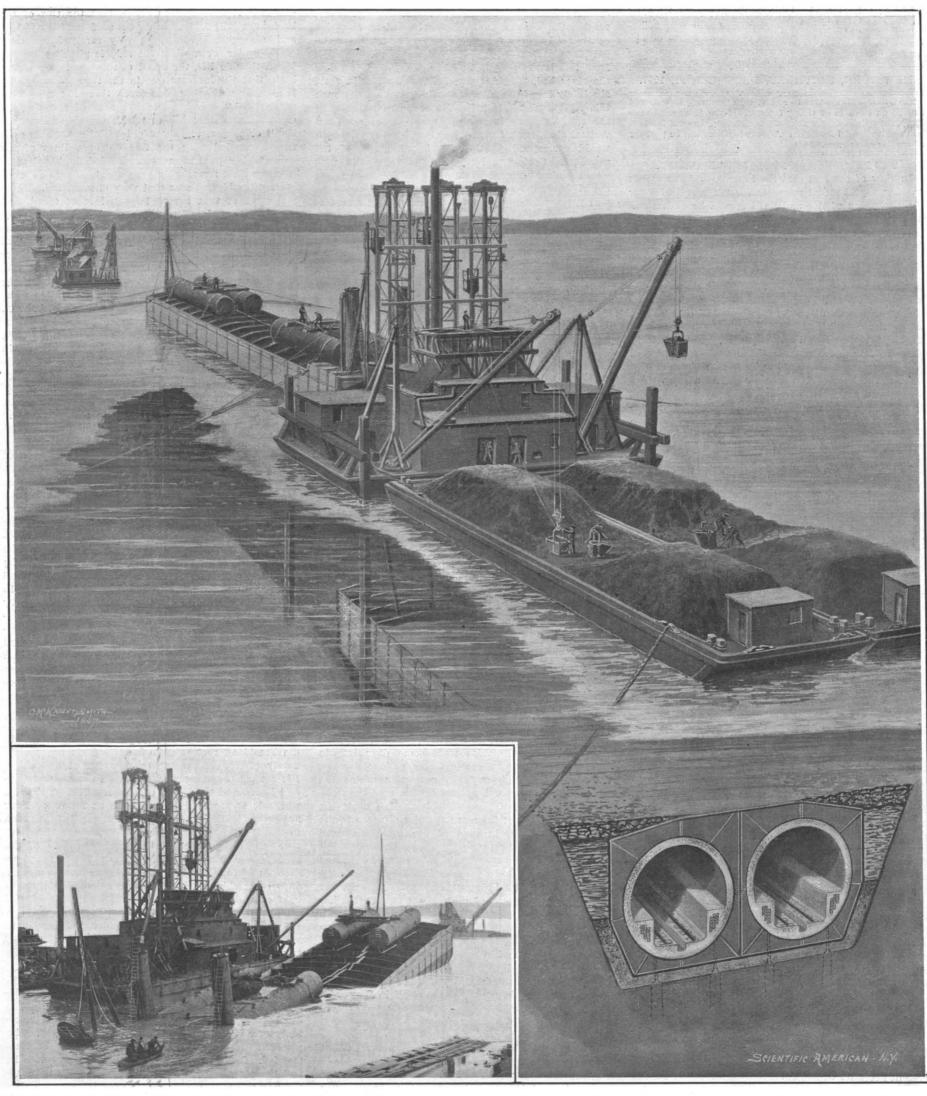
Vol. XCVII.—No. 25. ESTABLISHED 1845.

NEW YORK, DECEMBER 21, 1907.

10 CENTS A COPY \$3.00 A YEAR.



From Left to Right Are Shown the Floating Dredge for Excavating the Trench in the Bed of the River; the Scow Pile-Driver for Driving Piles in the Bottom of the Trench; a Section of the Double Tube in Position for Sinking; the Floating Concrete Mixer from Which the Concrete is Distributed Around the Sunken Tubes; and the Barges Carrying the Sand, Broken Stone, etc., for the Concrete. The Lower Left-Hand Cut Shows a Length of Tubes Being Sunk Into Position in the Excavated Trench.

NEW METHOD OF CONSTRUCTING A SUB-AQUEOUS TUNNEL.—[See page 458.]

Scientific American

SCIENTIFIC AMERICAN

ESTABLISHED 1845

MUNN & CO. - Editors and Proprietors

Published Weekly at No. 361 Broadway, New York

CHARLES ALLEN MUNN, President
361 Broadway, New York

FREDERICK CONVERSE BEACH, Sec'y and Treas.
361 Broadway, New York

NEW YORK, SATURDAY, DECEMBER 21, 1907.

The Editor is always glad to receive for examination illustrated articles on subjects of timely interest. If the photographs are sharp, the articles short, and the facts authentic, the contributions will receive special attention. Accepted articles will be paid for at regular space rates.

THE PRESIDENT ON EMPLOYERS' LIABILITY.

In view of the fact that the Scientific American is offering a gold medal annually for the best device for the protection of life and limb, it will be understood how thoroughly in sympathy we are with that portion of the President's message in which he recommends the adoption of legislation providing for the compensation for accidents to workmen. That the question is far-reaching and of sufficient magnitude to call for immediate action, is shown by a glance at the statistics of accidents published by various commissions and boards that take cognizance of this matter. Thus, the Public Utilities Commission lately drew attention to the fact that during twenty-six days in August of the present year, 5,500 accidents occurred on the surface roads of New York city alone-which is at the rate of 211 a day, or 77,000 a year. The Department of Health of this city reports that during 1906 there were 3.781 fatal accidents in New Yorkequivalent to an average of ten a day. That the fearful frequency of these accidents is not confined to New York alone, is shown by the figures of the Interstate Commerce Commission, which reports that in the year ending June 30, 1906, there were 108,324 railway accidents in the United States: an increase of 12.613 over the number which occurred in 1905, in which year the railroads of this country furnished more accidents than all the casualties on both sides during the three years of the Boer war. The total number of accidents in the United States of all kinds, chiefly

industrial, in a single year exceeds half a million. Now, seeing that a large proportion of the deaths and injuries is due directly to the risks incurred by workmen employed in our industries, and that as matters now stand the law affords little or no protection to the workman, who in the majority of cases must endure the results of injury without compensation, it can be seen what a vast injustice is laid upon our industrial workers under existing conditions. It is true that a body of attorneys has come into existence which, in the President's words, exist "only by inciting men who may or may not have been in the wrong to undertake suits for negligence"; but it is a fact that such suits usually "secure only inadequate compensation, and often cause altogether disproportionate annoyance to the employer." The President advocates the passing of a law providing limited but definite compensation for accidents to all workmen within the scope of the Federal power, including employees of navy yards and arsenals. The law should be so framed that the payment for accidents by the employer would be automatic, instead of being a matter for lawsuits; workmen receiving certain and definite compensation for all accidents in industry, irrespective of negligence. The spirit of such legislation would be based upon the principle that the employer is the agent of the public, and that when he starts any industry, he does so on his own responsibility and for his own profit. He sets in motion agencies which create risks for others, and he should, therefore, take all the ordinary and extraordinary risks involved; and the risk he thus at the moment assumes will ultimately be assumed as it ought to be, by the general public. By the enactment of such a law, the shock of the accident will be diffused, and will not, as it now does, fall upon the man or woman who is least able to bear it. The benefit would be twofold, since employers would gain a desirable certainty of obligation, and would get rid of the present necessity of litigation to determine that obligation, while the workman and his family would be relieved from the too-often crushing load of disablement or death.

It is a fact, unfortunate but undeniable, that in legislation designed to safeguard the life and limb of the individual citizens, we generally are lagging behind the rest of the industrial world. Since the year 1895 practically every country of Europe, together with Great Britain, New Zealand, Australia, British Columbia, and the Cape of Good Hope, has enacted legislation embodying the principle that upon the employer should be placed the entire trade risk in the various lines of industry. Considerations of humanity and of national prestige should lead Congress to take early and effective action to bring our practice at least up to the standard established by the rest of the world.

DIFFICULTIES IN CONSTRUCTING THE GREAT CATSKILL AQUEDUCT SIPHON.

It will be remembered that the plans of the Catskill aqueduct include the construction of a huge siphon for carrying the water below the Hudson River at a crossing near Storm King Mountain. The aqueduct reaches the western bank of the river at an elevation of several hundred feet above water level. The original plans contemplated the sinking of a vertical shaft from this level to a point about 400 or 500 feet below the river bed, where it was believed that solid rock, absolutely free from fissures, would be found. Through this rock a tunnel is to be driven horizontally, until the opposite shore is reached, where it is to meet a vertical shaft sunk from a level above the river, which would correspond to the established grade of the aqueduct. Geologists had predicted that solid rock would be encountered at a depth of 500 feet below the river, and borings were carried on through the past year to ascertain how far this estimate was correct. Much to the surprise of everybody concerned, no solid rock has yet been encountered, although the borings have been carried down to a depth of nearly 700 feet. Although the drills operated from scows in the river have been sunk for hundreds of feet below the river bed, nothing has been found thus far but mud, sand, and bowlders. In view of the fact that the pressure in the 14-foot circular tunnel will reach about 15 tons to the square foot, it is imperative that the tunnel be driven in absolutely sound rock; otherwise, under this pressure, there might be very serious leakage. Investigations of other possible points of crossing have shown there is no likelihood of finding a more satisfactory location than that at Storm King Mountain; for it is believed that the old bed of the river lies everywhere many hundreds of feet below the present bottom. Comparative estimates have been made of the cost of carrying the water across the river by means of steel pipes laid on the present bottom, or by an aqueduct built at high level; but the engineers of the Board have concluded that a deep tunnel through solid rock will, all things considered, prove to be the most satisfactory method of crossing. Apart from the fact that when such a tunnel is once built, there will be no subsequent expense for maintenance. a tunnel siphon would be absolutely safe from injury, a most important consideration where the health and safety of such a great city as New York is concerned.

THE MASTERY OF THE OCEAN.

The first week of December, 1907, will long be remembered as one of the most boisterous in the annals of transatlantic travel. The steamers which made the western passage encountered what was almost a continuous gale, from the time they left the English Channel and the Irish coast until they passed the Sandy Hook lightship. Not only were the winds at times of cyclonic force, but the captains of the various ships agree in stating that the seas were among the heaviest encountered in their experience. The fact that although all of the ships were some days late in arriving none of them received any serious damage, testifies to the high state of perfection which the art of constructing and navigating the modern ocean liner has reached. Of all the ships which made the passage, the greatest interest naturally attaches to the "Lusitania," which, because of her great size and power, would be expected to show superior ability, not only to smash her way at high speed through the heavy seas, but to do so with far less discomfort to the passengers than would be experienced on a smaller essel. Let it be recorded then, at the outset, that he experience in the boisterous weather she encountered makes it certain that the ship will never be built whose size is such that she will not be more or less the sport of the elements, and whose power will never be so great but her speed will be to some extent cut down by the combined resistance of the wind and sea. But having admitted this much, it was proved in the recent rough passage that increase in size and power contributes enormously to the comfort of the passengers and the average speed of the trip. A length of close upon 800 feet, a beam of 88 feet, and a draft of 34 feet, to say nothing of a displacement of over 40,000 tons, provide dimensions and mass to which even the most furious of Atlantic gales are able to impart only slow and rhythmical movements of pitching and rolling. Although the rise and fall of the bow must at times have been as great as 50 feet, the movement, except on rare occasions, was gradual, and did not involve those sudden changes of position which are so strongly provocative of seasickness. So also the rolling, which rarely reached ten degrees each side of the normal, was very slow, and was accompanied by an appreciable period of rest before recovery. It has been proved in this ship beyond question, that increase of comfort is gained by increase of size, and the future is certain to see a growth in the dimensions of transatlantic ships, whose only limits will be those imposed by the length of piers at which the ships lie, and the depth of the harbor channels through which they must pass.

The 70,000 horse-power, quadruple turbine engines proved to be admirably adapted for driving the vessel into a heavy head sea. "Racing," that bugaboo of the marine engineer, has been practically eliminated. The four propellers are so deeply immersed, and their diameter is relatively so small, that the tips of the blades are fully 12 feet below the surface of the water; and, consequently, they are very rarely lifted clear of the water, even when the ship is pitching heavily. When they do lift, the speed of rotation is already so high, that the increase due to the lessened resistance is scarcely noticeable. Moreover, there is no lowering of the ship's speed, as in the case of a racing reciprocating engine; the thrust on the ship being constant, or subject to only slight variations. This even thrust, coupled with the fine entrance lines of the ship and her great momentum, enabled the "Lusitania" to maintain a remarkably even and high rate of speed against the biggest seas that were encountered. There was none of that severe impact, loss of speed, and subsequent acceleration which mark the performance of a ship driven by reciprocating engines. Consequently, the turbine as a drive for big ships 'has already rendered itself very nonular with the officers on the navigating bridge. During the first heavy gale, which was encountered off the coast of Ireland, the ship was driven into enormous head seas for some hours at a speed of over 23 knots an hour. Ultimately, in spite of her freeboard forward of fully 50 feet, she began to ship green seas, which swept the fore deck, tore loose the derrick booms, and began to batter in the lighter plating of the forward breastworks. Subsequently, for the rest of the trip, she was driven under reduced power, the revolutions being about 157, as against the maximum speed of 180 per minute. This passage proved that if suitable alterations were made forward on the forecastle deck and the bridge structures, in the way of breakwaters and extra heavy scantling, and plating sufficient to stand the impact of the seas, it would be possible to drive a ship of this size with the full power of her engines through any gale which might be encountered and maintain a speed of 23 knots an hour against it. Such a ship, however, must be prepared to take on board and resist the impact of solid green seas, which may be at times 10 or 15 feet deep on the highest forward deck. The navigating bridge of this ship is 70 feet above the water, and yet at times the seas struck the rails and stanchions so heavily as to bend and split them in several places. Probably the best provision for heavy weather would be some form of turtleback deck forward, with the navigating bridge and pilot house carried upon a light framework above it, the forward end of the deck structures being given something of a snowplow shape, with a view to deflecting the seas that came on board, and throwing them clear of the passenger promenades and deck houses.

PROPOSED NEW SHIPS FOR THE NAVY.

The Secretary of the Navy, in his annual report to the President, recommends that Congress appropriate nearly \$70,000,000 for the construction of new ships. His recommendations are based upon those of the General Board and the Board on Construction. The ships which it is proposed to build are as follows: Four 20,000-ton battleships of the "Delaware" type, each to cost \$9,500,000; four scout cruisers of the "Chester" type, each to cost \$2,500,000; ten destroyers of the same type as those recently contracted for; four submarines of the "Octopus" type; one ammunition ship; one repair ship; two mine-laying ships, which are to be formed by the conversion and equipment of two cruisers now on the navy list; and four fleet colliers.

This programme of new construction is designed, in addition to increasing the strength of the fighting line, to strengthen our navy in elements in which, at present, it is somewhat weak, and in which other leading naval powers are moving ahead of us in the matter of construction. At present our navy is deficient in destroyers, submarines, and colliers; for, in building up our battleship strength, we have overlooked the importance of these three essentials of naval efficiency. The proposal to build 20,000-ton battleships is to be commended. Our own experience with our larger vessels, and the consensus of opinion and practice in the leading navies of the world, point to the big one-gun ship as the ideal fighting unit of the immediate future. It will be noticed that there is no recommendation for the construction of either armored or unarmored cruisers. The former has merged into the battleship; the place of the latter is taken by the fast unarmored scout, of which four are recommended in this report.

Scientific American

It is suggested by the Secretary that the four colliers, a type of ship in which our navy is sadly deficient, be built in the navy yards on the Atlantic coast. The absence of the Atlantic fleet during its cruise to the Pacific will leave our eastern navy yards with very little work to do, and the construction of these colliers on the vacant slips would serve to keep our efficient navy yard forces together until the fleet returns.

The total appropriation is a large one, the largest in fact that has ever been asked for by any Secretary of the Navy for naval increase, at any one time; but we must remember that the nation has been growing in wealth and numbers at a rate which is even greater than the rate of increase of naval expenditures. If our navy is to fulfill its great function of preserving the peace, it must be maintained at a standard of strength commensurate with the interests over which it stands guard.

RECENT AUTOMOBILE ENDURANCE TESTS.

Automobile endurance tests at this season of the year are rather of a novelty, to say the least, so the results of the two which occurred recently, in the East and West respectively, will doubtless interest our readers, especially since all the cars which obtained perfect scores are standard American machines and old-time favorites.

The first test was a decided novelty in the form of a 24-hour road reliability run. It was conducted by the New Jersey Automobile and Motor Club, the conditions being that each machine should make five rounds of a 94-mile circuit in just 24 hours without any adjustments and without stopping the engine except in controls. No running schedule was provided, and but three minutes leeway was allowed at the finish. Students from Stevens Institute acted as observers. The course was an excellent one, there being only one short, muddy stretch and three or four bad turns. Starting from Newark, it passed through Bloomfield, Montclair, Dover, Succasunna, Mount Freedom, Morristown, Bedminster, Somerville, Bound Brook, and Plainfield. The start was at 2 P. M. on November 15, under fair weather conditions. Twentyone cars started, and a few of them made the first round in a trifle less than three hours, while more than half completed it in less than four. Two Maxwell machines were eliminated in this round, one on account of faulty lubrication, which caused the connecting-rod bearings to burn out, and the other because of carbureter trouble. The Oldsmobile "Mudlark" experienced trouble from a slipping clutch, while a Pullman touring car caught fire and was burned during the refilling of the gasoline tank at Newark.

The next three rounds were made during the night, which was a moonlight one, although very chilly on account of a cold northeast wind. A single-cylinder Hewitt runabout dropped out on the second round, owing to loss of time from running out of fuel in a secluded part of the course. A 4-cylinder Cadillac runabout ran into a bank and smashed a front wheel at about 2:30 A. M. This car was far ahead of the requisite schedule of 19 miles an hour, and notwithstanding a delay of four hours, it finished on time, though penalized 1,098 points for replacing the wheel. One of the new water-cooled Marmon cars was ditched during the night while trying to pass a hay wagon on a narrow stretch of road.

Fifteen machines had started on the fifth round by 9 A. M. of November 16, and seven still had perfect scores. A Maxwell 4-cylinder touring car dropped out because of a leaky radiator, which left but fourteen cars to finish. Seven of these had perfect scores as follows: 40-horse-power Ford 6-cylinder runabout (the only 6-cylinder car in the contest), 28-horse-power aircooled Franklin touring car, 50-horse-power Haynes runabout, 20-horse-power Locomobile touring car, 20-horse-power Matheson touring car, 30-horse-power Oldsmobile touring car, and 50-horse-power Thomas touring car.

Seven cars were penalized, although most of these finished on time. A single-cylinder Cadillac hit a tree in the night and stalled its engine, for which it was penalized 23 points. Its 4-cylinder mate received 1,098 points. Grout, Autocar, and Mitchell machines were penalized 107, 76, and 115 points for adjustments en route. Two other Mitchell cars abandoned the test, one of them on account of a broken water pump. The new 4-cylinder water-cooled Marmon touring car also did not finish, while its air-cooled mate, driven most of the time by a woman, finished nearly on time with 341 points penalization, caused chiefly by a leaky petcock in the gasoline system. The Oldsmobile "Mudlark" (a 30-horse-power 1906 touring car) received 12 points on account of a slipping clutch.

In summing up the results of this test, it is to be noted that exactly one-third of the cars finished with perfect scores, a second third finished with penalizations, and the remainder abandoned the test because of breakdowns or accidents. The test was not a particularly strenuous one for the machines, though it showed their ability to keep going for twenty-four hours on good roads. It was more a test of the

physical endurance of the drivers than of the mechanical endurance of the cars, as almost without exception the drivers remained at their wheels throughout the entire run. Nevertheless, the test has shown the possibilities in a contest of this sort in the way of finding defects within a short period of time, and it is probable that similar tests over rougher roads will be held in the future.

The second endurance test was held under the auspices of the Chicago Motor Club, and consisted of three runs of about 200 miles each, made from Chicago to cities about 100 miles distant. The cars were divided into three classes according to a price classification, and were required to make 20, 17, and 14 miles an hour respectively. At the end of the read test the cars were submitted to the close scrutiny of a committee of technical men, and any breakages or slight defects in them or in their accessories counted against them. It was this latter part of the test-the final inspection at the end of the road trial—that brought penalizations to a number of leading makes of cars. It was, indeed, hard that after a strict 600mile endurance test a car should be deprived of a perfect score on account of the looseness or slight breakage of some accessory, such as a lamp, speedometer, or horn; and in this respect, the rules were rather too strict than otherwise. If they had been made to apply to the shaking loose or breakage of any parts of the car proper, this would have been sufficient.

In the first day's run of 230 miles from Chicago to South Bend and return, 35 cars started. Four of these dropped out during this run, one of them, a Thomas Flyer, becoming ditched on account of fast driving before it got beyond the city line. A Royal Tourist broke its rear axle before it had traveled 25 miles. The driver succeeded in obtaining a new axle from Chicago and putting it in place on his car. Altogether he lost 4% hours, but he managed to make half of this up before the end of the day. A Marion machine also broke an axle, while a Frayer-Miller cracked its frame. Other cars which were penalized were a Matheson (which lost 235 points owing to trouble with a radius rod, and 16 points for tying up the sprag to keep it from dragging); a Maxwell (which lost 334 points from engine trouble, though it made all controls on time); and the Locomobile and Pierce machines (which lost 10 and 26 points respectively from making brake adjustments).

The second day's run was from Chicago to Rockford and return, a distance of 189 miles. The roads were much better than those encountered during the first day's run, and the contestants found many stretches where they were able to make high speed. Several new machines were penalized on this day, while others which already had points against them secured some in addition. At the start of the third day's run, one of the three Matheson cars lost 401 points on account of the driver finding it necessary to open the bonnet and pour warm water on the carbureter before he could start the engine. The car was withdrawn from the contest, despite the fact that it had a perfect record up to this time. A third Matheson car, and a Stoddard-Dayton 6-cylinder car did not start on this day. The run was to Ottawa, Ill., and return, a distance of 205 miles. The cars which were penalized on this day were rather few. The Pierce machine, which was penalized 26 points on the first day, made the following two runs without further penalization. The Wayne roadster collided with a Maxwell touring car and broke its steering knuckle, while the Maxwell, which had encountered much hard luck throughout the test, lost no less than 610 points. The Rapid 'bus, which carried twelve people, received 66 points penalization in the third day's run. This machine made a remarkable performance, however, for although it was mounted on solid tires and propelled by a simple type of double-opposed-cylinder engine, it was able to keep up to the schedule. In one instance the driver lost his way and, in order to get back on the course, he was obliged to go across country on a flooded dirt road, which was very hard to travel. The machine made its way without shedding a passenger, however, and finally arrived ahead of its schedule. The performance of this machine has thoroughly demonstrated the reliability and usefulness of the modern lightweight commercial vehicle for cross-country work.

At the conclusion of the road test, and after the committee had examined and marked the cars, there was only one machine—a 30-horse-power Haynes road-ster—which was found to have a perfect score. The runabout body was on a chassis like that which participated in the Glidden tour last summer, and which has been in different contests throughout the year. Its designer, Mr. Elwood Haynes, is one of the oldest and most competent builders of automobiles in this country, and the winning of a perfect score in this contest (which secured him the Miles trophy) is an honor which he well merited. The machine which obtained second place, and thereby won a silver set, was a 6-cylinder Pierce touring car, which was penalized two points at the conclusion of the test, on account of its

having a loose grease cup on the rear axle. An Oldsmobile touring car was third. It had six points penalization, four being given for a loose boot on the driving shaft, and two for the adjustment of the emergency brake, which was according to the ideas of the committee, not adjusted tight enough. The fourth machine was a Rambler, which was penalized 8 points as follows: Pedal brake medium, 2; lamp damaged, 4; speedometer loose, 2. An Auburn touring car, which is a light 4-cylinder machine made in Chicago, came the nearest to the Haynes of any machine in securing a perfect score, as it was penalized 10 points on account of the wheels and spindles being slightly out of line. This might have been due to an error in the first measurement. The distance out was small, being only a fraction of an inch. Such standard machines as a White and a Locomobile were penalized 6 and 2 points for a loose running board and a loose fender, respectively. The former also lost 6 points because of a loose apron and the latter points as follows: Fan belt off, 2; emergency brake, medium, 2; grease cup loose, 6; speedometer loose, 2; total, 14.

Most of the other cars suffered chiefly from similar small troubles. A list of those that finished, together with the points which they were penalized, follows:

Studebaker, 16; Kisselkar, 18; National, 26; Silent Knight, 54; Pierce Arrow, 55; Jackson, 66; Locomobile, 67; Autocar, 74; Premier, 78; Dragon, 90; Stoddard-Dayton, 107; White, 110; White, 137; Stevens-Duryea, 186; Rapid 12-passenger 'bus, 188; Wayne, 620; Reo, 1,040; Maxwell, 1,108.

Still another midwinter sealed-bonnet contest of a very strenuous character was run by the Automobile Club of Washington, D. C., on the 10th instant. This test was carried out over a 118-mile course in a heavy rainstorm. It had been raining heavily for two days, and the roads were in very bad condition. Despite this fact 22 cars finished, 16 of them with perfect scores, out of 26 which started. A double-opposed-cylinder Buick made the fastest time, covering the entire course in 8 hours and 1 minute, at an average speed of 14½ miles an hour. The cars that had perfect scores were as follows: Buick, Cadillac, Columbia, Corbin, Ford, two Franklins, Locomobile, Maryland, Maxwell, two Mitchells, Oldsmobile, Packard, Thomas, and a Wayne.

THE MOTOR BOAT SHOW AT THE GRAND CENTRAL PALACE.

The motor boat exhibit, which was held last week in the Grand Central Palace in this city, showed nothing radically new for 1908. There were a number of large 40-foot cruisers and pleasure craft with elaborate cabins on exhibition in the main hall, while the exhibit of engines and accessories in the spaces around this hall was that which attracted the most attention.

The craze for speed, which was predominant a few years ago, seems to have died out, and practically all of the craft shown were intended for comfort and pleasure rather than for racing. A favorite type seems to be the hunting cabin launch, which type of boat has an inclosed cabin projecting above the deck at the forward end and followed at the stern by an open cockpit. Among the smaller boats shown were several launches of moderate cost. The only racing craft exhibited was the "Den."

Among the large engines displayed were the Craig motor, used in the boat "Ailsa Craig," which won the Bermuda race last spring. The small 2-cycle engine was to be found in large numbers. The tendency in the design and equipment of this type of motor seems to be the lightening in weight of the engine, and the fitting of it with positive oil feeds supplied by gravity or by a mechanical lubricator.

The reversing gear is another part of the motor boat which has received special attention. There were a half dozen different types of clutch and reverse gear shown. Most of these employed metal-to-metal clutches and spur planetary gears. One improved device of this sort made use of a jaw clutch with coiled springs arranged to take up the shock when the clutch is thrown in, while the reverse is obtained by friction disks, which are forced in contact with disks on the driving and driven shafts respectively. Several improvements were noted in the method of starting the motor. One starting device consisted of a crank placed beside the tiller, and connected through a chain to a shaft running along in the bottom of the boat to the motor. Another arrangement of this kind consisted of a crank placed back of the motor, and made to turn it through gears which gave a considerable reduction, thus making it possible to start the motor without relieving the compression. The arrangement in the steering wheel of the spark and throttle control levers, similar to that used in an automobile, also seems to be quite general.

There were a large number of accessories, such as exhaust-operated whistles, electric lights, ignition dynamos and batteries, etc., on exhibition. One of the most novel of these was a speed indicator, which is claimed to show at any moment the speed at which the boat is running.

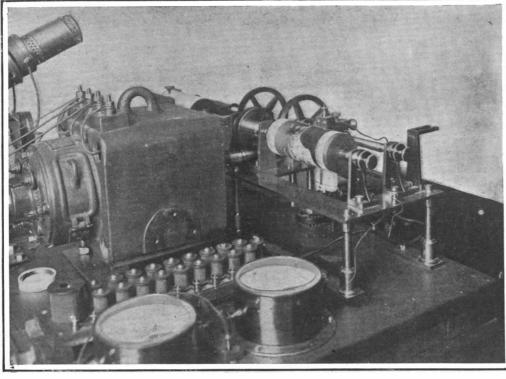
THE BELIN PROCESS OF TELEPHOTOGRAPHY.

BY JACQUES BOYER.

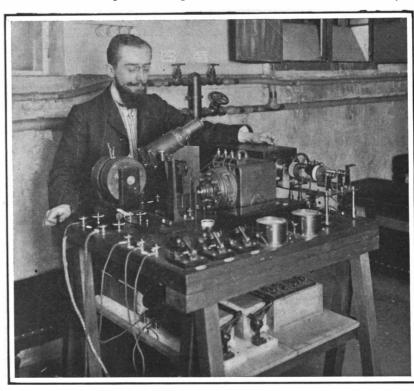
With the apparatus of Prof. Korn, of Munich, described in these columns, only photographs of faces can be transmitted to a distance, since pictures of busts and landscapes give poor results, owing to in-

arm of a lever. When the cylinder is turned, the fine sapphire point of the stylus passes over the entire surface of the picture, following spiral lines one-sixth of a millimeter apart. The differences of relief of the picture are translated into movements at the other end of the lever, and by means of a little slider on a

ing intensities. In the receiving apparatus of Bélin we find the same source of light produced by a Nernst lamp, but the galvanometer is supplanted by an apparatus known as the Blondell oscillograph, from the name of the inventor. This oscillograph is made up of two large coils between which oscillates a very



The Transmitting Apparatus in Detail. The Picture is Wrapped Around the Cylinder Seen in the Engraving.



The Inventor and His Apparatus in the Laboratory of the Société Française de Photographie.

sufficient distinctness. This problem, however, has been solved in a much more perfect manner by a Frenchman, M. Edouard Bélin, as has been shown by the experiments performed by him in the laboratory of the Societe Française de Photographie. The transmitting apparatus of this ingenious inventor is

wholly mechanical in all its details. A carbon print of the photograph to be telegraphed is placed on a revolving cylinder, while a stylus traveling over this print imparts to the line conductor by means of a lever current differences corresponding with the differences of relief through a rheostat.

In transmitting, the picture is rolled on a horizontal cylinder of metal. The picture consists of a carbon print made on rather thick paper, and

presenting a relief proportional to the intensity of the colors of the picture. This difference of level, almost unnoticeable to the touch, is, however, sufficient for a point in gliding over the cylinder to respond to the differences and to transmit them in movements of a corresponding amplitude to the extremity of the ity proportional to the amplitude of these movements and therefore the corresponding colors are sent.

In receiving, the apparatus follows the same general principles as that of Prof. Korn. As already described in these columns, Korn has made a receiver in which

rheostat connected with the line, currents of an intens-

A: Carbon print. B: Lever. C: Transmitting cylinder. D: Stylus. R: Rheostat. P: Battery. L and L1: Line 8: Source of light. L and L1: Line. G: Scale of colorr. M: Mirror. T: Opening of 1 mm. in diameter. •scillograph. H: Storage battery C1: Receiving cylinder. or generator. A : Sensitive paper.

Diagram Showing Electrical Connection of the Parts Comprising Bélin's Apparatus.

a beam of light is projected on the sensitized surface upon which the impression is to be made through a galvanometer in which a little sheet of aluminium forming a shutter is displaced more or less according to the intensity of the currents transmitted by the line, communicating to the luminous ray correspondnium sheet of Korn, are strictly proportional to the intensity of the received current. The ray coming from the Nernst lamp reflected by this oscillating mir-

small mirror scarcely two or three millimeters in

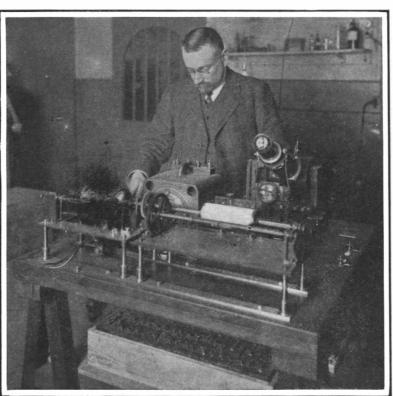
diameter, and of an extreme sensibility of movement. The movements of the mirror, like those of the alumi-

> ror is projected on a lens. where it produces a luminous line which is displaced more or less from right to left, according to the oscillations of the mirror. Opposite this lens, a sheet of glass is placed, called the "color scale," $tinted \quad gradually \quad f \; r \; o \; m$ right to left, from black to absolute transparence. According to the zonewhere it is projected, the luminous ray is colored more or less, while the lens on whatever point of which it falls focuses it back to the fixed point

where it impresses itself upon the photographic paper. This paper is rolled upon a cylinder contained in a dark chamber and is displaced before the point of light with a rotary motion, identical, with the exception of the correction for synchronism, to that of the sending station. To avoid spreading of the luminous



Outdoor Picture Especially Made for the Scientific American.



Receiving Apparatus With Inclosing Box Removed to Show the Mechanism.



Portrait of the Inventor M. Bélin Transmitted With His Apparatus.

THE BELIN SYSTEM OF TELEPHOTOGRAPHY,

ray so as to produce a halation around each point, which would cause a lack of distinctness in the picture, the cylinder almost touches the wall of the dark chamber in which is pierced the extremely small hole through which the luminous ray, reduced to a surface of onesixth of a millimeter, enters. The inventor can, at will, obtain a print sent as a negative or as a positive, whether it comes from a transmitting positive or a transmitting negative. It is merely necessary to transpose the color scale so that the ray of light may be tinted in a manner directly or inversely proportional to the intensity of the current and that of the colors sent. It is equally possible to receive a print of a desired tone, whether it comes from a picture either normal, too feeble, or too intense, by employing color scales of a proper transparence. Finally, enlargements can be made by replacing the receiving cylinder with another of larger diameter. In the demonstrating apparatus here shown, a transmitting and a receiving station are mounted on the same table and worked by the same electric motor. Hence, they need not be adjusted for synchronism, as the inventor intends to do later.

AN ARTIFICIAL HORIZON FOR SEXTANTS.

The imaginary line which unites the two sta-

tions is represented by a series of coils, consist-

ing of a resistance equivalent to a line of about

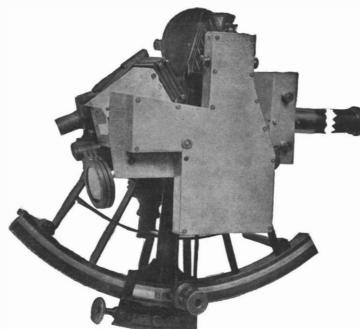
750 miles in length.

An artificial horizon for sea use has been wanted for the last hundred years; in fact, ever since the sextant came into general use. It is a matter of common occurrence for mist or fog to obscure or shroud the horizon and thus render an observation impossible though the sun or the stars be in plain view. Many efforts have been made to provide a substitute for the natural horizon. A few of these are based on the principle of the gyroscope, or the pendulum; but the vast majority use a liquid to fix the horizontal. Such devices have failed for shipboard use, because they are seriously disturbed by the slightest movement of the vessel. The fact is often overlooked that as the sextant is a double-reflecting instrument each degree of the circle is represented by two degrees of arc and, therefore, every motion of the head of the sextant doubles the motion

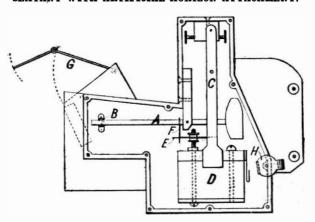
of the reflected image both in speed and extent. Hence, the requirement that contacts of heavenly bodies be made on the exact center of a bubble or other indicator of the horizontal is a feat that only the exceptionally steady few may accomplish; but even they cannot maintain such contacts long enough to be perfectly sure of their measurements. In the accompanying engraving we illustrate an attachment for sextants which is adapted to overcome the usual difficulties. An artificial horizon is provided which consists of two bars that exactly span the peri-

phery of the sun's image in the horizon glass, and are maintained in horizontal position by means of a pendulum forming part of the attachment. This is shown in detail in the line cut. At A is a pivoted balance beam which carries the horizon bars B, the latter extending through a slot in the casing. The pendulum comprises a pair of plates, C, pivoted to a block at their upper ends, while their lower ends carry a heavy weight, D. A plate, E, is secured to the weight, B, and is formed with an opening through which extends a rod, F, projecting from the beam, A. The pendulum maintains its vertical position when the

sextant is held in the hand, and by means of the rod, F, the horizon bars are kept at a proper horizontal level. The faults justly attributed to a pendulum when hung to the bulkhead or other fixture of a ship, do not prevail when it is suspended on an instrument in the grasp of a human pendulum who intuitively beats time to the movements of the vessel beneath him and maintains an upright position. The attachment adds about ten ounces to the weight of the sextant; but this is by no means an objection, as it tends to steady the hand of the observer. However, the principal feature of this attachment is the doublebarred horizon or "spanner" horizon, as it has been called. If contacts are not properly made, that is, if the contact be too "hard" on either leg of the spanner,



SEXTANT WITH ARTIFICIAL HORIZON ATTACHMENT.



DETAILS OF THE PENDULUM ATTACHMENT.

the error will be seen by the absence of contact on the other leg, and also by the orb being unequally divided by a wire which is stretched centrally between the bars. In fogs when the sun's limbs are not defined, a fair approximation may be obtained by centering the dim circumference. When quick-flying scud or slowmoving clouds obscure first one limb of the sun and then the other, its rise or fall is readily perceived on the respective legs of the spanner. At night the central wire may be used for observations. The spanner is protected against the wind by a casing of aluminium and a shutter G serves to protect the horizon glass from rain or spray. The attachment is the invention of Capt. Henry A. Gadsen, of 6 Binden Road, Ravescourt Park W., London, England.

MEXICAN FIESTAS. BY KATHERINE LOUISE SMITH.

Mexico is a great country for festivals and saints' days, and on such occasions the streets are filled with crowds of good natured people-many of whom are the peons or working class-who jostle each other (though they never fail to apologize for doing so),

and throng the little markets buying souvenirs for friends. In particular, Christmas time is a gala occasion and all Mexico turns out to buy curious things unheard of in other countries. These people make a specialty of odd and curious toys and one can take a choice of bears that dance when a string is pulled, woolly monkeys, Chinese-like lanterns, confetti, and candied fruits. These are piled in a jumble on little tables to tempt the customer. Queerest of all the toys are the naguales, dolls with a woolly body and a grotesque human face. They are hideous productions which are supposed by the children to have magical powers over evil and to ward off Satan, a belief shared by many of the Mexican Indians of older growth who live in shut-in portions of the country.

The strangest sight in the Mexican market at Christmas time is the piñata. This is a queer figure two to five feet high, built on a bamboo Sometimes these incongruous images framė. represent clowns, fashionable women, or unheardof animals, but they are always fat-bellied, with a form cut out of cardboard and the center or torso made of an olla or bowl. These odd figures are suspended by strings from the head and are dressed in gay silks or tissue paper. It is a common thing to see an Indian or a highclass citizen walking through the streets with

one of them suspended from his shoulders. When the piñata reaches home it is suspended in the patio and on Christmas night it is given a blow in the stomach by the youngest child in the family. Rattles, dolls, toys, and many things to delight the little ones fall out and the secret of its corpulency is revealed. No family is too poor to have one and it takes the place of our Christmas stockings.

Mexicans are exclusive and it is a mark of honor for a stranger to be invited to a posada or family party. These are held by the richest and poorest and last from the 16th to the 24th of December. The word posada means an abiding place or inn and the custom originated from the fact that Joseph and Mary journeyed nine days before the birth of Christ. Every night they were obliged to seek shelter. On the evening chosen for the religious celebration—which is usually the 9th-after merry-making on the preceding eight evenings, the friends and servants arrive and the family priest reads mass in a room in which is an altar. Over the altar hangs a picture of the Virgin. Below is a model of a stable and images of the Holy Family. These statues are onyx or clay, according to the means of the family.

After mass has been said every man, woman, and child who attends the posada walks with candle in







Venders of Christmas Piñatas.



Dressed for the Carnival.

in the room answer:

Scientific American

hand in solemn procession from cellar to attic. The figures of Mary and Joseph are borne reverently in front, and the worshipers intone the litany as they proceed, pausing at doors to beg admittance just as Joseph and Mary did over nineteen hundred years ago. When the litany is finished a few enter a room and the others sing to an ancient chant:

"In Heaven's name I beg for shelter,

My wife to-night can go no further."

This is supposed to be Joseph's plea, and those with-

"No inn is this, begone from hence,

Ye may be thieves, I trust ye not.

After knocking at many doors and chanting this indefinitely the party at midnight reaches a room chosen for the conclusion of the ceremony. Often this is the roof, for Mexicans learned to use that part of the house long before we had roof gardens. Here is a sort of stable and in it the images of Joseph and Mary are reverently deposited. Care is taken that this part of the posada takes place just as the bells of the churches begin to ring in Christmas morning. All the ramifications of a family are bidden to this semi-religious festival, and each year one house of a family circle is chosen for the celebration. The ceremony is the same, no matter what the station of the people.

Mexico City has another flesta at Carnival time. which, while it cannot compare with those in Rome and New Orleans, is well worth going to see. On Ash Wednesday every good Catholic woman wears somber black, which is at all seasons the favorite church costume. At this time devout people have a cross marked in ashes on their foreheads, and as this is done in the early morning by the priest and is seldom washed off, it lingers for some time as a sort of humiliation. The Saturday before Easter all this penance vanishes and students and young people parade the paseo or avenue dressed in old Spanish costumes and as clowns. A most curious custom takes place on this same day, for Judas is burned in public. It is said this strange performance is peculiar to Mexico, and at any rate it seems unique to strangers.

All over the streets of the large cities and villages are hideous paper dolls from two to five feet in height. stuffed with straw and containing coins, fireworks, and bread in their stomachs. These images are strung across the street, in courtyards, in parks and any convenient place and present a remarkable sight. They are homely and crude and are supposed to represent Judas ready for punishment. When all is ready the bells of the cathedral, which can be heard for miles around, peal forth, the other churches take up the chimes, and by 10 o'clock Saturday morning the whole town is ready to turn out to burn the numerous effigies and in this way punish Judas for his treachery in betraving Christ. As soon as the figure begins to ignite, the poor who have taken their station underneath rush forward for the coins and bread, and a great scramble ensues. Sometimes Judas represents an unpopular man and it seems a great relief to burn his effigy. Free fights ensue for the contents of Judas's stomach and the carnival ends in a small riot.

The Jockey Club of Mexico City is the richest and most exclusive club in the republic. It is housed in a dwelling made of tiles, designed by Count Orizaba, who brought the glistening bricks from Spain, and the fashionables of the city belong to it. For many years they had the most elaborate Judas in town. On one occasion it was mounted on a horse whose accouterments, saddle, stirrups, etc., were made of embossed leather. Judas was dressed in an expensive and gaudy suit, with tight fitting trousers decorated with silver coins up the side, and gold-embroidered felt sombrero that cost in the neighborhood of fifty dollars. Of course the populace went nearly wild over such an exhibition, and when the match was lighted and it was discovered that Judas's interior anatomy consisted of fireworks that exploded with a terrific noise and made the sky lurid for miles around, the peons started such a free fight that the police were obliged to ask the Jockey Club to discontinue such exhibitions.

Another fiesta day is All Saints', when the cemeteries are filled with people who camp out, put flowers on the graves of their dead, and eat picnic lunches on "the dead tables" spread for the occasion. In some places ices are molded in the shape of skulls, and though the people do not intend to appear festive the occasion seems somewhat like a party to the bewildered outsider.

Dates Thrive on Colorado Desert.

Recent experiments made at the government farm at Mecca, Arizona, with the date palm have proved that dates can be cultivated on the Colorado desert with equal the facility reached in the Sahara desert, from which the palms for the 15-acre Mecca farm were brought.

Although this farm has been in cultivation for only three years, already the palms are bearing well; and this season contain from one to three branches of dates, each bearing upward of twenty pounds.

A year ago it was believed the Salton Sea was to

overflow and submerge the Mecca farm, and the government officials purchased ten acres of land near Indio, to which the Mecca palms were to be removed. The water was stopped, however, and now the two farms will be utilized, suckers from the Mecca farm plants being transplanted at Indio.

Of the ten or more varieties there, some are very rare, and as soon as they come into their full bearing it is proposed to establish a packing house, and experiments with packing and shipping the fruit will be conducted on an extensive scale.

THE DETROIT RIVER TUNNEL.

BY JAMES COOKE MILLS.

In a very little while, measured by the swift flight of time in this era of rapid solution of transportation problems, the huge railway car ferries on the Detroit River will have passed from the traffic life of the busy stream. For many years these powerful steamers have transported the enormous freight tonnage and millions of travelers across the border between the two countries. The five trunk lines—the Michigan Central, the Grand Trunk System, the Wabash, the Père Marquette, and the Canadian Pacific—operate no less than ten of these car floats.

When the Detroit River tunnel, one of the most important railway enterprises of the present time, is completed, the through "limited" and express trains and the long heavy freights of all the trunk lines will pass below the bed of the river, and rise to the surface of another country in six to seven minutes. By the present system, about thirty minutes is lost in ferrying and switching each express train, and from four to seven hours in handling through freights; while perishables, which are given the preference over all other classes in quick ferriage, do not get under way again within three hours. In winter, when the ice floes, brought down from Lake St. Clair by the swift current, often jam the river from bank to bank, the big steamers frequently become fast in the stream; and the delay from this cause to fast passenger service between the East and the West sometimes amounts to from three to twelve hours.

The saving in time and expense of operation in moving the heavy traffic across the river through a doubletracked tunnel, over the slow and uncertain ferry system is deemed by the Michigan Central officials, in view of the ever-increasing tonnage of the road, of sufficient moment for the expenditure of \$10,000,000 in the construction of the international tunnelway. About three years ago the project was taken up by Mr. Henry B. Ledyard, then president of the Central, and through his untiring efforts the board of directors authorized the construction of the tunnel, and also the organization of the advisory board of engineers to carry out the great undertaking. The advisory board was appointed in June, 1905, and was composed of W. J. Wilgus, then chief engineer of the New York Central and in charge of the electrification of the New York city terminals; H. A. Carson, consulting engineer, who designed and built practically all of the Boston subways; and W. S. Kinnear, chief engineer of the tunnel in charge of construction.

Instead of digging parallel bores through the tough blue clay far below the bed of the river, by means of shields driven by hydraulic rams, a great trench has been dredged out of the bottom of the river, in which are being sunk successive tubes of steel, 23 feet in diameter and 260 feet long, secured together by transverse stiffening diaphragms of steel at every eleven feet of their length. These tubes form the waterproofing of the tunnel proper, which consists of a solid ring of concrete, two feet in thickness, formed within the tubes. The width of the river between dock lines is about half a mile, and the subaqueous section of the tunnel, or part entirely under the river, will consist of ten of these twin tubes with a total length of 2,622 feet. Along the bottom of the trench, rows of piles have been driven and capped, to form a bearing for the tubes.

The tubes are built at the shipyard of the Great Lakes Engineering Company at St. Clair, forty-eight miles away. The ends of the tubes are "plugged" with stout wood bulkheads, to render ther watertight. Then they are launched into the river sideways, very much as lake ships are launched. Floating lightly on the water, and drawing no more than six feet, the tubes are towed by a tug down the river to the place where they are to be sunk. On top of the tubes and near each end are two air cylinders, ten feet in diameter and sixty feet long, strapped securely to the tube diaphragms, and these serve to regulate the settling of the tubes, as they slowly fill with water, which is admitted at the will of the engineers through gate valves in the bulkheads. There is also provided at each end a detachable upright, firmly braced to the section and of sufficient length to indicate the position of the tubes when they have been entirely submerged. These uprights also show the engineers the exact position of the tubes when they are resting on the piling. eighty feet below the surface of the river, and act in adjusting them in their position laterally, so as to

bring the sections into alignment. The uprights extend about ten feet above the water when the section is in place. After all is prepared and proper precautions have been taken to check the least deviating movement, the gate valves are opened, and the tubes slowly settle into position.

Each tube as constructed in the shipyard is provided at one end with a sleeve, which is slipped over the end of the adjoining tube already sunk and in position. The sleeve is fitted with a flange, which is bolted to a corresponding flange of the other tube, a rubber gasket being placed between the two. A similar gasket is slipped in at the inner end of the sleeve, bearing up against the edge of the other tube. When the bolts are in place and all is ready, divers turn up the nuts, thus squeezing the rubber gaskets together between the ends of the tubes to form a tight joint. An annular space of three inches by eighteen inches is thus formed all around the tube at the joint, which is then filled with a grout of pure cement. To this end each sleeve is provided on the top with two small pipes, flexible at the joints and leading up to the cement scow floating above. The water in the space is then pumped out, and if the least leak occurs in the main joint, there is more work for the divers in bolting up. When the joint is absolutely watertight, pure cement is pumped into the space through one pipe and continued until it comes out through the other, which is evidence that the space is completely

The water in the tubes is now pumped out and the inner bulkheads removed, leaving the space clear and dry to the outer bulkheads. Concrete gangs now come on the scene, and, pushing their big half circular wood forms along into the new tubes, proceed to build up the tunnel itself, which is of solid concrete varying in thickness from two to five feet. The concrete tube is calculated to be of sufficient strength to withstand all strains and vibrations of the heaviest trains, the steel tubes serving as waterproofing protection, while the outer covering of concrete in turn is the steel tube preservative. On each side of the lower section of the tubes there are benches of concrete four feet high and two and a half feet wide at the top, to serve as passageways and places of refuge for the trackmen. When the concreting is completed there is a clear head room of eighteen feet from the tops of the rails to the center of the arch.

Out in the stream are the cement scows, fitted out with the latest concrete mixers and with huge cranes and other devices for the rapid handling of the material from the lighters alongside. The scows are anchored as immobile as is possible in the swift current of the river, which is constantly churned into choppy waves by hundreds of passing freighters and excursion and ferryboats plying the busy stream. By means of hoppers placed at the top of long vertical delivery pipes, the concrete, as it is prepared, is deposited in the trench exactly where it is needed. and comes in contact with the water only when it is spread over the surface of the gravel bed which was prepared for it. As the work goes on, the concrete is held in proper form about the tubes by three-inch oak planking, firmly braced and backed up with clay and river slime from the dredges, working in the trench farther out in the river. Concrete is also chuted down between the tubes and continued up over them for five feet, thus encompassing them in a solid monolithic mass. The trench is then filled around the tunnel, and the top is covered with riprap.

The construction of the approach tunnels is proceeding on lines well established by the best engineering practice: and this part of the undertaking is a huge task of itself. Two shafts were first sunk at the river banks, one on each side, and from these excavating for the center wall was carried on inland as far as other shafts, and from them to the portals. Concrete gangs followed, building up the center wall, and when this was completed, the bores were pushed forward by a modification of the shield methods of the New York tunnel work, the change being necessary because of the tough clay of the under stratum. The shafts near the river will be permanent, and they are lined with double walls of concrete. They will serve to ventilate the tunnel, and as trains move in each tube only in one direction, a constant circulation of air will be maintained.

Electricity will be the motive power used in hauling trains through the tunnel, and current from the power plant of a local concern has been arranged for. Only a small transforming station will be needed to convert the alternating current, commercially supplied, to direct current for the locomotive motors. For the operation of the tunnel eight powerful electric locomotives are being constructed. It will be brilliantly lighted with electric lamps, and the walls will be clean and bright, for there will be none of the gas and soot that fill tunnels operated by steam locomotives A system of block signals will be installed, and so arranged that no train or locomotive will enter either tube until the train ahead of it has passed beyond the summit on the other side.

Correspondence.

Panama Canal Locks in War.

To the Editor of the Scientific American:

One of the strongest arguments made for the United States undertaking the construction of the Panama Canal is that it will be invaluable to us in case of war with a foreign nation, in that it will enable our warships to pass quickly from one ocean to the other. But for this very reason, the first attempt on the part of any nation going to war with us will probably be to close the canal and thus divide our naval forces. Japan could easily whip us could she attack our Atlantic and Pacific fleets one at a time and prevent them from uniting; and so could Germany or France or Great Britain. And how easy it would be to do this if all that one of these powers had to do, in order to put the canal out of commission for months, were to hire the captain of some old tramp steamer to smash through one of the gates at the locks, drop a few sticks of dynamite overboard, or scuttle the ship at some narrow point. No amount of neutralizing of the canal and international treaties could prevent a little "accident" like this; and it could be far more easily planned and executed than was the little "accident" to the "Maine" in Havana harbor; and the results would probably be far more disastrous to us. In this case, as in the other, it would probably be our first intimation that war was seriously contemplated by the enemy.

Such a state of affairs should not only be made unlikely, but it should be made absolutely impossible. There should be a sufficient number of gates and locks, and they should be so arranged with reference to each other, that the crippling of one could by no means destroy the others or cripple the canal as a whole. Wrecking apparatus should be provided, too, so that the sinking of a ship could not block the canal for more than a day or two at the most. These precautions, small though they may seem, may mean the difference, some day, between a glorious victory, on the one hand, and, on the other, defeat, the destruction of our navy, the loss of our insular possessions and a heavy tribute. CHARLES S. ADAMS.

Warren, Ohio.

Aeronautical Notes.

The latest record for duration of flight by an airship is that made by the German military airship of Major Gross, the "Bazenach," which on October 28 last was in the air 8 hours and 10 minutes, during which time it made the trip from Berlin to Brandenburg and return, a distance of 120 kilometers (75 miles). This flight, while of the longest duration, is not the longest as far as distance is concerned, as previously, on September 30, the Zeppelin airship made a flight estimated at 340 kilometers (2111/4 miles) in length, during the 7 hours which it was in the air. The best previous record for duration of flight is that of the French dirigible the "Lebaudy," which, on July 6, 1905, was in the air for 3 hours and 21 minutes, during which time it covered a distance of 93 kilometers (57% miles). On November 23, a week before it was lost, the French dirigible "La Patrie" made a flight of 1461/2 miles from Paris to Verdun in 7 hours and 5 minutes at an average speed of about 21 miles an hour. The weather conditions were not good, and wind, rain, and fog were encountered. The officers in charge of the airship expected to descend at Chalons to obtain fresh supplies of gas and fuel; but this was found unnecessary, and the trip was made without a stop. Only 55 pounds of ballast was used, while the fuel consumption was but 37 gallons of gasoline, or less than half the quantity carried.

Count Zeppelin has started the construction of a new airship which he is building for the German government. The dimensions of this new airship are given as follows: Length, 130 meters (4261/2 feet); diameter, 12 meters (39 1/3 feet); horse-power, 240, consisting of two Daimler motors of 120 horse-power each, which will be used instead of the two 85-horse-power motors with which the present airship is equipped. The new airship is being constructed in a shed mounted on floats at Manzell on Lake Constance. It is the fourth airship that Count Zeppelin has built.

An interesting line of aeronautical experiments were conducted recently by Mr. G. Coleman Brown. of Dallas, Texas, at the "balloon farm" of Carl E. Myers, Frankfort, N. Y., which is an aeronautical experiment station. Here was successfully tested a new aeroplane principle for attaining mechanical flight. This is a heavier-than-air machine based on the aeroplane system. Hydrogen gas is used in connection, but for an entirely new purpose, for which gas was never before employed. The tests were successful in establishing the principle sought, and practical application will later be made.

The British War Department has under construction a second dirigible balloon, which will have a total capacity of 64,000 cubic feet and a diameter of 42 feet. The lifting capacity, which is 1,400 pounds more than that of the "Nulli Secundus," will give it a lifting

Scientific American

power of 4,800 pounds. In calm weather it is expected that a speed of 40 miles an hour will be obtained, as the airship will be fitted with a 100-horse-power engine. It is expected to carry six passengers, instead of three, in this new air craft.

Aeronautics in Europe. BY THE PARIS CORRESPONDENT OF THE SCIENTIFIC AMERICAN.

Somewhat of a sensation was caused at the recent banquet of the Aero Club of the United Kingdom at the Savoy Hotel, London, by the announcement that Senator Henri Deutsch, vice-president of the French Aero Club, had the intention of trying to sail from France to England. M. Deutsch, who was present on this occasion, made a speech in which he dwelt upon the advantages of aerial navigation, not indeed for war, as some wished, but, on the contrary, for advancing civilization. After this President Richard Wallace of the British Aero Club announced officially that he had obtained from Senator Deutsch the promise to make a flight from France to England on board his airship "Ville de Paris." Mr. Wallace stated subsequently that the trial would take place as soon as a good shed could be secured for the airship, and that he would see whether the military balloon shed of Aldershot could be used for the purpose. He added that the arrival of a French airship in England would be an event of great international importance. Senator Deutsch stated to our Paris correspondent that he would attempt the voyage as soon as the question of garage for the airship was solved. He would choose the most favorable weather for making the start. After crossing the channel, he hoped to arrive at Aldershot, after sailing over London.

The promoters of the aeronautic exposition of Turin wish to give special importance to the show, and to this end they propose to establish two international Grands Prix for aerial navigation. The first prize of \$50,000 will be awarded for airships, and the second prize of \$20,000 for heavier-than-air apparatus. It appears that the organizers stipulate that the winning apparatus is to be turned over to the Italian government after being placed on exhibition at the show. After hearing of the project King Victor Emmanuel wished to show the great interest which he is taking in the question, both as to the progress of science and the application to military affairs, and accordingly he decided to award a royal cup, which will be competed for during the next international airship contests. On the other hand, it is stated that Lord Northcliff has just established a prize in the name of the London Daily Mail of \$500 for an aeroplane which will cover a flight of half a mile, or a quarter of a mile each way, remarking that M. Farman could now easily win this prize. The interest is increasing in Great Britain, and we hear that Mr. Patrick Alexander recently made a wager with Mr. Griffith Brewer of \$2,500 that he will accomplish a flight during the year following November 5 of one mile in a closed circuit.

In Russia the subject of aeroplanes has been occupyir g different inventors, and one of the first of these to make its appearance in the field is the new military aeroplane which has been designed according to the system of Capt. Schabsky. It is expected that a speed of 12 meters (40 feet) per second will be reached with this apparatus.

Aeroplanes are very active at Paris. Santos Dumont is continuing his experiments at the Bagatelle grounds and is making short flights with his new machine. He has already succeeded in winning the 150-meter Aero Club prize, and he soon expects to make a longer flight. It took him some time to get his machine in good condition, owing to its novelty, but he is now contented with the results. He modified it since our last account by replacing the single high-speed propeller with two propellers of larger diameter, which are mounted side by side upon the flyer and run at a reduced speed.

Henri Farman has been profiting by the enforced interval of rest due to the rainy weather by overhauling his aeroplane and putting it in good shape after its recent hard flights. Since then he has been making several good flights on the Issy grounds, and he soon expects to make another official trial for the Deutsch-Archdeacon prize. He is to modify his arrangement of the carbureter again before doing so; it is now placed higher up, and this he found to be much better for giving a good gasoline feed. The Antoinette motor has been now fitted with a magneto and it will operate a new propeller. M. Farman also found that he could lighten the apparatus at least 40 pounds, which is an advantage, and he will now be in better shape than

As to M. Bleriot's new aeroplane, he is now trying it at the Issy grounds. Not long since he made the first test by rolling on the ground with his 50-horsepower Antoinette motor, and found that the framework was in good shape. This he reinforced, as before he saw that it was not strong enough. After this he made a long flight at a very high speed, and this he estimated to be not less than 50 miles an hour. His motor and propellers allow him to travel at a comfortable speed. Coming down to the ground, he somewhat damaged his carrying wheel, but this was not very serious and can easily be set right. With such a speed he will have what is needed for going around curves. However, he requires more practice with it in order to be able to operate it successfully. On the same grounds, M. Bischoff is carrying out his tests of his aeroplane. He uses an improved wood propeller made by the constructor Chauvière. During the recent attempts, he traveled over the ground, but unfortunately ran into a tree at the side of the grounds and somewhat injured his machine, which ran head down, and the rear became entangled in the branches of the tree. He will soon have the machine repaired, how-The Zens brothers are building a new aeroplane at Paris, and these inventors, who are well known in aeronautic circles, will soon have their apparatus finished for trial. It has two superposed plane surfaces with a rudder placed in front, and is fitted with a 50-horse-power Antoinette motor. M. Vuia, who made an aeroplane some time ago, and seems to be the first who adopted the method of using a rolling carriage so as to rise up from the ground, has been at work for some time upon his aeroplane, and has modified it considerably. Abandoning his carbonic acid motor, he uses an 8-cylinder gasoline motor giving 25 horsepower, and expects to begin the flights with it in the near future. As to M. Esnault-Pelterie, he has discontinued his experiments near Paris in order to build a new aeroplane which will be modified according to the results of his previous work. He may construct several different types of apparatus, fitted with 30 and 60 horse-power motors.

The Current Supplement.

The increased weights of railroad locomotives and cars has created a demand for heavier cranes for breakdown purposes. The English correspondent of the Scientific American describes a British articulated breakdown crane which meets this new demand. "Panama a Half Century Ago" is the title of an article based upon an old diary which was kept by a forty-niner. As one of the most important factors in the construction of a steam vessel is the riveting and especially so in vessels of such dimensions and power as the "Mauretania" and her sister vessel "Lusitania"—it was decided to resort to hydraulic riveting to a much larger extent than usual in their construction. A most excellent article by E. W. de Rusett describes the hydraulic riveting machines which were used, and the character of the four million rivets that hold the plates together. The problem of how to protect structures from dampness is one whose solution was attempted even in the remote ages of antiquity. In an article entitled "Scientific Waterproofing" modern methods are described. The seventh installment of Prof. Watson's "Elements of Electrical Engineering" is published. The subject discussed is "Principles of Direct-Current Motors." For certain branches of suburban railroad traffic the Prussian State Railroad Department has introduced an accumulator-propelled passenger car. This new vehicle is thoroughly described in an illustrated article. The denatured alcohol situation is summarized. A new method of reducing atmospheric nitrogen is described. Cornelia Kennedy writes on "Wheat through Mill to Market." The Paris correspondent of the Scientific AMERICAN presents an interesting account of some automobile novelties which were exhibited at the recent Automobile Shows in Paris.

To Our Subscribers.

We are at the close of another year—the sixty-second of the Scientific American's life. Since the subscription of many a subscriber expires, it will not be amiss to call attention to the fact that the sending of the paper will be discontinued if the subscription be not renewed. In order to avoid any interruption in the receipt of the paper, subscriptions should be renewed before the publication of the first issue of the new year. To those who are not familiar with the Supple-MENT, a word may not be out of place. The Supple-MENT contains articles too long for insertion in the Scientific American, as well as translations from foreign periodicals, the information contained in which would otherwise be inaccessible. By taking the Sci-ENTIFIC AMERICAN and SUPPLEMENT the subscriber receives the benefit of a reduction in the subscription

In a review of the metal trade, the Torg. Prom. Gazeta observes that the importation of aluminium into Russia fell to 7,000 poods in the first half of this year, against 24.000 poods in the corresponding period of 1906. The tendency on the part of platinum, according to advices from the Urals, says the same authority, is distinctly downward. The exportation of this metal, according to customs returns, has fallen from the level of 156 poods in 1906—the first six months—to 90 poods in the first six months of this year (1 pood=36.07 lbs.).

RECENT ARCHÆOLOGICAL DISCOVERIES IN EGYPT.

BY THE ENGLISH CORRESPONDENT OF THE SCIENTIFIC AMERICAN. The past season of the British School of Archæology in Egypt, the work of which has been carried out under the direction of Prof. Flinders Petrie, has been of unusual value. It resulted not only in bringing to light more evidences of the earliest eras of Egyptian civilization, but it also demonstrated the prevalence of this civilization over a wide tract of country. Hitherto the early kings have only been traced at Abydos in Upper Egypt, but now their works have been found near Cairo. These latest excavations and researches establish conclusively the uniformity of this civilization of Egypt over the country early in the first dynasty-5400 B. C. During a period of several thousand years a common government, ideas, habits, and standard of art prevailed. The details of working in stone, of the forms of pottery, and of the

The country excavated during the past year lies rather more than a mile south of the pyramids of Gizeh, opposite Cairo. Here a series of fifty-two graves

chipping of flints are identical in the same reign at

points 300 miles apart.

for the American College there, other discoveries were made. At this point a large cemetery was excavated which had been buried by gravel washed down from the hills. But the very material which had obliterated the burial ground had served to preserve its most interesting possession from an archæological point of view. This was a unique series of "soul houses"; little models of residences which were placed upon the grave for the accommodation of the liberated soul. These are the actual dwellings in which the soul was believed to reside, and they are modeled for all classes, from the wealthiest to the poorest. Not only do they afford us an interesting insight into Egyptian religous beliefs and practices, but also in their various forms show the types of dwellings favored in the days

The simplest type of "soul house" is a crude affair, comprising in fact a single room with one or two openings with a slight shelter propped up on poles like a Bedawy tent. Curiously enough the typical residence of the lower classes of society has scarcely altered during the passage of the centuries, for it bears a very striking resemblance to the peasant's

to the ground floor, where there was plenty of weight on the spring, but a high-arched parabolic skew roof to the upper floor, and a small arch over the front gallery. In some cases hood moldings were placed over some windows, showing that the residences from which the miniatures were copied were situated in a wet climate.

The ventilation of some of these soul houses was of an elaborate character. Commissariat for the dead person was not neglected. In some of the houses the roofs carried corn bins. There were also for the soul's sustenance ribs, bulls' heads, haunches, and so forth, together with adequate supplies of water. Apparently each house was designed for one soul.

Another discovery was a very fine group of coffins, etc., in an untouched tomb dating back to approximately 3300 B. C. The outer shells are elaborately painted and at first sight, owing to the skill with which the work is carried out, resemble inlay or mosaic work. The coffins themselves were of huge dimensions, of rectangular form, and upon being opened revealed fine examples of mummy cases, covered with intricate and delicate colored patterns of the

deck and finely painted with eyes of Horus, lotus flowers, and rosettes. One feature of these models is the striking definition with which the members of the crew are reproduced in the carving.

Some excellent specimens of the weapons of the period wrought in copper were also found. The finest example is a dagger fitted with a handsome ebony and silver handle; it has since been placed on view in the Fine Art Museum at Boston, Mass. A seated figure executed in granite, and which is very rare in this period, is now preserved in the Metropolitan Museum, New York, and other objects, all excellent specimens of their character, have been acquired by various other

Coming down to a more recent period—about 1500 B. C.—a large quantity of quaint figures or statuettes worked in rough pottery and limestone were found, together with some furniture, the most interesting specimens of which are a folding stool, and the lid of a basket in a splendid state of preservation and of fine workmanship.

Valuable discoveries were also made in a Coptic monastery of the seventh century. Here a set of

Boston, a great number of valuable objects of ancient Egyptian civilization, handicraft, and commerce are assured every year for the enrichment of the various American museums.

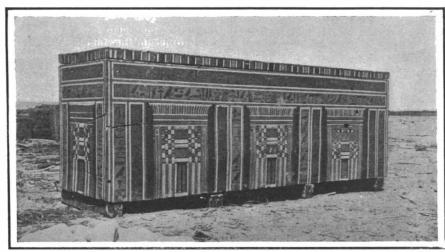
The Sense of Vision in Vertebrates and Cephalopods.

In order to form an idea of the sense of vision in vertebrates and cephalopods, the refraction and accommodation should be considered. The human eye, like a photographic camera, is always adjusted only for a given distance, and the normal human eye in a state of rest for an infinite distance. Those objects which are situated close to the eye cannot be reproduced by a well-defined image in the retina unless the eye be adjusted for or accommodated to a smaller distance. This is performed by the function of a system of angular muscles situated in the eve socket, and which is able to alter the convexity and accordingly the refraction of the eye.

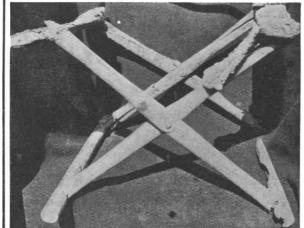
Some interesting facts about the question of sight accommodation for varying distances in the case of higher and lower animals were given by Prof. Heine at the last Congress of German Naturalists and Physieyes of these animals being adjusted from a central position to greater or smaller distance by a forward or backward displacement of a rigid lens under the action of an internal muscular system. While these mollusks are otherwise far below even the lowest vertebrates, their mechanism of adjustment seems to be comparable to that of some highly developed birds, and by no means to the far more elementary accommodation mechanism of man. In fact, comparative physiology shows man to be inferior from the point of view of his senses to many animals, being excelled by dogs as regards his sense of smell, by most animals as to his sense of hearing and even by the lowest mollusks as to his power of vision.

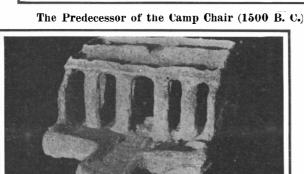
Venus as a Luminous Ring.

Venus has on many occasions been observed when its phase corresponded to that of the new moon, but recently the excessively rare phenomenon of Venus as a luminous ring was noted by Messrs. Russell and Daniel of Princeton Observatory, using a 5-inch finder. The observation was made on the 29th of November, 1907, at 5h. 7m. (G.M.T.), when Venus was 1 deg.

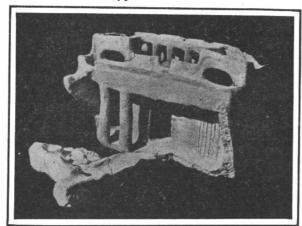


A Decorated Coffin, About 3300 B. C.

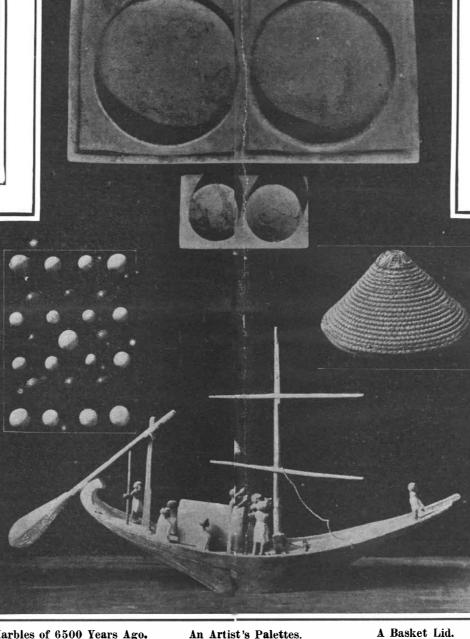




An Egyptian Soul House.

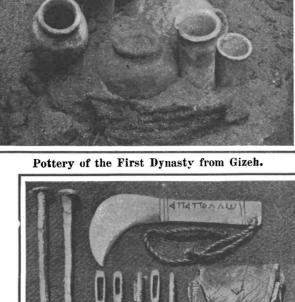


A Soul House with Veranda on Upper Story.



Marbles of 6500 Years Ago.







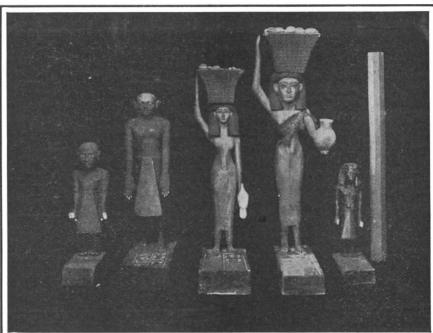
A Leather Worker's Tools, Seventh Century A. D.



A Bible Fragment of the Seventh Century.



Decorated Mummy Case



Statuettes from Coffins at Rifeh.

A Boat Sailing Up the Nile. RECENT ARCHÆOLOGICAL DISCOVERIES IN EGYPT

were found surrounding a royal tomb. They extended in longitudinal rows each senarated from its neighbor by a thin earthen partition or wall. One-half of these vaults contained relics such as pottery placed in a basket, slate palettes containing red and black paint as used by the painters and scribes, glazed pottery ornaments and vases, ivory carvings, and delicate needles of gold provided with minute eyes. The age of these relics is definitely determined by a clay seal which was unearthed and which bears the name of King Zet, the third monarch of the first dynasty. In another great sepulcher seals of the second dynasty were found, while a third great sepulcher, of the third dynasty, yielded about sixty-five small stone marbles fashioned out of milky quartz, brown quartz, and cornelian, and which were used in some early Egyptian game. This discovery goes to show that the use of marbles for a pastime is of extremely ancient origin. These discoveries through the first three dynasties throw light upon early civilization at Gizeh during the 800 years before the erection of the colossal pyra-

Graves of the First Dynasty at Gizeh.

At Rifeh, near Asyut in Upper Egypt, so well known

mids in 4700 B.C.

home of to-day. Some of the houses were more elaborate. Usually a portico or veranda with raised edges ran around the roof, with generally a small chamber behind it, which was gained by means of a stairway. In other cases a hut was placed beneath the portico while a back chamber was also provided, fitted with a doorway. The closed room performed the office of

storeroom and was shut with a mat of maize stalks. The more elaborate soul houses had wind openings similar to those of modern Egyptian residences, and an upper veranda on the roof. In some instances the houses were more imposing, possessing two stories, while others had three divisions on the roofs and several types of closed doors, while in one instance there were serrated walls such as are adopted in the more modern buildings upon the site of this ancient cemetery. In addition to the mere residences, miniature articles of furniture are shown. There is the couch with a headrest, the stool, and a woman making bread under the sloping stairway. The constructive details are of great interest, there being flying brick stairways curved in a quadrant, which show much ability in arching. A side of a house shows a flat-arched roof

most exquisite workmanship. Many relics were found, including statuettes ranging from six to eleven inches in height representing the dead persons and their retinue of servants, the latter bearing on their heads and in their arms baskets and vases of offerings. Possibly the quaintest and most interesting finds were two small models of river boats of the period, of beautiful workmanship, and in excellent preservation. In one instance the craft is being rowed down the Nile, the mast being stowed, and the sail packed up, with five of the crew seated on either side at their oars. In the other case the mast is stepped, the boat being before the wind, and the crew are shown in the act of hauling up the yards, the oars being discarded. In the bow is the look-out, while at the stern is the helmsman, both being closely wrapped up to protect them from the bitterness of the north wind, while the members of the crew have donned a kilt in accordance with the usual procedure when the boat was sailing with the wind. On the deck of each boat is a cabin in front of which sits the captain. Both the boats and their equipment are intact, the steering oars mounted on a rudder post extending upward from the

leather workers' needles and knife was found packed in a small leather case or pouch for convenience of transport, together with many stone inscriptions and a great quantity of leaves of manuscripts, one of which, here shown, contains the ninth chapter of the Book of Hebrews. Upon this same site many other fragments of the Bible, apocryphal books, lives of saints, and business transactions were also brought to

During the coming winter the British School of Archæology in Egypt will commence the clearing and investigation of the ruins of Memphis, from which many valuable and important results bearing more particularly upon the commerce of the early Egyptians are anticipated. The work will be carried out under the direction of Prof. Flinders Petrie, to whom we are indebted for the information and photographs accompanying this article, assisted by six students. Memphis was the great capital and commercial center of the life of Egypt throughout a period of 6,000 years. Thanks to the substantial support which has been accorded to this undertaking from this country, principally through the efforts of Dr. Winslow of

birds, as well as in many amphibia, mechanism of accommodation similar to that of the human eve is found with more or less perfection, being specially developed in apes. The bigger the animal and its eye, the less this power of accommodation seems to be developed. In the case of birds a considerable improvement is obtained by the transversely striped muscular system as compared with the smooth muscular system of mammalia. The focus may thus be altered with remarkable rapidity, which is especially important in the case of birds catching their prey while flying. In many reptiles another mechanism of accommodation is found, the lens being displaced instead of being deformed, being protruded or withdrawn. This allows of a very ample accommodation, and in certain species a combination of both mechanisms is found. The eye of fishes is adjusted most actively to a distance by the (rigid) lens being drawn backward.

cians. It was pointed out that in all mammalia and

It is interesting to note that in the case of inferior animals such as cephalopods (polyps, sepia, etc.) the most complicated eye mechanism should be found, the 49 min, away from the center of the sun. At this time the planet was theoretically invisible. However, during moments of atmospheric tranquillity, the plane detached itself clearly on the black of the sky, and showed itself surrounded by a luminous ring, the interior of which seemed darker than the surrounding space. It is believed, however, that this characteristic is a subjective effect. The ring phase may be observed again in 1914, after which it will be necessary to wait until 1972 before a favorable opportunity of studying it will again be provided.

The British Admiralty have created a new post of Inspector of Diving. At present the inspector will have his headquarters on the "Excellent." and will have sole charge of the instructional duties and of all questions that may arise in regard to diving, under the general directions of the captain of the "Excellent." The intention is that the officer holding this appointment, while still borne for gunnery duties, shall be looked upon as the diving expert in the navy, to whom all questions may be referred through the usual official

Scientific American

A CHROMATIC ILLUSION.

BY GUSTAVE MICHAUD, COSTA RICA STATE COLLEGE.

A quality of the nervous element of the eye, that of inverting all images painted on the retina, was the cause of the inversion illusion described in the May 25 issue of the SCIENTIFIC AMERICAN; the cause of the illusion described here is, on the contrary, a serious though ever-present defect of the normal eye.

With a single stroke of your penknife make a slit nearly one inch long in the middle of a large piece of dark-shaded pasteboard. Over half the length of the slit lay a piece of blue glass, and keep it in place with some gummed paper stuck on the edges of the glass, so as to let light pass freely from the slit through the glass. Over the other half of the slit fix in a similar manner a piece of red glass. This being done, the card, seen on the opposite side, will look as shown on the following figure, B and B being the blue and red halves of the slit.

Take another piece of the same pasteboard, and near a corner make two pinholes one-eighth of an inch apart. The apparatus is now complete and ready for use.

Place yourself near a source of light, lamp or window. Bring the card bearing the two pinholes in contact with one eye, the two holes lying on a horizontal line, and, through them, look at the vertical blue and red slit, BR. on the other card, this being placed at a distance of about one foot from the eye and right in the middle of the field of vision.

The following figure shows the appearance of the card thus observed. Two luminous red slits and only one blue are perceived.

The card bearing the slit may be inverted. The result is the same; the red goes up, the blue goes down, the red slit is duplicated, the blue is not. As everything but the color is symmetrical, right and left, up and down, on both cards, any

observer will promptly reach the conclusion that the cause of the illusion lies, not in the position, size, or shape of the slits or pinholes, but in the difference in color of the slits.

The inference is right. Owing to its defective achromatism, the eye does not bring red and blue rays to one and the same focus, and the little apparatus shows that this aberration is far from being an insignificant factor of the imperfection of normal sight. The following two figures show the path of the luminous pencils emitted by the blue and red slits and admitted by the two pinholes. (Distance from slit to eye has been shortened to spare space, and the refraction phenomena in the several humors has been sim-

plified.) The blue rays emitted by the slit B are brought to a focus, b, on the retina, but the red rays are less bent than the blue; and although the distance of both blue and red slits from the eye is the same, the red pencils emitted by the slit R, and admitted by the two pinholes, strike the retina in rr, before meeting, and give thereby the impression of a double red slit.

If the card bearing the slit is placed at much less than one foot from the eye, two blue slits, much closer together than the red ones, will be perceived. The blue pencils, in that case, also meet behind the retina, although not so far behind it as the red pencils under the same circumstances. The card with the slit must be large, to prevent side light from partially closing the pupil, thus increasing notably the achromatism of the eye. For a similar reason, if the two pinholes are much less than one-eighth of an inch apart, the experiment is much less remarkable; the central instead of the marginal parts of the crystalline lens are made to work, and increased achromatism is the result.

No Fire Peril in Pennsylvania Terminal. Contracts have been closed for the con-

struction of floors, interior partitions, and roof of the Pennsylvania's new Manhattan Passenger Terminal. Protection of the 400,000 passengers who will pass in and out of this station daily has absorbed the attention of the company's engineers a long time, and to avoid the possibility of fire they have selected a material, every block of which is tested by being heated red hot before being used, to be sure that it is unburnable. Porous terra cotta was the only building material which was found able to withstand such a test, and the railroad's engineers have decided to use it in the form of hollow blocks as a covering for the gigantic steel frame of the building, and for the partitions and roof, as well as for lining the outside walls.

If all the blocks used in this work should be built

into a wall ten feet high, it would stretch from the station to Newark, N. J., a distance of twelve miles.

The "Mauretania" Beats the Record.

In spite of a fresh gale and a high following sea during her last passage, the "Mauretania" beat the best eastward time of her sister ship, the "Lusitania," by 21 min., completing the run from Sandy Hook to Daunt's lightship in 4 days, 22 hours, and 29 minutes. The average speed was 23.69 knots, and the best day's runs were 556 knots and 554 knots respectively.

The Lady of Senbtes.

During the excavations made under the direction of the Metropolitan Museum of Art in Egypt, a mummy now known as the "Lady of Senbtes" was discovered.



B | | | | | | |

Fig. 1.—The Slit as It Is.

Fig. 2.—The Slit as It Appears to Be.

It is believed that it is the oldest mummy that has been discovered so far. When the tomb was opened, Dr. Eliot-Smith, professor of anatomy at the Cairo School of Medicine, was called in, and made an interesting report. He found that the lady was of the twelfth dynasty, about 4,000 years ago. She was fifty years old at the time of her death and was slender, with a small, almost infantile face. Her eyes were large and round, and her nose well proportioned, being neither aquiline nor flat. Her teeth were remarkably well preserved. The mummy was that of a person of very high caste, as was shown by the ornaments buried with it. On the breast was a dagger in a gold-capped sheath of wood, and in the hair was a weave of gold

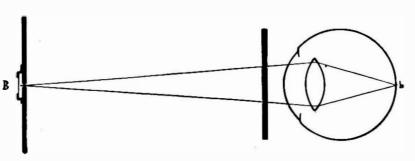


Fig. 3.—Path of the Luminous Blue Pencils.

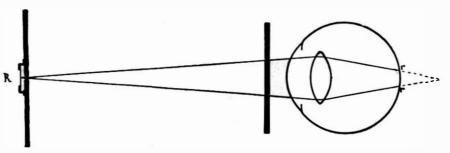


Fig. 4.—Path of the Luminous Red Pencils.

A CHROMATIC ILLUSION.

filigree work profusely decorated with gold rosettes. Perhaps the most interesting find in this connection was the discovery of the ceremonial whip of Senbtes, which was lying beside the mummy in the coffin. This whip, the only perfect one in existence, was swung ceremonially by those high in authority.

Arbitration proceedings between the Ottoman government and the Ottoman Railway Company have been commenced before Señor Maret, the ex-premier of Spain, who has been nominated umpire by the Kaiser, the former arbitrator. The chief matters in dispute, says Reuter, relate to the harbor works at Salonika, the port of Dedeagatch, and questions of customs and maritime transports. The sum involved amounts to about \$16,000,000.

NEW AND INGENIOUS FRENCH TOYS.

Many ingenious devices, some of them of practical utility, were to be seen at the seventh annual toy show at the Tuileries, Paris.

Diabolo, the ancient game that has again become popular, was represented by numerous models, ranging in price from two cents to more than two dollars, according to size or material, the latter including wood, metal, celluloid, cork, rubber, and cloth.

Diabolo has inspired several similar toys; among which is the "climbing shell." The apparatus consists of a deeply grooved flat spool or disk, a cord, and a fork with two bent tines. A metal pin projects from each side of the disk to hold it on the fork, One end of the cord is attached to the disk, the other held in the hand with the fork, and the cord is wound up in the groove. The pins are rested on the fork.

when the latter is tilted to let the disk roll off. As it falls it rapidly unwinds, and as it reaches the end of the cord keeps on spinning, and so rewinds itself up the cord. Just as the disk is at the lowest point a quick upward pull is given to the cord. This pull must be just sufficient to replace the energy lost by the disk, and so enable it to climb as high as the point it fell from. The trick consists in giving the right amount of jerk at the right moment, and to present the fork in such a way that the disk is caught at the top of its flight.

Similar in principle to the foregoing is the Rail Ball. A rubber ball is placed on two parallel curved rails, one extremity of which is held in the hand, and the ball is caused to roll up the rails and lodge securely in the ring which terminates them, by means of a dexterous movement of the wrist. The rails and the ring are made of one piece of iron wire.

The Joust is another game of skill. A

little tub filled with water or flour swings from a cross-beam supported by two posts. One end of a railway is inserted between the heavy bases of the posts and the other end is supported on blocks at any desired height. In a carriage stands a puppet armed with a lance. It is required to adjust the direction and the inclination of the railway so that, when the carriage rolls down the grade, the lance shall enter a hole in a vertical plate attached to the bottom of the tub. Otherwise the lance will strike the plate and overturn the tub, spilling its contents on the lancer. The difficulty is increased by giving an oscillating motion to the lance. Similar jousts, entailing the same risk of being drenched with water or covered with flour, are practised by human lancers at French

country fairs. The Weathercock Race is a modification of the popular French game of "Petits cheveux." The innovation consists in causing the circle of horses and riders to revolve, alternately in opposite direction, as it glides down a pole. This result is accomplished by means of two spiral grooves, corresponding to right and left handed screws of long pitch, which are cut on the inside of the sleeve or hub of the circle of riders, and which encounter and engage with pegs on the post as the circle descends. The horse which stops nearest a marked goal is the winner.

Another game of chance is Toboggan Marbles or Toboggan Billiards. An inclined board is crossed obliquely by a number of wires. A small interval is left between the lower end of each wire and the upper side of the next one, so that a small ball, placed on the upper wire, will roll down along all the wires in succession, following a zigzag course, to the bottom of the board, and there fall into a numbered compartment. An interesting feature is the automatic and successive release of the twelve balls, which is accomplished as follows: A rod, mounted so that it can turn freely on its axis,

runs along one inclined side of the board. The ends of this rod are bent in such a manner that, during the descent of the first ball, the second and succeeding balls are stopped by the upper bent end, but when the moving ball reaches the bottom of its course it lifts the lower bent end of the rod, thus releasing the second ball by turning the rod, which immediately falls back into its original position and holds the third and succeeding balls. Along the other inclined side of the board an endless band is stretched over two rollers. By turning a crank attached to the upper roller a sort of spoon carried by the band is made to pick up the balls from the receptacle at the base and carry them, one by one, to the top wire, for another descent.

The Balloon Accident is a lottery in which the winner is determined by the fall of the aeronaut. A card

is divided into sectors marked with the names of different countries. From the center rises a mast which bears a yard at its top. An imitation balloon, with its basket and aeronaut, is hoisted by a cord which runs up the mast and over a pulley on the yard. But the pulling of the cord also causes the mast to rotate so that the balloon passes over the different countries. The contact of the top of the balloon with the yard releases one of the attachments of the basket which overturns and drops the aeronaut. The players guess the country in which he will land.

The Triplane is a vehicle that can travel on land,

on water, and through the air. It has a hull in the form of a double cone, and four wheels for traveling on land. It is propelled by a large air propeller, driven by clockwork, and develops a fair speed both on land and on water. For aerial navigation the wheels are replaced by aeroplanes and the vehicle is suspended by a long cord. The Triplane is an instructive toy, because it illustrates the action of air propellers.

Another scientific toy bears the fanciful name of Houille Blanche, or White Coal, which French writers apply to waterfalls regarded as sources of power. A small but powerful turbine, attached to a water tap, drives a variety of machines, including a little dynamo which produces sufficient current for the operation of a tiny incandescent lamp, thus giving a striking illustration of the transformation of energy.

The Cord Telegraph comprises two grooved posts, two equal weights which slide in the grooves, and a long cord attached to the weights and passing over pulleys at the top of the posts. Each post is marked with the letters of the alphabet, but the alphabetical order runs up one post and down the other. Each weight carries a pointer. If one weight is moved so that the point-

er indicates successively the letters of a word or cipher the other weight will move so as to spell out the same word on the other post. The posts may be set at any distance apart. The call is made by moving the weight rapidly to the bottom of the post, thus raising the other weight as rapidly to the top of the distant post, where it strikes a bell.

The Cord Alphabet is an instructive puzzle designed to fix the forms of letters in the minds of young children. The apparatus consists of a pattern alphabet, a cord, and a board in which about forty nails have been driven in such arrangement that any of the capital letters and numerals can be made by wrapping the

cord around the proper nails. Two devices of practical utility deserve mention. The Bath Screen, or Spray Catcher, is designed to supplement the ring douche and protect the carpet, which is likely to suffer if no screen is used, even if the tub is three feet in diameter. With the screen a small foot tub suffices and a bath can be taken in the smallest room.

in diameter. With the screen a small foot tub suffices and a bath can be taken in the smallest room. The screen is a bottomless bag of waterproof fabric, distended by a rigid ring at the top and supported by cords attached to a smaller ring which rests on the shoulders

The Electric Searchlight has a wide field of useful-

The Hand Grenade in Our Army.

The Ordnance Department of the army has been experimenting for some time past with a hand grenade, for use in places where the attacking party has been able to come close to the besieged, and when the fire of the small-arms rifle would be ineffective, owing to its flat trajectory. The fact that the Japanese used hand grenades with telling effect during the war with Russia, and opened a way when field guns and small arms were practically useless, and also the fact that this country is the greatest lover of base ball in the world, has induced the government to experiment with

grenades. As grenades are usually thrown by hand, it is planned to organize a corps of army ball players, to throw the projectiles as one would throw an ordinary base ball, although there is under consideration a design of a small mortar for throwing these projectiles a greater distance than they could be thrown by hand, and yet be light enough to be carried by hand.

The grenades as tested by the Ordnance Department were of about one pound in weight, and could be thrown by a muscular man a distance of from 100 to 125 feet, and over obstacles from 50 to 60 feet high. This method of throwing by hand is. however, more or less uncertain, for the reason that the hand grenade is loaded with a high-power explosive, and should one of them be dropped or handled carelessly, there would follow a terrific explosion, resulting probably in great loss of life.

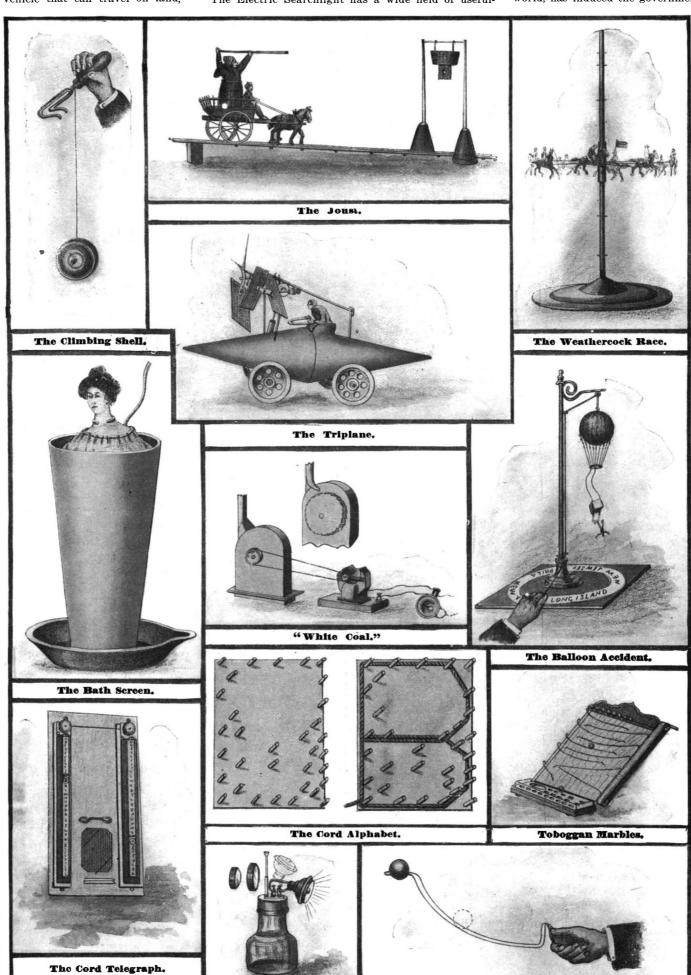
The mortars as used by the Japanese were of wood, about three feet long with a caliber of five to six inches. Mounted at an angle of about 55 degrees, grenades were thrown a distance of over 1,000 feet, with a charge of only two ounces of black powder.

It is the consensus of opinion of many officers of the army, that such a corps as is planned would be very

effective, and the means of quickly reducing a fort which could not be scaled, or one whose location would not permit of the use of field guns. There would be a practical immediate use for grenades in the Philippines, where our troops are almost daily fighting the rebellious natives, who are intrenched in inaccessible places, where field guns could not be used, and where the hand grenade would prove the only effective means of attack.

The Railball.

It is stated that there are over 5,000 motor-boats on the canals of Holland, mostly driven by kerosene motors.



The Searchlight.

NEW AND INGENIOUS FRENCH TOYS.

ness. The battery is of the bottle type and its only novel feature is the ease with which it can be taken apart for cleaning. This is important, as cleanliness is essential to perfect working. The zinc, which is the only part consumed, can be renewed with the greatest ease. The lamp is mounted on a joint so that it can be turned in any direction. For use in the photographer's dark room the lamp and reflector can be inclosed in a hood with a ruby window. For reading in bed, a short focus lens, mounted in a similar manner, projects a strong parallel beam. If the zinc is immersed gradually the lamp may be used several hours.—Translated for the Scientific American from La Nature.

RECENTLY PATENTED INVENTIONS. Pertaining to Apparel.

AND COAT HANGER.—A. A. and R. C. Stein, Birmingham, Ala. The patentees have designed a garment-holder to be formed out of wire which is provided with a main frame that may be given an ornamental shape such as the general configuration of a The wire is twisted in a very ingenious manner so as to form a series of coat and hat holders from the bases of these coat and hat hangers, and shaped to connect and brace the main frame.

Of Interest to Farmers.

LOADING APPARATUS. — A. J. DERBY Honolulu, Hawaii. More especially the invention refers to apparatus for loading sugar-cane and the like in the field for conveyance and transportation of the same to one or more places or stations, as a sugar factory for instance. A principal object is to provide an apparatus comparatively inexpensive besides being time-saving and labor-saving, and possessing capacity for long and repeated service.

Of General Interest.

SIGHT FOR FIREARMS.—E. W. EVANS, Greenwood, British Columbia, Canada. The invention relates to sights for firearms, and has for its principal object to provide sights for arms which will prevent the blurring of the vision of the marksman when he is aiming at a mark. It provides the sights with surfaces which will give such a contrast as will assist the marksman when aiming at dark objects.

FOLDING STEP-LADDER.-A. DAHL, New York, N. Y. The object of the inventor is to provide a folding step ladder, for use by painters, interior decorators, and other persons, and capable of being folded into a comparatively small package to be conveniently carried from one place to another, and also of being readily extended for its legitimate use.

HEDDLE-FRAME FOR LOOMS.-G. BRISson, Lewiston, Maine. The invention pertains to weaving, and its object is to provide a harness, more especially designed for carrying the selvage warp, and arranged to permit convenient and quick repair of a broken heddle without requiring cutting of the selvage and without wasting the other non-injured heddles or other parts of the harness.

BOTTLE-STOPPER.-J. A. MOLLER, JR., New York, N. Y. · A purpose in this case is to provide a construction of bottle stopper adapted for ready attachment to any form or type of bottle, which stopper can be quickly and conveniently cleaned and operated to open or close the bottle, and whereby the movements of the stopper for opening and closing can be accomplished by the application of the thumb only.

Hardware.

TOOL.-G. H. GOODHOLM and J. A. TRAIN, Lindsborg, Kan. In addition to splicing wire the tool is for use in cutting pipes and rods. It is more especially directed to the cutting of porcelain and other brittle tubes such as are used for insulating purposes. There is the provision of means for the uniform cutting of tubes which may not or may be of exact cylindrical cross section, and for a novel pivotal adjustment for the operating levers.

SAFETY-RAZOR .- L. HEUSER, New York, N. Y. The invention has for its object to provide a safety attachment simple in construction, effective in operation, and durable in use, adapted to be used with razors of ordinary or special construction. The guard is readily removed from the razor blade by raising the free end of the clamping arm and releasing the offset end or hook from engagement with the back of the razor.

Heating and Lighting.

CHIMNEY-COWL .- M. LUDWIG, Albany, Ore. The present invention is an improvement upon the one for which Mr. Ludwig formerly received U. S. Letters Patent; and it relates to the construction of the top or cap proper of the cowl and to the means for supporting the same and securing it detachably yet rotatably. The spider or cowl attachment is adapted for eation to two different sizes of pipes.

CRUDE-OIL BURNER .-- A. D. MARCOTTE, Church Point, La. This is a form of vapor generator and burner particularly adapted for the consumption of crude or heavy oil. The burner comprises a U-shape tube arranged horizontally with one leg over the other, the lower being provided with gas nipples and with a sliding cleaner, a second tube arranged over the U-shape one and a small tube connecting the second tube with the lower branch of the

Household Utilities.

COMBINED BOOKCASE AND FOLDING BED .- W. FREEDMANN, New York, N. Y. The inventor has in view the provision of a bookcase having a compartment formed at the rear thereof in which is adapted to be contained when in folded relation, a bed of novei construction. The case is revolubly mounted, whereby it may be easily reversed to bring either the bed or front of the case to accessible

Machines and Mechanical Devices,

WELL-DRILLING MACHINE.—N. D. WELLS Tulsa, Indian Ter. The machine is arranged to permit convenient actuating of the drill-rod at the beginning of the drilling operation by the employment of a spudding device, without the use of the walking-beam, and to allow convenient and quick lifting of debris, etc., out of the well, independent of the spudding device and beam.

CHANGE-SPEED APPARATUS.—A. SAUER Pittsburg, Pa. This apparatus communicates rotary motion from a motor shaft to another shaft arranged for driving machinery of various descriptions. By substituting gears of one size for others of different size the speed of the driven shaft may be changed at will relative to the speed of the motor shaft. There is a special provision of means for adjusting the gears, to take up wear or compensate for imperfections or irregularities in the bear-

RETHRESHER AND POLISHER FOR COF-FEE.-E. C. PRIETO, Cipaquira, Colombia, S. America. This machine has means for subjecting the coffee grain or bean to a rubbing or polishing action, and improves the means for subjecting the same to an air current during the polishing process, for the purpose of separating out chaff or bran. Means regulate the degree of pressure to which the grain is subjected during the polishing process.

LIFTING-MACHINE. — C. Moller, Jacksonville, Fla. The invention in this instance is to provide a lifting machine simple and portable in construction, and more especially designed for picking up barrels and other packages from the ground or floor and elevating and discharging the same at any desired height for storing, stacking, and other purpos

WEIGHING-MACHINE. — G. H. MALLETT, Copake, N. Y. In this patent the invention has reference to means for depositing powders or granulated commodities of various kinds in a plurality of receptacles at the same time, and is designed to provide means for accurately weighing and placing the commodities in even proportions in each of the several receptacles.

MULTOGRAM RECORD. - A. HOFFMAN, New York, N. Y. The invention relates to records used for talking machines, the more particular object being to provide a record with a multiplicity of record tracks for the purpose of increasing the amplitude and volume of the sound vibrations. Among further means it relates to those for separating the various record tracks from each other, so as to prevent a stylus from one of these record tracks moving into another.

CLUTCH .- P. DANIEL, New York, N. Y. The aim in this case is to provide certain improvements whereby the connection between the driving and the driven member is effected by means of a fluid which may freely circulate to permit one member to rotate in respect to the other, and which may be prevented from circulating to effect the simultaneous movement of the two members.

AUTOMATIC SWITCH-GOVERNOR. -COLSON and C. GEBAUER, New York, N. Y. The more particular object of the invention is to produce a mechanism suitable for use in connection with stereopticons and with projectors for moving pictures, and in which the lamp is automatically extinguished in case the mechanism moving the film of the projector is stopped, so that the heat from the lamp endangers the film.

WIND-MOTOR .- J. W. BEATES, Denver, Col. The purpose of this improvement is the provision of a new wind motor, arranged to utilize the motive power of the wind to the fullest advantage by varying the length of the stroke of the pump rod according to the velocity of the wind.

Prime Movers and Their Accessories.

ENGINE-STARTER .- F. L. ORR, Thurman, Iowa. The invention refers to means for starting gas or gasolene engines, and the object is to provide power means adapted for cranking internal combustion engines in general, stationary or movable, but more especially for starting engines of the general character stated, employed on gasolene automobiles.

Railways and Their Accessories.

MINER, Lucerne, Ind. An object of the invention is to provide a device which can be readily applied to the switch and which will not interfere with the ordinary operation of the switch by means of a switch bar or the like. improved tripper is carried by the car for operating the switch.

Pertaining to Vehicles.

AXLE-LUBRICATOR .- A. B. DAY, Knoxville, Tenn. The improvement relates to axle lubricators in which the outer end of the hub is provided with an opening for reception of lubricant, the same being normally closed by a spring valve. The lubricating attachment contains a normally seated valve, but adapted to be opened by due pressure, the body or cage being adapted to be screwed into the wheel hub and a portion of the attachment projecting into the recess in the end of the axle.

NOTE.—Copies of any of these patents will be furnished by Munn & Co. for ten cents each. Please state the name of the patentee, title of the invention, and date of this paper.



HINTS TO CORRESPONDENTS.

HINTS TO CORRESPONDENTS.

Names and Address must accompany all letters or no attention will be paid thereto. This is for our information and not for publication.

References to former articles or answers should give date of paper and page or number of question.

Inquiries not answered in reasonable time should be repeated; correspondents will bear in mind that some answers require not a little research, and, though we endeavor to reply to all either by letter or in this department, each must take his turn.

Buyers wishing to purchase any article not advertised in our columns will be furnished with addresses of houses manufacturing or carrying the same.

addresses of houses manufacturing or carrying the same.

Special Written Information on matters of personal rather than general interest cannot be expected without remuneration.

Scientific American Supplements referred to may be had at the office. Price 10 cents each.

Books referred to promptly supplied on receipt of price.

Minerals sent for examination should be distinctly marked or labeled.

(10642) H. R. writes: Having had a up; meaning that the "draw" end of the syphon must be longer than the "lift" end. The other party maintains that the syphon operates through atmospheric pressure. the air being drawn from the pipe and replaced by water, the atmosphere by its pressure on the body of water to be moved forces the water through the syphon. At the end where the water flows out of the pipe he claims the atmospheric pressure has been removed. He won't see that the pressure is the same at both ends. I also maintain that water will lift or pull water, as it does in the syphon, claiming that when the pipe is filled and no air allowed to leak in, the molecules of water are held together by the equal pressures of air at both ends of the syphon, thus preventing segregation. He maintains that water cannot lift or pull water, because it is a liquid and not cohesive. The discussion arose by intention of a coal mining company of which I am a director to syphon the water from air workings. The water will have to be lifted a vertical height of about 175 feet. A plumbing contractor here whom we consulted in regard to pipe told us we could not syphon water where the lift was more than 60 feet vertical at sea level, and at this altitude (4,500 feet) not more than 40 feet. already easily syphoned water over a vertical height of 60 feet, so we knew he was wrong. I would like to know also of an instance of the greatest height over which water has been syphoned, if you know one. A. A syphon operates by the pressure of the atmosphere. This fact is fully demonstrated in text books of physics. The pressure of the atmosphere is equal to that of a column of water 34 feet at sea level, so that no syphon can lift water any higher than that. Indeed 28 to 30 feet is as high as it is practicable to carry water by a syphon. Experiment has fully confirmed the theoretical deductions. It is true that the greater weight of water in the outflow pipe determines the direction of the stream, but the water is lifted into the other arm of the syphon by the pressure of air on the water in the reservoir. When this arm is longer than 34 feet the pressure of the air is not able to lift the water to the top of that arm and water cannot run over the bend of the pipe. Except for the presence of water vapor a vacuum exists in such a pipe above the water. Because of the air always present in running water a syphon will not carry water to its full theoretical height, and in many syphons it is necessary to provide an outlet for this air at the top of the pipe. You will find the syphon discussed in books of civil engineering such as Trautwine's, price \$5.00. Your friend is quite correct in his statement that water cannot draw water along in a pipe, since water is almost destitute of cohesion. The altitude of your place will reduce the height of the RAILWAY-SWITCH.—J. F. REESE and C. L. syphon about 6 feet, so that you can raise the water only 22 to 24 feet, according to the height of the barometer at the time. cannot raise water by a syphon any higher than it may be raised by an ordinary lifting or suction pump at the same time and place, Any claim to have raised water 60 feet by a simple syphon is certainly an error.

(10643) C. E. B. writes: 1. In your answers to Query No. 10489, C. E. B., I think you have slightly misunderstood question 2. I did not mean the magnet to carry the armature as a hook would, but to lift or attract it to itself. The argument I wished the questions to settle was this: A says that if the armature of a permanent magnet is taken off by sliding it from the poles to the neutral part it will need less total energy to remove it than the magnet expended in drawing it up. Therefore, if the magnet in the question would, even in theory, go on lifting the armature forever, it would give out more work than was ever put into it, and that is impossible. B spring. When the armature is drawn off, it is more apparent features had been noted, the

it springs back into place. He cannot, however, give any clear theory to explain the stretching." They would like you to decide which is nearer the mark. A. The modern conception of a magnet is that of elastic and self-repellent lines of force passing out of the positive pole and returning through the magnet by way of the negative pole to their starting point. When an armature comes near the magnet, these lines of force enter the armature because iron presents less resistance to their passage than does any other known material, and because of the elasticity of lines of force the iron is pulled to the magnet. When the armature is pulled off, the lines of force are stretched until they break. The pull necessary to break them is obviously equal to their pull in the opposite direction when they pulled the armature toward the magnet. We do not see that the direction of the pull makes any difference. Sliding the armature along the magnet only changes the direction of pull and not its quantity. The same lines of force are ruptured in each case. No adhesion exists between the magnet and its armature. We are unable to think that there is any less force required to remove the armature than the magnet has exerted in drawing discussion with an acquaintance bearing on it to itself, since all the force there is in either the working principle of a syphon, I wish an case is due to the magnetic lines which the authority to settle the dispute, as neither has convinced the other to his view. I maintain at the degree of magnetization which the magnet possesses. We do not think A is right in the water in the "lift" and that by keeping his position. B has an indefinite idea that the weight of water in the "draw" greater than that in the "lift" the flow can be kept of magnetic force stretch and this requires work. When the lines of force give way, the magnet returns to its original condition. B is more nearly correct than A is. 2. There seems to be great difficulty in making telescope object glasses over about 40 inches. Would it be possible to arrange a number of small glasses, say six 30-inch, in a circle, all focused, by means of prisms, on a common eyepiece and so adjusted that all the images coincide? A. It would seem impossible to adjust images from several lenses so as to produce a well-defined image in an eveniece common to all the lenses. It is difficult to do so with even two or three lenses in projecting upon a screen in the three-color process of projecting pictures in natural colors. It would be much more difficult if an accurate magnification of the combined images were to be made.

NEW BOOKS, ETC.

ELEMENTS OF ELECTRIC TRACTION FOR MOTORMEN AND OTHERS. By L. W. Gant. New York: D. Van Nostrand Company. 8vo.; cloth; 217 pages, illustrated. Price, \$2.50.

Electric traction is a branch of electrical engineering of the greatest importance, and an intelligent understanding of its principles by motormen and men of similar connection with its practice makes for greater public good. The "Elements of Electric Traction" is based upon a short series of lectures and practical demonstrations given during the last two years to a class of motormen and others at the Leeds Institute Technical School. It is designed as an introduction to the more advanced works on the subject, and as a supplement to the various handbooks that have from time to time appeared.

The elementary principles of electricity, magnetism, and the related phenomena are explained in the first chapters of the treatise, before going on to the headings more germane to the title.

The style of the work is very clear and lucid, and although the treatment is simple, nothing is lost in needless repetition.

THE MARINE STEAM TURBINE, Second Edition. By J. W. Sothern, M.I.E.S. New York: D. Van Nostrand Company, 1906. Cloth; 158 pages; 8% by 5¼ inches; numerous figures and illustrations. Price, \$2.50.

The marine steam turbine is receiving more respectful treatment from marine engineers, since it has proved itself to be the successful rival of the reciprocating engine. In fact it almost seems that the turbine will some day entirely supersede the older form, for it is the ideal type of power producer for the modern high-speed steamship.

The author, who has had exceptional chances of studying marine turbines from every point of view, has added in this, his second edition, more details relating to the practical construction and running of this type of engine than were contained in his excellent first edition.

The work contains numerous drawings and sketches explanatory of the text; in fact, the drawings alone would make the book one of great value. The text is arranged so as to most forcibly impress the mind without fatiguing the eye.

THE MOON IN MODERN ASTRONOMY, A Summary of Twenty Years' Selenographic Work, and a Study of Recent Problems. By Philip Fauth. Translated by Joseph McCabe. With an introduction by J. Ellard Gore. London: A. Owen & Co. 8vo.; cloth, illustrated. Price, \$4.

When telescopes were first invented, they were naturally turned upon the nearest celesthinks that the magnet merely acts as a tial object, our satellite the moon. After its like stretching the spring, and when released enthusiasm of the early investigators was di-

873,670

873,559 873,598 873,574

W. Keehn...

rected to other bodies, and the deeper problems of our neighbor planet were left more or less untouched, owing to the very desultory manner in which they were attacked.

Mr. Philip Fauth has devoted a lifetime to the study of selenography, and has shown himself admirably fitted to distinguish the minute differences that the selenographer must be able to detect. His work is written in an agreeable style, and commands both the interest and the confidence of the reader. In spite of this there is in the last chapter a statement that seems to exceed "scientific probability." After saying that the moon is at a temperature of -273 deg. C., the theoretical "absolute zero," at which all molecular motion ceases, and that its surface is covered with ice, under which are seas of water, Mr. Fauth goes on to state that the waters have at times broken through the mantle of ice, and, by their ebb and flow, have melted depressions it, making the so-called "walled plains." This seems highly improbable, for even if water could exist as a liquid at temperatures in the neighborhood of the "absolute zero," it is most unlikely that such an ebb and flow could take place, since in a liquid cooled below its freezing point, solidification is almost instantaneous when the solid phase of the compound is in contact with the liquid phase. At a temperature of -273 deg. C. a body of water, however large, would be cooled below its freezing point in a very short time interval and freezing would be almost immediate. This would be more apt to result in the formation of mounds than of depressions.

INDEX OF INVENTIONS

For which Letters Patent of the United States were Issued for the Week Ending December 10, 1907.

AND EACH BEARING THAT DATE

[See note at end of list about copies of these patents.]

		873,456	•
Aerial vessel, G. Halliday 873,542	Cross head, P. Langer	873,561 I	H
Air heater, A. H. Lovejoy	Cultivator weeder attachment, S. A. McCune Cultivator, wheeled, J. S. Kendig Curtain support and hanger, J. Garret Curtains, automatic uncoupling handle for vestibule, H. M. Robertson. Cutlery, table, W. H. Smith Cutting out circular or elliptical forms, machine for, C. C. Wals Damper, A. W. Walker Delivering articles of manufacture from a	873,376 I	
Amusement apparatus, Mangels & Brewster 873,570 Animal trap, Brendt & Sherman . 873,137 Animal trap, F. M. Sletto . 873,331 Animal trap, Carlson & Hedstrom . 873,631 Animal trap, A. T. Sullivan . 873,631 Article holder, E. E. Minard . 873,133 Antometic switch F. M. Hull . 872,328	Curtain support and hanger, J. Garret	873,038 I	H
Animal trap, F. M. Sletto 873,331	vestibule. H. M. Robertson	873.091 F	H
Animal trap, Carlson & Hedstrom 873,502 Animal trap A T Sullivan 873 631	Cutlery, table, W. H. Smith	873,274 I	Η
Article holder, E. E. Minard	Cutting out circular or elliptical forms,	873 395 J	H
Automatic switch, F. M. Hall	Damper, A. W. Walker	873,141 I	н
Automobile, F. Bartl			H
Automobile, F. Bartl 873,405 Automobile bumper, R. W. Harroun 873,544 Automobile folding seat frame, J. M. 873,544 Nolan 873,453	collecting receptacle, device for automatically, P. Raabe	873,268 H	H
Automobile folding seat frame, J. M.	matically, P. Raabe Dental broach, C. A. Skalstad Dental chair, A. W. Browne Derailer, M. C. Sloderbeck Derrick, E. E. Jenkins Detinning, E. A. Sperry Digger. See Compost digger. Directory, telephone, C. E. Napp Display can, sheet metal, F. Rudolphi. Display cand rack, F. L. Stone. Display device, C. C. Fleming Distribution system, J. B. Taylor. Door attachment, screen, C. S. McElroy. Door closer and check, W. K. Henry. Door, grain, W. H. Ascue	873,100 I	H
Automobile lubricating device. F. J. Ziegler 873,478	Dental chair, A. W. Browne	873,015 I	H
Automobile lubricating device, F. J. Ziegler 873,478 Automobile steering wheel pivot, H. S.	Derrick, E. E. Jenkins	873,374 I	H
Baldwin	Detinning, E. A. Sperry	873,699	H
Automobiles, combined heating and ventilat-	Digger. See Compost digger.	873 259 H	H
Automobiles, combined heating and ventilating system for, N. W. Williams 873,399 Automobiles, coupling rod for the axles	Display can, sheet metal, F. Rudolphi	873,137 I	Ĥ
of T Rommel	Display card rack, F. L. Stone	873,184 I	K
of, T. Rommel	Distribution system, J. B. Taylor	873:107 I	[] []
	Door attachment, screen, C. S. McElroy	873,580 1	I
Awnings, apparatus for laying out and marking round top, C. Diehl 873.852 Band brake, F. O'Brien 873.679 Battery connection, G. P. Blow 873.660 Battery grid, storage, J. Marx 873.882 Bayonet and side arm, A. Krull 873.054 Bearing for vehicles, spring, R. J. Edwards	Door closer and check W K Henry	873,693 1 873 433 T	[t
Band brake, F. O'Brien 873,679	Door closer and check, W. K. Henry. Door parain, W. H. Ascue Door hanger, J. W. Harris Door hanger track, P. A. Myers Door operating mechanism, R. F. Le Brocq Door, rolling, J. Erwood Double flange trap and sink, G. E. Dunstan Dough dividing machine for bread making, G. T. Pendrith	873,115 I	ĺ
Battery grid, storage, J. Marx	Door hanger, J. W. Harris	873,230 I	I
Bayonet and side arm, A. Krull 873,054	Door operating mechanism. R. F. Le Broco	873.058	Ιı
Bearing for vehicles, spring, R. J. Ed-	Door, rolling, J. Erwood	873,359 I	I 1
Bearing, shaft, A. Sauer	Double flange trap and sink, G. E. Dunstan	873,120	т.
Bearing for venicles, spring, R. 3. 221 Bearing, shaft, A. Sauer 873.021 Bed, J. J. Dunn 873,357 Bed, couch, F. S. Sprague 873,103 Beds, head rest for, J. G. Ryan 873,095 Bedstead side rail joint, metallic, G. M. Robinson 873,173	G. T. Pendrith Drawer support, C. A. Gehne Drawing instrument for parallel ruling, T. English Drill, S. Lake	873,682 J	j
Bed, couch, F. S. Sprague	Drawer support, C. A. Gehne	873,225	K
Bedstead side rail joint, metallic, G. M.	T. English	873.524 I	K L
Robinson 873,173 Beer racker, Lowy & Adelman 873,567 Belt fastener, F. Baxter 873,009 Bicycle attachment, J. J. Walters 873,278 Bin. See Store bin.	Drill, S. Lake	873,056	Ľ
Relt fastener F Rayter 873 009	Diving and ventuating system for houses,	1	Ļ
Bicycle attachment, J. J. Walters 873,278	factories, or buildings, G. Muller Dumb bell, magneto electric, J. Moores. Dump bed, automatic, C. C. Taylor, et al. Dust collector, G. H. Forsyth Dust pan, S. C. Courtney. Dyeing, Waldinger & Iserloth Dyeing, H. Toepfer Easel, photograph, H. C. Itter Eaves strip, W. Behl Eaves trough support, C. H. Molyneux. Edger, G. M. Hinkley Electric accumulator, Marino & Barton-Wright	873,066 i	L
Bin. See Store bin.	Dump bed, automatic, C. C. Taylor, et al	873,187	Ē
Binder and letter file, E. A. P. Will 873,282 Binder, loose leaf, J. E. Maclachlan 873,151	Dust collector, G. H. Forsyth	873,532 I	L
Bin. See Store bin. Binder and letter file, E. A. P. Wolf. 873,282 Binder, loose leaf, J. E. Maclachlan. 873,151 Binder, loose leaf, J. C. Dawson. 873,417 Blocking and derailing device. Kenvon &	Dyeing, Waldinger & Iserloth	873,277	Ľ
Ving 979 977	Dyeing, H. Toepfer	873,636 1	Ļ
Blow guns, dart for, C. E. Stivers 873,628	Eaves strip, W. Behl	873,407	L
Boat, life, T. B. King	Eaves trough support, C. H. Molyneux	873,578 1	L
Boiler, W. G. Ross	Electric accumulator Marino & Barton-	873,667	L
Blow guns, dart for, C. E. Stivers. 873,628 Boat, life, T. B. King 873,557 Boat, motor, Salo & Rukonen 873,614 Boiler, W. G. Ross 873,094 Bolt and nut cutter, combination, J. Back-	Wright	873,132	L
scheider 873,004 Book, loose leaf, H. M. Sturgis 873,106	Electric apparatus, H. L. Beach Electric cable, C. W. Davis Electric circuit controller, W. A. Paris. Electric heater, M. Landry Electric machine, dynamo, J. E. Noeggrafth	873,290	
Boring or drilling machine, W. Topham 873,637	Electro circuit controller. W. A. Paris	873,263	L
Bottle cap fastener, G. A. Williams 873,646	Electric heater, M. Landry	873,317 i	Ĺ
Boring or drilling machine, W. Topham 873,637 Bottle cap fastener, G. A. Williams 873,648 Bottle capping machine, A. W. Cordes 873,022 Bottle capping machine head, G. Kirke-	Electric machine, dynamo, J. E. Noeg- gerath	973 079	Ļ
	Electric machine, static, W. C. Shinn Electric wires, rotating bracket for the suspension of, C. E. Buckbee	873,178	Ľ
Bottle indicating device, J. Casaccia 873,410 Bottle, non-refillable, H. Mindermann 873,155 Bottle, non-refillable, G. P. Vissas 873,472	Electric wires, rotating bracket for the	072 700	Ļ
Bottle, non-refillable, G. P. Vissas 873,472	Electrical apparatus coil. P. MacGahan	873.253	L
Bottle stopper, J. Repetto 873,087	Electrical drop, G. J. Galbraith	873,307	_
Bottle stopper, J. Repetto	Electrical testing system, H. E. Miller	873,674 1 873 165	L
	Elevator bucket, A. W. Berkner	873,655	L
Brake, O. M. Gould	Elevator safety appliance, S. Bruce	873,495	L
Brake operating attachment. H. L. Witherell 873.113	Engines, intake device for explosive mix-	813,291	L
Brake, O. M. Gould 873,367 Brake mechanism, K. Rushton 873,459 Brake operating attachment, H. L. Witherell 873,113 Braking, regenerative system for, W. I. Slichter 873,101	tures in vapor, C. P. Hollister	873,372	
Rrick treating A Magoon 873 568	suspension of, C. E. Buckbee Electrical apparatus coil, P. MacGahan. Electrical drop, G. J. Galbraith Electrical testing system, H. E. Miller. Elevated carrier, A. H. Neller Elevator bucket, A. W. Berkner Elevator safety appliance, S. Bruce. Ellipsograph, N. D. S. K. Beck. Engines, intake device for explosive mixtures in vapor, C. P. Hollister. Engraving machine, E. Bausch Entrail cleaning mechanism, H. Hakenholz Envelop, B. Davis.	873,008	L
Brick, treating, A. Magoon 873,568 Bridle bit, J. Reichert 873,604	holz	873,311	N
Bronze dust, machine for removing, A. J. Ford	Envelop, B. Davis	873,416	M
Brush, adjustable cleaning, R. T. Gillespie, 873.308	Envelop and letter sheet, combined, C. A. W. Westholm	873,691	N
Brush, blacking, E. C. Hudson	Envelop blank gumming mechanism, Hey-	1.3	M
Buckle, C. E. Smith 873,464	wood & Travis Envelop manufacturing machine, M. R.		N N
Ruckle harness E I Allison 873 000		873,520	Ñ
Buckle, snap fastening, G. A. Holmes 873,128 Buggy top attachment, W. C. Neff 873,164 Building block, hollow, B. Cerutti 873,505 Building block or slab, reinforced, E. C. Peole.	Dunnebier Eraser, blackboard, M. W. Perkins Eyeglasses, Webster & Ingold	873,327 1 873 109	N N
Building block, hollow, B. Cerutti 873,505			
Poole	Eyeglasses, W. L. Bemis Eyeglasses, nose guard for, G. A. Bader Fan, T. M. Mulkerins Fan, A. Sakovitch Fastening device, M. F. MacNelly Fastening device, J. Senn Fastening means A. L. White	873,343	Ņ
	Fan, T. M. Mulkerins	873,257	N N
Bung starter, H. H. Ashenberg 873,116	Fan, A. Sakovitch	873,460	
Button, J. C. & J. A. Doran 873,354, 873,355	Fastening device, M. F. Mackeny	873.271	N
Bung starter, H. H. Ashenberg. 873,104 Burg starter, H. H. Ashenberg. 873,116 Burglar alarm, C. Van Bergh 873,635 Button, J. C. & J. A. Doran 873,354 Cabinet, kitchen, A. C. Kerr. 873,450 Cable clamp, well drilling, C. F. Rigby. 873,090 Cable joint, metal sheathed, C. W. Davis 873,215 Caisson construction, A. Z. McLeod. 873,069 Calculating machine, C. J. Smith. 873,181 Calendar, A. Anderson 873,696	Fastening means, A. L. WhiteFat cutting machine, E. E. MotterFaucet, J. W. Grantland	873,692	N
Cable joint, metal sheathed. C. W. Davis. 873.090	Faucet. J. W. Grantland	873,538	N
Caisson construction, A. Z. McLeod 873.069	Feeding mechanism, O. Ashton	873,338	N
Calculating machine, C. J. Smith 873.181	Feeding mechanism, O. Ashton Fence structure, N. B. Dixon Fence, wire, G. L. Langer	873,353	Ņ
Came. T. W. Morrell 873.067	Fertilizer distributer, Hill & Coleman	873,236	N
Can. See Display can. Can vent shielding machine, H. J. Douglass 873.519	Fertilizer distributer, Hill & Coleman File, arch, W. O. Gottwals File box, T. A. Walsh	873,537	N
Canning device, fruit, T. H. Ranev 873.603			,
Canning device, fruit, T. H. Raney 873,603 Candle molding machine, C. Nordfors 873,073	dell	873,010	V
Candy making machine, round stick, R. S. Walters 272 206	Filter press, F. B. Anderson	873,482	N N
Cap, E. Forman 873,122	Filtering apparatus. liquid, Reeves & Bram- well	873.458 E	
Candy making machine, round stick, R. S. Walters 873,396 Cap, E. Forman 873,122 Car and train pipe coupling, combination, J. W. Barth 873,288	Fire extinguisher, automatic, W. G. Asmus Firearm, magazine, J. J. Henry	873,651	D
## *** **** **** **** *** *** *** *** *	гисани, шадалие, д. д. пенгу	010,041	۵

Car and train pipe coupling, combined, J	г. Т	Fire
Car and train pipe coupling, combined, W. Barth Car door, G. W. Sayre Car, dumping, J. H. Blake Car fender, street, M. Wilenski Car, log or lumber, M. M. Russell. Car, motor, J. T. Hepburn Car side bearing, J. C. Barber. Car ventilating system, passenger, N. Mercer	. 873,287 . 873,175	Fire
Car, dumping, J. H. Blake	. 873,149 . 873,197	Fisl
Car, log or lumber, M. M. Russell Car, motor, J. T. Hepburn	. 873,685 . 873,434 . 873,404	Fla Flo
Car side bearing, J. C. Barber	. 873,404 S.	Flo
Mercer Car wheel, J. H. Woodworth Cars, metallic window frame for steel,	. 873,153 . 873,477	Flu Fob
Cars, metallic window frame for steel, S. Doyle	J. . 873,218 . 873,392	For Fol
S. Doyle	. 873,392	Foo
punching jacquard, H. Carbonnelle Carriage running gear support, baby, W	. 873, 2 93	For For
Carriage running gear support, baby, W. C. Willets Carrier, Leidal & Ulring Carving fork, J. F. Brower Casket handle, J. D. Lawrence. Catheter user's portable mechanical assitant, J. F. Spalding Centrifugal separator, J. W. Phillips. Chain rope or belt, C. H. Bryan. Chair support or prop, Rothfuchs & Bliss. Chalk line holder, A. B. Sharp. Christmas tree holder, J. T. Bailey Cigar cutter, A. C. Gast Cigar package, F. E. Derge Cigarette making device, I. L. Conkling. Cigarette tipping machine, A. L. Boucher. Clay cutting tool, K. Busch Cleaner handle, vacuum, A. P. Cranston. Cleaning device, H. Chapman Cloth shrinking machine, G. L. Ballard Cloth shrinking machine, G. W. Fenner. Clothes line hook, A. H. & A. J. J. 6 Beaumont Clutch, W. W. Sly	. 873,196 . 873,380	Fru
Carving fork, J. F. Brower	. 873,150 873,563	1 4.
Catheter user's portable mechanical assi	8- 873 275	Fur Fur
Centrifugal separator, J. W. Phillips	873,593	Gal
Chair support or prop, Rothfuchs & Bliss.	873,612	Gar
Chark time holder, A. B. Sharp	873,402	Gar Gas
Cigar package, F. E. Derge	873,217	Gas
Cigarette making device, I. L. Conking Cigarette tipping machine, A. L. Boucher.	. 873,350 . 873,014	Gas
Cleaner handle, vacuum, A. P. Cranston	. 873,209 . 873,300	Gas
Cleaning device, H. Chapman	. 873,412 . 873,285	Gas
Cloth shrinking machine, C. W. Fenner Cloth shrinking machine, A. Bloch	. 873,224 . 873,656	Gas Gas
Clothes line hook, A. H. & A. J. J. d. Beaumont	le . 873,488 . 873,102	Gas
Coal drill supporting frame, W. H. Clark	k-	Gas
Coal hoist electrically operated Hende	r-	Ga1 Gea
Cock, time controlled gas, A. Davis Coll support, field, E. T. Mug Coin receptacle safety device, J. Nutry. Coke oven door jamb, E. H. Abraham Collar dampening and folding device, E. (Skirner	. 873,312 . 873,026	Gea Gea
Coil support, field, E. T. Mug	873,160 873,678 873,479	Gla
Coke oven door jamb, E. H. Abraham Collar dampening and folding device, E. (873,479 3.	Glo Go- Gol
Skinner	873,179 873,077 873,260	Gol Goo
Skinner Comb cementing clamp, F. J. Patnod Compost digger and elevator, G. Noll Concrete construction, subaqueous, F. 1	R. 873,260	
McQueen	873,581 873,634	Gra Gra
Concrete work mold, F. M. Stults Condenser, electric, F. S. Koch	873,138 873,053	Gri Gri
Confectionery, article of, G. Heppe Control system, Darlington & Schairer	. 873,138 . 873,053 . 873,369 . 873,351 . 873,672	Gri
Cooking utensil, Loudenslager & Morris. Copper and other metals, electrodeposition	873,672 on	Gro
of, S. O. Cowper-Coles	873,508 0, 873,684	Gro
Concrete construction, subaqueous, F. I. McQueen Concrete tile mold, W. S. Thomas. Concrete work mold, F. M. Stults. Condenser, electric, F. S. Koch. Confectionery, article of, G. Heppe Control system, Darlington & Schairer. Cooking utensil, Loudenslager & Morris. Copper and other metals, electrodeposition, S. O. Cowper-Coles	F. 873,498 873,610	Gu
		Gu
Corset, J. Lindauer Corset, apparel, A. H. Benjamin Cotton chopper, H. P. Mizell Cotton chopper and cultivator, Higgs Hamilton Creta kneekdown A Williman	873,443 873,489 873,255	Ha Ha
Cotton chopper and cultivator, Higgs Hamilton	& 873,548	Ha Ha
Crate, knockdown, A. Williman Crate, metallic, J. Repetto	873,645 873,086	Ha Ha
Hamilton Crate, knockdown, A. Williman Crate, metallic, J. Repetto Crate or case for bottles, Jars, and ti like, metallic, J. Repetto Cross arm and insulator therefor, wire ca	he 873,085	Ha He
Cross arm and insulator therefor, wire carving, E. C. Ottinger	r- 873,456	Hie
Cultivator weeder attachment S. A. McCui	873,561 ne 873,383	Hie
Cultivator, wheeled, J. S. Kendig Curtain support and hanger, J. Garret Curtains, automatic uncoupling handle f vestibule. H. M. Robertson	873,376 873,038	Hi Ho
Curtains, automatic uncoupling handle f vestibule, H. M. Robertson	or 873,091	Ho Ho
Cutlery, table, W. H. Smith Cutting out circular or elliptical form	873,274 is,	Ho Ho
Cutlery, table, W. H. Smith Cutting out circular or elliptical form machine for, C. C. Wais Damper, A. W. Walker Dalivering anticles of manufacture from	873,395 873,141	Но
Delivering articles of manufacture from collecting receptacle, device for aut	a.	Ho Ho
collecting recentuals device for out	a.	Ho Ho Ho
collecting receptacle, device for aut matically, P. Raabe	873,268 873,100 873,015	Ho Ho Ho Ho Ho
collecting receptacle, device for aut matically, P. Raabe	873,268 873,100 873,015	Ho Ho Ho Ho Ho Ho
collecting receptacle, device for aut matically, P. Raabe	873,268 873,100 873,015	Ho Ho Ho Ho Ho Ho Ho
collecting receptacle, device for aut matically, P. Raabe	873,268 873,100 873,015	Ho Ho Ho Ho Ho Ho Hu Hy Ice
collecting receptacle, device for aut matically, P. Raabe Dental broach, C. A. Skalstad Dental chair, A. W. Browne Derailer, M. C. Sloderbeck Derrick, E. E. Jenkins Detinning, E. A. Sperry Digger, See Compost digger. Directory, telephone, C. E. Napp Display can, sheet metal, F. Rudolphi. Display card rack, F. L. Stone. Display device, C. C. Fleming. Distribution system, J. B. Taylor.	873,268 873,100 873,015 873,622 873,374 873,699 873,184 873,184 873,184	Ho Ho Ho Ho Ho Ho Hu Hy
collecting receptacle, device for aut matically, P. Raabe Dental broach, C. A. Skalstad Dental chair, A. W. Browne Derailer, M. C. Sloderbeck Derrick, E. E. Jenkins Detinning, E. A. Sperry Digger, See Compost digger. Directory, telephone, C. E. Napp Display can, sheet metal, F. Rudolphi. Display card rack, F. L. Stone. Display device, C. C. Fleming. Distribution system, J. B. Taylor.	873,268 873,100 873,015 873,622 873,374 873,699 873,184 873,184 873,184	Ho Ho Ho Ho Ho Hu Hy Ice Illi
collecting receptacle, device for aut matically, P. Raabe Dental broach, C. A. Skalstad Dental chair, A. W. Browne Derailer, M. C. Sloderbeck Derrick, E. E. Jenkins Detinning, E. A. Sperry Digger, See Compost digger. Directory, telephone, C. E. Napp Display can, sheet metal, F. Rudolphi. Display card rack, F. L. Stone. Display device, C. C. Fleming. Distribution system, J. B. Taylor.	873,268 873,100 873,015 873,622 873,374 873,699 873,184 873,184 873,184	Ho Ho Ho Ho Ho Ho Ho Institute in the second
collecting receptacle, device for aut matically, P. Raabe Dental broach, C. A. Skalstad Dental chair, A. W. Browne Derailer, M. C. Sloderbeck Derrick, E. E. Jenkins Detinning, E. A. Sperry Digger, See Compost digger. Directory, telephone, C. E. Napp Display can, sheet metal, F. Rudolphi. Display card rack, F. L. Stone. Display device, C. C. Fleming. Distribution system, J. B. Taylor.	a 6 873,268 873,010 873,015 873,692 873,374 873,699 873,137 873,184 873,580 873,483 87	Ho Ho Ho Ho Ho Hu Hy Ice Illi Inc Ins Ins
collecting receptacle, device for aut matically, P. Raabe Dental broach, C. A. Skalstad Dental chair, A. W. Browne Derailer, M. C. Sloderbeck Derrick, E. E. Jenkins Detinning, E. A. Sperry Digger. See Compost digger. Directory, telephone, C. E. Napp Display can, sheet metal, F. Rudolphi. Display card rack, F. L. Stone Display device, C. C. Fleming. Distribution system, J. B. Taylor. Door attachment, screen, C. S. McElroy. Door check, J. S. Young Door closer and check, W. K. Henry. Door, grain, W. H. Ascue Door hanger, J. W. Harris Door hanger track, P. A. Myers. Door captating mechanism, R. F. Le Bro	873,268 873,100 873,015 873,612 873,374 873,699 873,137 873,184 873,142 873,184 873,421 873,493 873,493 873,693 873,693 873,693 873,230 873,230 873,068	Ho Ho Ho Ho Ho Ho Ho Ince Ince Inter
collecting receptacle, device for aut matically, P. Raabe Dental broach, C. A. Skalstad Dental chair, A. W. Browne Derailer, M. C. Sloderbeck Derrick, E. E. Jenkins Detinning, E. A. Sperry Digger. See Compost digger. Directory, telephone, C. E. Napp Display can, sheet metal, F. Rudolphi. Display card rack, F. L. Stone. Display device, C. C. Fleming. Distribution system, J. B. Taylor. Door attachment, screen, C. S. McElroy. Door closer and check, W. K. Henry. Door closer and check, W. K. Henry. Door hanger, J. W. Harris Door hanger track, P. A. Myers. Door operating mechanism, R. F. Le Bro Double flange trap and sink, G. E. Dunstr	873,268 873,100 873,101 873,615 873,622 873,699 873,184 873,184 873,184 873,184 873,184 873,421 873,589 873,693 873,693 873,058 873,058 873,058 873,358 873,358	Ho Ho Ho Ho Ho Ho Ho Hu Ind Ind Ind Int Int Int
collecting receptacle, device for aut matically, P. Raabe Dental broach, C. A. Skalstad Dental chair, A. W. Browne Derailer, M. C. Sloderbeck Derrick, E. E. Jenkins Detinning, E. A. Sperry Digger. See Compost digger. Directory, telephone, C. E. Napp Display can, sheet metal, F. Rudolphi. Display cand rack, F. L. Stone. Display device, C. C. Fleming. Distribution system, J. B. Taylor. Door attachment, screen, C. S. McElroy. Door closer and check, W. K. Henry. Door closer and check, W. K. Henry. Door banger, J. W. Harris Door hanger track, P. A. Myers. Door operating mechanism, R. F. Le Bro Double flange trap and sink, G. E. Dunst: Double flange trap and sink, G. E. Dunst: Dough dividing machine for bread makin G. T. Pendrith Drawing instrument for parallel rulin	873,268 873,100 873,101 873,615 873,622 873,699 873,184 873,184 873,184 873,184 873,184 873,421 873,589 873,693 873,693 873,058 873,058 873,058 873,358 873,358	Ho Ho Ho Ho Ho Ho Ho Ind Ind Ins Int Int Int Int Int Int
collecting receptacle, device for aut matically, P. Raabe Dental broach, C. A. Skalstad Dental chair, A. W. Browne Derailer, M. C. Sloderbeck Derrick, E. E. Jenkins Detinning, E. A. Sperry Digger. See Compost digger. Directory, telephone, C. E. Napp Display can, sheet metal, F. Rudolphi. Display card rack, F. L. Stone. Display device, C. C. Fleming. Distribution system, J. B. Taylor. Door attachment, screen, C. S. McElroy. Door closer and check, W. K. Henry. Door closer and check, W. K. Henry. Door hanger, J. W. Harris Door hanger, J. W. Harris Door hanger track, P. A. Myers. Door ling, J. Erwood Double flange trap and sink, G. E. Dunst: Double in the company of the company o	a 6 873,268 873,100 873,100 873,612 873,622 873,374 873,184 873,184 873,421 873,184 873,421 873,184 873,433 873,433 873,433 873,120 873,683 873,683 873,683 873,683 873,683 873,683 873,120 873,683 873,683 873,120 873,683 873,120 873,683 873,120 873,683 873,120 873,682 873,358 873,120 873,682 873,358 873,120 873,682 873,358 873,120 873,682 873,358 873,225 873,682	Ho Ince Illi Inc. Int. Int. Int. Int. Int. Int. Int. Int
collecting receptacle, device for aut matically, P. Raabe Dental broach, C. A. Skalstad Dental chair, A. W. Browne Derailer, M. C. Sloderbeck Derrick, E. E. Jenkins Detinning, E. A. Sperry Digger, See Compost digger. Directory, telephone, C. E. Napp Display can, sheet metal, F. Rudolphi. Display cand rack, F. L. Stone. Display device, C. C. Fleming. Distribution system, J. B. Taylor Door attachment, screen, C. S. McElroy. Door check, J. S. Young. Door check, J. S. Young. Door, grain, W. H. Ascue Door hanger, J. W. Harris Door hanger track, P. A. Myers. Door perating mechanism, R. F. Le Bro Double flange trap and sink, G. E. Dunst: Dough dividing machine for bread makin G. T. Pendrith Drawer support, C. A. Gehne Drawing instrument for parallel rulin T. English Drill, S. Lake	a 6 873,268 873,015 873,619 873,619 873,622 873,374 873,629 873,184 873,194 873,623 873,623 873,623 873,058 873,230 873,524 873,524 873,526 87	Ho Ins Institution In
collecting receptacle, device for aut matically, P. Raabe Dental broach, C. A. Skalstad Dental chair, A. W. Browne Derailer, M. C. Sloderbeck Derrick, E. E. Jenkins Detinning, E. A. Sperry Digger, See Compost digger. Directory, telephone, C. E. Napp Display can, sheet metal, F. Rudolphi. Display cand rack, F. L. Stone. Display device, C. C. Fleming. Distribution system, J. B. Taylor Door attachment, screen, C. S. McElroy. Door check, J. S. Young. Door check, J. S. Young. Door, grain, W. H. Ascue Door hanger, J. W. Harris Door hanger track, P. A. Myers. Door perating mechanism, R. F. Le Bro Double flange trap and sink, G. E. Dunst: Dough dividing machine for bread makin G. T. Pendrith Drawer support, C. A. Gehne Drawing instrument for parallel rulin T. English Drill, S. Lake	a 6 873,268 873,015 873,619 873,619 873,622 873,374 873,629 873,184 873,194 873,623 873,623 873,623 873,058 873,230 873,524 873,524 873,526 87	Ho Ince Inc. Inc. Int. Int. Int. Int. Int. Int. Int. Int
collecting receptacle, device for aut matically, P. Raabe Dental broach, C. A. Skalstad Dental chair, A. W. Browne Derailer, M. C. Sloderbeck Derrick, E. E. Jenkins Detinning, E. A. Sperry Digger, See Compost digger. Directory, telephone, C. E. Napp Display can, sheet metal, F. Rudolphi. Display cand rack, F. L. Stone. Display device, C. C. Fleming. Distribution system, J. B. Taylor Door attachment, screen, C. S. McElroy. Door check, J. S. Young. Door check, J. S. Young. Door, grain, W. H. Ascue Door hanger, J. W. Harris Door hanger track, P. A. Myers. Door perating mechanism, R. F. Le Bro Double flange trap and sink, G. E. Dunst: Dough dividing machine for bread makin G. T. Pendrith Drawer support, C. A. Gehne Drawing instrument for parallel rulin T. English Drill, S. Lake	a 6 873,268 873,015 873,619 873,619 873,622 873,374 873,629 873,184 873,194 873,623 873,623 873,623 873,058 873,230 873,058 873,230 873,524 873,524 873,526 87	Ho Inc. Inc. Inc. Inc. Inc. Inc. Inc. Inc.
collecting receptacle, device for aut matically, P. Raabe Dental broach, C. A. Skalstad Dental chair, A. W. Browne Derailer, M. C. Sloderbeck Derrick, E. E. Jenkins Detinning, E. A. Sperry Digger. See Compost digger. Directory, telephone, C. E. Napp Display can, sheet metal, F. Rudolphi. Display cand rack, F. L. Stone. Display card rack, F. L. Stone. Display device, C. C. Fleming. Distribution system, J. B. Taylor. Door attachment, screen, C. S. McElroy. Door closer and check, W. K. Henry. Door, grain, W. H. Ascue Door hanger, J. W. Harris Door hanger, J. W. Harris Door hanger track, P. A. Myers. Door perating mechanism, R. F. Le Bro Double flange trap and sink, G. E. Dunst: Dough dividing machine for bread makin G. T. Pendrith Drawne support, C. A. Gehne Drawing instrument for parallel rulin T. English Drill, S. Lake Drying and ventilating system for house factories, or buildings, G. Muller. Dumb bell, magneto electric, J. Moores. Dump bed, automatic, C. C. Taylor, et al Dust collector, G. H. Forsyth. Dust pan, S. C. Courtney. Dyeing, Waldinger & Iserloth	a 873,268 873,100 873,612 873,612 873,622 873,374 873,184 873,184 873,421 873,184 873,184 873,184 873,184 873,185 873,185 873,185 873,185 873,185 873,185 873,185 873,185 873,185 873,185 873,185 873,185 873,185 873,185 873,185 873,185 873,185 873,185 873,524 873,185 873,187 873,187 873,187 873,187 873,277	Ho H
collecting receptacle, device for aut matically, P. Raabe Dental broach, C. A. Skalstad Dental chair, A. W. Browne Derailer, M. C. Sloderbeck Derrick, E. E. Jenkins Detinning, E. A. Sperry Digger. See Compost digger. Directory, telephone, C. E. Napp Display can, sheet metal, F. Rudolphi. Display cand rack, F. L. Stone. Display card rack, F. L. Stone. Display device, C. C. Fleming. Distribution system, J. B. Taylor. Door attachment, screen, C. S. McElroy. Door closer and check, W. K. Henry. Door, grain, W. H. Ascue Door hanger, J. W. Harris Door hanger, J. W. Harris Door hanger track, P. A. Myers. Door perating mechanism, R. F. Le Bro Double flange trap and sink, G. E. Dunst: Dough dividing machine for bread makin G. T. Pendrith Drawne support, C. A. Gehne Drawing instrument for parallel rulin T. English Drill, S. Lake Drying and ventilating system for house factories, or buildings, G. Muller. Dumb bell, magneto electric, J. Moores. Dump bed, automatic, C. C. Taylor, et al Dust collector, G. H. Forsyth. Dust pan, S. C. Courtney. Dyeing, Waldinger & Iserloth	a 873,268 873,100 873,612 873,612 873,622 873,374 873,184 873,184 873,421 873,184 873,184 873,184 873,184 873,185 873,185 873,185 873,185 873,185 873,185 873,185 873,185 873,185 873,185 873,185 873,185 873,185 873,185 873,185 873,185 873,185 873,185 873,524 873,185 873,187 873,187 873,187 873,187 873,277	Ho Inc
collecting receptacle, device for aut matically, P. Raabe Dental broach, C. A. Skalstad Dental chair, A. W. Browne Derailer, M. C. Sloderbeck Derrick, E. E. Jenkins Detinning, E. A. Sperry Digger, See Compost digger. Directory, telephone, C. E. Napp Display can, sheet metal, F. Rudolphi. Display cand rack, F. L. Stone. Display device, C. C. Fleming. Distribution system, J. B. Taylor Door attachment, screen, C. S. McElroy. Door check, J. S. Young Door check, J. S. Young Door choser and check, W. K. Henry. Door, grain, W. H. Ascue Door hanger track, P. A. Myers. Door hanger track, P. A. Myers. Door perating mechanism, R. F. Le Bro Doon, rolling, J. Erwood Double flange trap and sink, G. E. Dunst: Double diange trap and sink, G. E. Dunst: Dough dividing machine for bread makin G. T. Pendrith Drawer support, C. A. Gehne Drawing instrument for parallel rulin T. English Drill, S. Lake Drying and ventilating system for house factories, or buildings, G. Muller. Dumb bed, automatic, C. C. Taylor, et al Dust collector, G. H. Forsyth. Dust pan, S. C. Courtney. Dupting, Waldinger & Iserloth Dyeing, Waldinger & Iserloth Dyeing, H. Toepfer Easel, photograph, H. C. Itter Eaves strip, W. Behl Eaves strough support, C. H. Molyneux.	a	Ho H
collecting receptacle, device for aut matically, P. Raabe Dental broach, C. A. Skalstad Dental chair, A. W. Browne Derailer, M. C. Sloderbeck Derrick, E. E. Jenkins Detinning, E. A. Sperry Digger. See Compost digger. Directory, telephone, C. E. Napp Display can, sheet metal, F. Rudolphi. Display cand rack, F. L. Stone. Display device, C. C. Fleming. Distribution system, J. B. Taylor. Door attachment, screen, C. S. McElroy. Door closer and check, W. K. Henry. Door closer and check, W. K. Henry. Door hanger, J. W. Harris Door hanger, J. W. Harris Door hanger track, P. A. Myers. Door operating mechanism, R. F. Le Bro Double flange trap and sink, G. E. Dunst: Dough dividing machine for bread makin G. T. Pendrith Drawer support, C. A. Gehne Drawing instrument for parallel rulin T. English Drill, S. Lake Drying and ventilating system for house factories, or buildings, G. Muller. Dumb bed, automatic, C. C. Taylor, et al Dust collector, G. H. Forsyth. Dust pan, S. C. Courtney. Dyeing, Waldinger & Iserloth Dyeing, Waldinger & Iserloth Dyeing, H. Toepfer Easel, photograph, H. C. Itter. Eaves trough support, C. H. Molyneux. Edger, G. M. Hinkley	a	Ho H
collecting receptacle, device for aut matically, P. Raabe Dental broach, C. A. Skalstad Dental chair, A. W. Browne Derailer, M. C. Sloderbeck Derrick, E. E. Jenkins Detinning, E. A. Sperry Digger. See Compost digger. Directory, telephone, C. E. Napp Display can, sheet metal, F. Rudolphi. Display cand rack, F. L. Stone. Display device, C. C. Fleming. Distribution system, J. B. Taylor. Door attachment, screen, C. S. McElroy. Door closer and check, W. K. Henry. Door closer and check, W. K. Henry. Door hanger, J. W. Harris Door hanger, J. W. Harris Door hanger track, P. A. Myers. Door operating mechanism, R. F. Le Bro Double flange trap and sink, G. E. Dunst: Dough dividing machine for bread makin G. T. Pendrith Drawer support, C. A. Gehne Drawing instrument for parallel rulin T. English Drill, S. Lake Drying and ventilating system for house factories, or buildings, G. Muller. Dumb bed, automatic, C. C. Taylor, et al Dust collector, G. H. Forsyth. Dust pan, S. C. Courtney. Dyeing, Waldinger & Iserloth Dyeing, Waldinger & Iserloth Dyeing, H. Toepfer Easel, photograph, H. C. Itter. Eaves trough support, C. H. Molyneux. Edger, G. M. Hinkley	a	Ho H
collecting receptacle, device for aut matically, P. Raabe Dental broach, C. A. Skalstad Dental chair, A. W. Browne Derailer, M. C. Sloderbeck Derrick, E. E. Jenkins Detinning, E. A. Sperry Digger. See Compost digger. Directory, telephone, C. E. Napp Display can, sheet metal, F. Rudolphi. Display cand rack, F. L. Stone. Display device, C. C. Fleming. Distribution system, J. B. Taylor. Door attachment, screen, C. S. McElroy. Door closer and check, W. K. Henry. Door closer and check, W. K. Henry. Door hanger, J. W. Harris Door hanger, J. W. Harris Door hanger track, P. A. Myers. Door operating mechanism, R. F. Le Bro Double flange trap and sink, G. E. Dunst: Dough dividing machine for bread makin G. T. Pendrith Drawer support, C. A. Gehne Drawing instrument for parallel rulin T. English Drill, S. Lake Drying and ventilating system for house factories, or buildings, G. Muller. Dumb bed, automatic, C. C. Taylor, et al Dust collector, G. H. Forsyth. Dust pan, S. C. Courtney. Dyeing, Waldinger & Iserloth Dyeing, Waldinger & Iserloth Dyeing, H. Toepfer Easel, photograph, H. C. Itter. Eaves trough support, C. H. Molyneux. Edger, G. M. Hinkley	a	Ho H
collecting receptacle, device for aut matically, P. Raabe Dental broach, C. A. Skalstad Dental chair, A. W. Browne Derailer, M. C. Sloderbeck Derrick, E. E. Jenkins Detinning, E. A. Sperry Digger, See Compost digger. Directory, telephone, C. E. Napp Display can, sheet metal, F. Rudolphi. Display cand rack, F. L. Stone. Display cand rack, F. L. Stone. Display device, C. C. Fleming. Door attachment, screen, C. S. McElroy. Door attachment, screen, C. S. McElroy. Door closer and check, W. K. Henry. Door closer and check, W. K. Henry. Door hanger, J. W. Harris Door hanger, J. W. Harris Door operating mechanism, R. F. Le Bro Door pling, J. Erwood Double flange trap and sink, G. E. Dunst. Dough dividing machine for bread makin G. T. Pendrith Drawer support, C. A. Gehne Drawing instrument for parallel rulin T. English Drill, S. Lake Drying and ventilating system for house factories, or buildings, G. Muller. Dumb bell, magneto electric, J. Moores, Dumb bed, automatic, C. C. Taylor, et al Dust collector, G. H. Forsyth. Dyeing, Waldinger & Iserloth Dyeing, H. Toepfer Easel, photograph, H. C. Itter Eaves strip, W. Behl Eaves trough support, C. H. Molyneux Electric accumulator, Marino & Barto Wight Electric cable, C. W. Davis Electric reaction, J. E. Noe	a	Ho H
collecting receptacle, device for aut matically, P. Raabe Dental broach, C. A. Skalstad Dental chair, A. W. Browne Derailer, M. C. Sloderbeck Derrick, E. E. Jenkins Detinning, E. A. Sperry Digger, See Compost digger. Directory, telephone, C. E. Napp Display can, sheet metal, F. Rudolphi. Display cand rack, F. L. Stone. Display card rack, F. L. Stone. Display device, C. C. Fleming. Distribution system, J. B. Taylor. Door attachment, screen, C. S. McElroy. Door closer and check, W. K. Henry. Door closer and check, W. K. Henry. Door parain, W. H. Ascue Door hanger, J. W. Harris Door hanger, J. W. Harris Door operating mechanism, R. F. Le Bro Door loser and check, W. K. Henry. Door operating mechanism, R. F. Le Bro Door banger, J. W. Harris Double flange trap and sink, G. E. Dunst. Dough dividing machine for bread makin G. T. Pendrith Drawner support, C. A. Gebne Drawing instrument for bread makin T. English Drill, S. Lake Drying and ventilating system for house factories, or buildings, G. Muller. Dumb bell, magneto electric, J. Moores. Dump bed, automatic, C. C. Taylor, et al Dust collector, G. H. Forsyth Dust collector, G. H. Forsyth Dust pan, S. C. Courtney. Dveing, Waldinger & Iserloth Dreing, H. Toepfer Easel, photograph, H. C. Itter. Eaves trough support, C. H. Molyneux. Edger, G. M. Hinkley Electric accumulator, Marino & Barte Wright Electric capparatus, H. L. Beach Electric reparatus, H. L. Beach Electric cheater, M. Landry Electric machine, dynamo, J. E. Noe gerath	a	Ho H
collecting receptacle, device for aut matically, P. Raabe Dental broach, C. A. Skalstad Dental chair, A. W. Browne Derailer, M. C. Sloderbeck Derrick, E. E. Jenkins Detinning, E. A. Sperry Digger, See Compost digger. Directory, telephone, C. E. Napp Display can, sheet metal, F. Rudolphi. Display cand rack, F. L. Stone. Display card rack, F. L. Stone. Display device, C. C. Fleming. Distribution system, J. B. Taylor. Door attachment, screen, C. S. McElroy. Door closer and check, W. K. Henry. Door closer and check, W. K. Henry. Door parain, W. H. Ascue Door hanger, J. W. Harris Door hanger, J. W. Harris Door operating mechanism, R. F. Le Bro Door loser and check, W. K. Henry. Door operating mechanism, R. F. Le Bro Door banger, J. W. Harris Double flange trap and sink, G. E. Dunst. Dough dividing machine for bread makin G. T. Pendrith Drawner support, C. A. Gebne Drawing instrument for bread makin T. English Drill, S. Lake Drying and ventilating system for house factories, or buildings, G. Muller. Dumb bell, magneto electric, J. Moores. Dump bed, automatic, C. C. Taylor, et al Dust collector, G. H. Forsyth Dust collector, G. H. Forsyth Dust pan, S. C. Courtney. Dveing, Waldinger & Iserloth Dreing, H. Toepfer Easel, photograph, H. C. Itter. Eaves trough support, C. H. Molyneux. Edger, G. M. Hinkley Electric accumulator, Marino & Barte Wright Electric capparatus, H. L. Beach Electric reparatus, H. L. Beach Electric cheater, M. Landry Electric machine, dynamo, J. E. Noe gerath	a	Hoo
collecting receptacle, device for aut matically, P. Raabe Dental broach, C. A. Skalstad Dental chair, A. W. Browne Derailer, M. C. Sloderbeck Derrick, E. E. Jenkins Detinning, E. A. Sperry Digger, See Compost digger. Directory, telephone, C. E. Napp Display can, sheet metal, F. Rudolphi. Display cand rack, F. L. Stone. Display card rack, F. L. Stone. Display device, C. C. Fleming. Distribution system, J. B. Taylor. Door attachment, screen, C. S. McElroy. Door closer and check, W. K. Henry. Door closer and check, W. K. Henry. Door parain, W. H. Ascue Door hanger, J. W. Harris Door hanger, J. W. Harris Door operating mechanism, R. F. Le Bro Door loser and check, W. K. Henry. Door operating mechanism, R. F. Le Bro Door hanger track, P. A. Myers. Door operating mechanism, R. F. Le Bro Dough dividing machine for bread makin G. T. Pendrith Drawer support, C. A. Gehne Drawing instrument for parallel rulin T. English Drill, S. Lake Drying and ventilating system for house factories, or buildings, G. Muller. Dumb bell, magneto electric, J. Moores. Dump bed, automatic, C. C. Taylor, et al Dust collector, G. H. Forsyth. Dveing, H. Toepfer Easel, photograph, H. C. Itter Eaves strip, W. Behl Eaves strip, W. Behl Eaves strip, W. Behl Eaves trough support, C. H. Molyneux. Edger, G. M. Hinkley Lectric apparatus, H. L. Beach Electric cable, C. W. Davis Electric machine, dynamo, J. E. Noe gerath Electric machine, dynamo, J. E. Noe Electric machine, dynamo, J. E. Noe Electric machine, dynamo, J. E. Noe Electric machine, dynamo, J. E. Ruelbeer Electrical apparatus coil, P. MacGahan.	a	Hoo
collecting receptacle, device for aut matically, P. Raabe Dental broach, C. A. Skalstad Dental chair, A. W. Browne Derailer, M. C. Sloderbeck Derrick, E. E. Jenkins Detinning, E. A. Sperry Digger, See Compost digger. Directory, telephone, C. E. Napp Display can, sheet metal, F. Rudolphi. Display cand rack, F. L. Stone. Display card rack, F. L. Stone. Display device, C. C. Fleming. Distribution system, J. B. Taylor. Door attachment, screen, C. S. McElroy. Door closer and check, W. K. Henry. Door closer and check, W. K. Henry. Door parain, W. H. Ascue Door hanger, J. W. Harris Door hanger, J. W. Harris Door operating mechanism, R. F. Le Bro Door ling, J. Erwood Double flange trap and sink, G. E. Dunst. Dough dividing machine for bread makin G. T. Pendrith Drawer support, C. A. Gebne Drawing instrument for parallel rulin T. English Drill, S. Lake Drying and ventilating system for house factories, or buildings, G. Muller. Dumb bell, magneto electric, J. Moores. Dump bed, automatic, C. Taylor, et al Dust collector, G. H. Forsyth Dveing, H. Toepfer Easel, photograph, H. C. Itter Eaves strip, W. Behl Electric apparatus, H. L. Beach Electric machine, static, W. C. Shinn. Electrical apparatus, G. J. Galbraith Electrical testing system H. E. Miller. Electrical apparatus, G. J. Galbraith Electrical testing system H. E. Miller.	a	Hoo
collecting receptacle, device for aut matically, P. Raabe Dental broach, C. A. Skalstad Dental chair, A. W. Browne Derailer, M. C. Sloderbeck Derrick, E. E. Jenkins Detinning, E. A. Sperry Digger, See Compost digger. Directory, telephone, C. E. Napp Display can, sheet metal, F. Rudolphi. Display cand rack, F. L. Stone. Display card rack, F. L. Stone. Display device, C. C. Fleming. Distribution system, J. B. Taylor. Door attachment, screen, C. S. McElroy. Door closer and check, W. K. Henry. Door closer and check, W. K. Henry. Door parain, W. H. Ascue Door hanger, J. W. Harris Door hanger, J. W. Harris Door operating mechanism, R. F. Le Bro Door ling, J. Erwood Double flange trap and sink, G. E. Dunst. Dough dividing machine for bread makin G. T. Pendrith Drawer support, C. A. Gebne Drawing instrument for parallel rulin T. English Drill, S. Lake Drying and ventilating system for house factories, or buildings, G. Muller. Dumb bell, magneto electric, J. Moores. Dump bed, automatic, C. Taylor, et al Dust collector, G. H. Forsyth Dveing, H. Toepfer Easel, photograph, H. C. Itter Eaves strip, W. Behl Electric apparatus, H. L. Beach Electric machine, static, W. C. Shinn. Electrical apparatus, G. J. Galbraith Electrical testing system H. E. Miller. Electrical apparatus, G. J. Galbraith Electrical testing system H. E. Miller.	a	Hoo
collecting receptacle, device for aut matically, P. Raabe Dental broach, C. A. Skalstad Dental chair, A. W. Browne Derailer, M. C. Sloderbeck Derrick, E. E. Jenkins Detinning, E. A. Sperry Digger. See Compost digger. Directory, telephone, C. E. Napp Display can, sheet metal, F. Rudolphi. Display cand rack, F. L. Stone. Display card rack, F. L. Stone. Display device, C. C. Fleming. Distribution system, J. B. Taylor. Door attachment, screen, C. S. McElroy. Door closer and check, W. K. Henry. Door closer and check, W. K. Henry. Door panger, J. W. Harris Door hanger, J. W. Harris Door hanger, J. W. Harris Door hanger, J. W. Harris Door perating mechanism, R. F. Le Bro Double flange trap and sink, G. E. Dunst: Double diange trap and sink, G. E. Dunst: Double flange trap and sink, G. E. Dunst: Double flange trap and sink, G. E. Dunst: Double flange trap and sink, G. E. Dunst: Drawing instrument for parallel rulin T. English Drawing instrument for parallel rulin T. English Drill, S. Lake Drying and ventilating system for house factories, or buildings, G. Muller. Dumb bed, automatic, C. C. Taylor, et al Dust collector, G. H. Forsyth. Dust pan, S. C. Courtney. Dyeing, Waldinger & Iserloth Dyeing	a	Hoo
collecting receptacle, device for aut matically, P. Raabe Dental broach, C. A. Skalstad Dental chair, A. W. Browne Derailer, M. C. Sloderbeck Derrick, E. E. Jenkins Detinning, E. A. Sperry Digger, See Compost digger. Directory, telephone, C. E. Napp Display can, sheet metal, F. Rudolphi. Display cand rack, F. L. Stone. Display card rack, F. L. Stone. Display device, C. C. Fleming. Distribution system, J. B. Taylor. Door attachment, screen, C. S. McElroy. Door closer and check, W. K. Henry. Door closer and check, W. K. Henry. Door parain, W. H. Ascue Door hanger, J. W. Harris Door hanger, J. W. Harris Door operating mechanism, R. F. Le Bro Door loser and check, W. K. Henry. Door operating mechanism, R. F. Le Bro Door hanger track, P. A. Myers. Door operating mechanism, R. F. Le Bro Dough dividing machine for bread makin G. T. Pendrith Drawer support, C. A. Gehne Drawing instrument for parallel rulin T. English Drill, S. Lake Drying and ventilating system for house factories, or buildings, G. Muller. Dumb bell, magneto electric, J. Moores. Dump bed, automatic, C. C. Taylor, et al Dust collector, G. H. Forsyth. Dveing, H. Toepfer Easel, photograph, H. C. Itter Eaves strip, W. Behl Eaves strip, W. Behl Eaves trough support, C. H. Molyneux. Edger, G. M. Hinkley Lectric apparatus, H. L. Beach Electric cable, C. W. Davis Electric machine, dynamo, J. E. Noe gerath Electric machine, dynamo, J. E. Noe gerath Electric machine, dynamo, J. E. Noe Electric wires, rotating bracket for tous suspension of, C. E. Buckbee Electrical testing system H. E. Miller Elevator safety appliance, S. Bruce Ellipsogr	a	Hoo
collecting receptacle, device for aut matically, P. Raabe Dental broach, C. A. Skalstad Dental chair, A. W. Browne Derailer, M. C. Sloderbeck Derrick, E. E. Jenkins Detinning, E. A. Sperry Digger, See Compost digger. Directory, telephone, C. E. Napp Display can, sheet metal, F. Rudolphi. Display cand rack, F. L. Stone. Display cand rack, F. L. Stone. Display device, C. C. Fleming. Distribution system, J. B. Taylor. Door attachment, screen, C. S. McElroy. Door closer and check, W. K. Henry. Door closer and check, W. K. Henry. Door parain, W. H. Ascue Door hanger, J. W. Harris Door hanger, J. W. Harris Door operating mechanism, R. F. Le Bro Door loser and check, W. K. Henry. Door operating mechanism, R. F. Le Bro Door hanger track, P. A. Myers. Door operating mechanism for bread makin G. T. Pendrith Drawer support, C. A. Gehne Drawing instrument for parallel rulin T. English Drill, S. Lake Drying and ventilating system for house factories, or buildings, G. Muller. Dumb bell, magneto electric, J. Moores. Dump bed, automatic, C. C. Taylor, et al Dust collector, G. H. Forsyth Dveing, Waldinger & Iserloth Dveing, H. Toepfer Easel, photograph, H. C. Itter. Eaves trough support, C. H. Molyneux. Edger, G. M. Hinkley Electric apparatus, H. C. Itter. Eaves trough support, C. H. Molyneux Edger, G. M. Hinkley Electric apparatus, H. L. Beach Electric apparatus, H. L. Beach Electric apparatus, H. L. Beach Electric machine, dynamo, J. E. Noe gerath Electric machine, static, W. C. Shinn. Electrical testing system, H. E. Miller. Elevator bucket, A. W. Berkner Elelevator safety appliance, S. Bruce Ellipsograph, N. D. S. K. Beck. Engines, intake device for explosive mi tures in vapor, C. P. Hollister Engraving machine, E. Bausch Entrail Cleaning mechanism, H. Hake holz	a	Hoo
collecting receptacle, device for aut matically, P. Raabe Dental broach, C. A. Skalstad Dental chair, A. W. Browne Derailer, M. C. Sloderbeck Derrick, E. E. Jenkins Detinning, E. A. Sperry Digger. See Compost digger. Directory, telephone, C. E. Napp Display can, sheet metal, F. Rudolphi. Display cand rack, F. L. Stone. Display cand rack, F. L. Stone. Display device, C. C. Fleming. Distribution system, J. B. Taylor. Door attachment, screen, C. S. McElroy. Door closer and check, W. K. Henry. Door closer and check, W. K. Henry. Door parin, W. H. Ascue. Door hanger, J. W. Harris Door operating mechanism, R. F. Le Bro Door, rolling, J. Erwood Double flange trap and sink, G. E. Dunst: Drawing instrument for bread makin G. T. Pendrith Drawer support, C. A. Gehne Drawing instrument for parallel rulin T. English Drill, S. Lake Drying and ventilating system for house factories, or buildings, G. Muller. Dumb bell, magneto electric, J. Moores. Dump bed, automatic, C. C. Taylor, et al Dust collector, G. H. Forsyth. Dust pan, S. C. Courtney. Dyeing, Waldinger & Iserloth Dyeing, Waldinger & Is	a	Ho H
collecting receptacle, device for aut matically, P. Raabe Dental broach, C. A. Skalstad Dental chair, A. W. Browne Derailer, M. C. Sloderbeck Derrick, E. E. Jenkins Detinning, E. A. Sperry Digger. See Compost digger. Directory, telephone, C. E. Napp Display can, sheet metal, F. Rudolphi. Display cand rack, F. L. Stone. Display cand rack, F. L. Stone. Display device, C. C. Fleming. Distribution system, J. B. Taylor. Door attachment, screen, C. S. McElroy. Door closer and check, W. K. Henry. Door closer and check, W. K. Henry. Door parin, W. H. Ascue Door hanger, J. W. Harris Door operating mechanism, R. F. Le Bro Door, rolling, J. Erwood Double flange trap and sink, G. E. Dunst: Drawing instrument for bread makin G. T. Pendrith Drawer support, C. A. Gehne Drawing instrument for parallel rulin T. English Drill, S. Lake Drying and ventilating system for house factories, or buildings, G. Muller. Dumb bell, magneto electric, J. Moores. Dump bed, automatic, C. C. Taylor, et al Dust collector, G. H. Forsyth. Dust pan, S. C. Courtney. Dyeing, Waldinger & Iserloth Dyeing, Waldinger & Ise	a	Hoo
collecting receptacle, device for aut matically, P. Raabe Dental broach, C. A. Skalstad Dental chair, A. W. Browne Derailer, M. C. Sloderbeck Derrick, E. E. Jenkins Detinning, E. A. Sperry Digger. See Compost digger. Directory, telephone, C. E. Napp Display can, sheet metal, F. Rudolphi. Display cand rack, F. L. Stone. Display cand rack, F. L. Stone. Display device, C. C. Fleming. Distribution system, J. B. Taylor. Door attachment, screen, C. S. McElroy. Door closer and check, W. K. Henry. Door closer and check, W. K. Henry. Door parin, W. H. Ascue Door hanger, J. W. Harris Door operating mechanism, R. F. Le Bro Door, rolling, J. Erwood Double flange trap and sink, G. E. Dunst: Drawing instrument for bread makin G. T. Pendrith Drawer support, C. A. Gehne Drawing instrument for parallel rulin T. English Drill, S. Lake Drying and ventilating system for house factories, or buildings, G. Muller. Dumb bell, magneto electric, J. Moores. Dump bed, automatic, C. C. Taylor, et al Dust collector, G. H. Forsyth. Dust pan, S. C. Courtney. Dyeing, Waldinger & Iserloth Dyeing, Waldinger & Ise	a	Ho H
collecting receptacle, device for aut matically, P. Raabe Dental broach, C. A. Skalstad Dental chair, A. W. Browne Derailer, M. C. Sloderbeck Derrick, E. E. Jenkins Detinning, E. A. Sperry Digger, See Compost digger. Directory, telephone, C. E. Napp Display can, sheet metal, F. Rudolphi. Display cand rack, F. L. Stone. Display cand rack, F. L. Stone. Display device, C. C. Fleming. Distribution system, J. B. Taylor. Door attachment, screen, C. S. McElroy. Door closer and check, W. K. Henry. Door closer and check, W. K. Henry. Door hanger, J. W. Harris Door hanger, J. W. Harris Door hanger track, P. A. Myers. Door operating mechanism, R. F. Le Bro Door, Individing machine for bread makin G. T. Pendrith Drawer support, C. A. Gehne Drawing instrument for parallel rulin T. English Drill, S. Lake Drying and ventilating system for house factories, or buildings, G. Muller. Dumb bell, magneto electric, J. Moores. Dumb bed, automatic, C. C. Taylor, et al Dust collector, G. H. Forsyth. Dyeing, Waldinger & Iserloth Dyeing, H. Toepfer Easel, photograph, H. C. Itter Eaves strip, W. Behl Eaves trough support, C. H. Molyneux. Efger, G. M. Hinkley Electric accumulator, Marino & Barto Wright Electric accumulator, Marino & Barto Electric accumulator, Marino & Barto Electric accumulator, W. A. Paris. Electric machine, dynamo, J. E. Noe gerath Electric alten, M. Landry Electric machine, dynamo, J. E. Noe gerath Electric machine, dynamo, J. E	a	Hoo
collecting receptacle, device for aut matically, P. Raabe Dental broach, C. A. Skalstad Dental chair, A. W. Browne Derailer, M. C. Sloderbeck Derrick, E. E. Jenkins Detinning, E. A. Sperry Digger, See Compost digger. Directory, telephone, C. E. Napp Display can, sheet metal, F. Rudolphi. Display cand, rack, F. L. Stone. Display cand, sheet metal, F. Rudolphi. Door attachment, screen, C. S. McElroy. Door attachment, screen, C. S. McElroy. Door closer and check, W. K. Henry. Door closer and check, W. K. Henry. Door parain, W. H. Ascue Door hanger, J. W. Harris Door hanger, J. W. Harris Door perating mechanism, R. F. Le Bro Door operating mechanism, R. F. Le Bro Door perating mechanism, R. F. Le Bro Double flange trap and sink, G. E. Dunst Dough dividing machine for bread makin G. T. Pendrith Drawer support, C. A. Gehne Drawing instrument for parallel rulin T. English Drill, S. Lake Drying and ventilating system for house factories, or buildings, G. Muller. Dumb bell, magneto electric, J. Moores. Dump bed, automatic, C. C. Taylor, et al Dust collector, G. H. Forsyth. Dust collector, G. H. Forsyth. Dveing, Waldinger & Iserloth Dveing, H. Toepfer Essel, photograph, H. C. Itter. Essel, photograph, H. C. Itter. Eaves trough support, C. H. Molyneux. Edger, G. M. Hinkley Electric apparatus, H. L. Beach Electric caple, C. W. Davis Electric machine, dynamo, J. E. Noe gerath Electric machine, dynamo, J. E. Noe gerath Electric machine, dynamo, J. E. Noe suspension of, C. E. Buckbee Electric machine, dynamo, J. E. Noe Electric machine, d	a	Hoo
collecting receptacle, device for aut matically, P. Raabe Dental broach, C. A. Skalstad Dental chair, A. W. Browne Derailer, M. C. Sloderbeck Derrick, E. E. Jenkins Detinning, E. A. Sperry Digger, See Compost digger. Directory, telephone, C. E. Napp Display can, sheet metal, F. Rudolphi. Display cand, rack, F. L. Stone. Display cand, sheet metal, F. Rudolphi. Door attachment, screen, C. S. McElroy. Door attachment, screen, C. S. McElroy. Door closer and check, W. K. Henry. Door closer and check, W. K. Henry. Door parain, W. H. Ascue Door hanger, J. W. Harris Door hanger, J. W. Harris Door perating mechanism, R. F. Le Bro Door operating mechanism, R. F. Le Bro Door perating mechanism, R. F. Le Bro Double flange trap and sink, G. E. Dunst Dough dividing machine for bread makin G. T. Pendrith Drawer support, C. A. Gehne Drawing instrument for parallel rulin T. English Drill, S. Lake Drying and ventilating system for house factories, or buildings, G. Muller. Dumb bell, magneto electric, J. Moores. Dump bed, automatic, C. C. Taylor, et al Dust collector, G. H. Forsyth. Dust collector, G. H. Forsyth. Dveing, Waldinger & Iserloth Dveing, H. Toepfer Essel, photograph, H. C. Itter. Essel, photograph, H. C. Itter. Eaves trough support, C. H. Molyneux. Edger, G. M. Hinkley Electric apparatus, H. L. Beach Electric caple, C. W. Davis Electric machine, dynamo, J. E. Noe gerath Electric machine, dynamo, J. E. Noe gerath Electric machine, dynamo, J. E. Noe suspension of, C. E. Buckbee Electric machine, dynamo, J. E. Noe Electric machine, d	a	Hoo
collecting receptacle, device for aut matically, P. Raabe Dental broach, C. A. Skalstad Dental chair, A. W. Browne Derailer, M. C. Sloderbeck Detrick, E. E. Jenkins Detinning, E. A. Sperry Digger, See Compost digger. Directory, telephone, C. E. Napp Display can, sheet metal, F. Rudolphi. Display cand, rack, F. L. Stone. Display cand, sheet metal, F. Rudolphi. Door attachment, screen, C. S. McElroy. Door closer and check, W. K. Henry. Door closer and check, W. K. Henry. Door parain, W. H. Ascue Door hanger, J. W. Harris Door hanger, J. W. Harris Door operating mechanism, R. F. Le Bro Door operating mechanism, R. F. Le Bro Door ling, J. Erwood Double flange trap and sink, G. E. Dunst Dough dividing machine for bread makin G. T. Pendrith Drawer support, C. A. Gehne Drawing instrument for parallel rulin T. English Drill, S. Lake Drying and ventilating system for house factories, or buildings, G. Muller. Dumb bell, magneto electric, J. Moores. Dump bed, automatic, C. C. Taylor, et al Dust collector, G. H. Forsyth. Dust collector, G. H. Forsyth. Dveing, Waldinger & Iserloth Dveing, H. Toepfer Easel, photograph, H. C. Itter. Eaves trough support, C. H. Molyneux. Edger, G. M. Hinkley Electric apparatus, H. L. Beach Electric cable, C. W. Davis Electric machine, dynamo, J. E. Noe gerath Electric machine, dynamo, J. E. Noe gerath Electric machine, dynamo, J. E. Noe suspension of, C. E. Buckbee Electric machine, dynamo, J. E. Noe gerath Electric machine, dynamo, J. E. Noe suspension of, C. E. Buckbee Electric machine, dynamo, J. E. Noe suspension of, C. E. Buckbee Electric machine, dynamo, J. E. Noe suspension of, C. E. Buckbee Electric machine, dynamo, J. E. Noe suspension of, C. E. Buckbee Electric machine, dynamo, J. E. Noe suspension of, C. E. Buckbee Electric machine, dynamo, J. E.	a	Hoo
collecting receptacle, device for aut matically, P. Raabe Dental broach, C. A. Skalstad Dental chair, A. W. Browne Derailer, M. C. Sloderbeck Derrick, E. E. Jenkins Digger, See Compost digger. Directory, telephone, C. E. Napp Display can, sheet metal, F. Rudolphi. Display cand, rack, F. L. Stone. Display cand, sheet metal, F. Rudolphi. Door attachment, screen, C. S. McElroy. Door closer and check, W. K. Henry. Door closer and check, W. K. Henry. Door parain, W. H. Ascue Door hanger, J. W. Harris Door hanger, J. W. Harris Door hanger, J. W. Harris Door perating mechanism, R. F. Le Bro Door operating mechanism, R. F. Le Bro Door perating mechanism, R. F. Le Bro Double flange trap and sink, G. E. Dunst Dough dividing machine for bread makin G. T. Pendrith Drawng instrument for parallel rulin T. English Drill, S. Lake Drying and ventilating system for house factories, or buildings, G. Muller. Dumb bell, magneto electric, J. Moores. Dump bed, automatic, C. C. Taylor, et al Dust collector, G. H. Forsyth Dust collector, G. H. Forsyth Dust pan, S. C. Courtney. Dveing, Waldinger & Iserloth Dreing, H. Toepfer Easel, photograph, H. C. Itter. Eaves trough support, C. H. Molyneux. Edger, G. M. Hinkley Electric apparatus, H. L. Beach Electric caple, C. W. Davis Electric machine, dynamo, J. E. Noe gerath Electric machine, static, W. C. Shinn Electric wires, rotating bracket for to suspension of, C. E. Buckbee Ellipsograph, N. D. S. K. Beck Electric apparatus, H. L. Beach Electric alapparatus, Gil, P. MacGahan, Electric machine, Static, W. C. Shinn Electric machine, Static, W. C. Shinn Electric bucket, A	a	Hoo
collecting receptacle, device for aut matically, P. Raabe Dental broach, C. A. Skalstad Dental chair, A. W. Browne Derailer, M. C. Sloderbeck Derrick, E. E. Jenkins Detinning, E. A. Sperry Digger, See Compost digger. Directory, telephone, C. E. Napp Display can, sheet metal, F. Rudolphi. Display cand, rack, F. L. Stone. Display cand rack, F. L. Stone. Display device, C. C. Fleming. Distribution system, J. B. Taylor. Door attachment, screen, C. S. McElroy. Door closer and check, W. K. Henry. Door closer and check, W. K. Henry. Door parain, W. H. Ascue Door hanger, J. W. Harris Door hanger, J. W. Harris Door operating mechanism, R. F. Le Bro Door, I. Erwood Double flange trap and sink, G. E. Dunst. Dough dividing machine for bread makin Grawer support, C. A. Gehne Drawing instrument for parallel rulin T. English Drawer support, C. A. Gehne Drawing instrument for parallel rulin T. English Drill, S. Lake Drying and ventilating system for house factories, or buildings, G. Muller. Dumb bell, magneto electric, J. Moores. Dump bed, automatic, C. C. Taylor, et al Dust collector, G. H. Forsyth. Duveing, H. Toepfer Easel, photograph, H. C. Itter. Eaves strip, W. Behl Eaves strip, W. Behl Eaves trough support. C. H. Molyneux. Edger, G. M. Hinkley Electric apparatus, H. L. Beach Electric capparatus, H. L. Beach Electric apparatus, H. L. Beach Electric machine, dynamo, J. E. Noe gerath Electric machine, dynamo, J. E. Noe Electric machine, dynamo, J. E. Noe Electric machine, dynamo, J. E. Noe gerath Electric machine, dynamo, J. E. Noe Electrical testing system, H. E. Miller. Elevator bucket, A. W. Berkner	a	Ho H
collecting receptacle, device for aut matically, P. Raabe Dental broach, C. A. Skalstad Dental chair, A. W. Browne Derailer, M. C. Sloderbeck Derrick, E. E. Jenkins Detinning, E. A. Sperry Digger, See Compost digger. Directory, telephone, C. E. Napp Display can, sheet metal, F. Rudolphi. Display cand, rack, F. L. Stone. Display cand rack, F. L. Stone. Display device, C. C. Fleming. Distribution system, J. B. Taylor. Door attachment, screen, C. S. McElroy. Door closer and check, W. K. Henry. Door closer and check, W. K. Henry. Door parain, W. H. Ascue Door hanger, J. W. Harris Door hanger, J. W. Harris Door operating mechanism, R. F. Le Bro Door, I. Erwood Double flange trap and sink, G. E. Dunst. Dough dividing machine for bread makin Grawer support, C. A. Gehne Drawing instrument for parallel rulin T. English Drawer support, C. A. Gehne Drawing instrument for parallel rulin T. English Drill, S. Lake Drying and ventilating system for house factories, or buildings, G. Muller. Dumb bell, magneto electric, J. Moores. Dump bed, automatic, C. C. Taylor, et al Dust collector, G. H. Forsyth. Duveing, H. Toepfer Easel, photograph, H. C. Itter. Eaves strip, W. Behl Eaves strip, W. Behl Eaves trough support. C. H. Molyneux. Edger, G. M. Hinkley Electric apparatus, H. L. Beach Electric capparatus, H. L. Beach Electric apparatus, H. L. Beach Electric machine, dynamo, J. E. Noe gerath Electric machine, dynamo, J. E. Noe Electric machine, dynamo, J. E. Noe Electric machine, dynamo, J. E. Noe gerath Electric machine, dynamo, J. E. Noe Electrical testing system, H. E. Miller. Elevator bucket, A. W. Berkner	a	Ho H
collecting receptacle, device for aut matically, P. Raabe Dental broach, C. A. Skalstad Dental chair, A. W. Browne Derailer, M. C. Sloderbeck Derrick, E. E. Jenkins Detiming, E. A. Sperry Digger, See Compost digger. Directory, telephone, C. E. Napp Display can, sheet metal, F. Rudolphi. Display cand rack, F. L. Stone. Display cand rack, F. L. Stone. Display device, C. C. Fleming. Door attachment, screen, C. S. McElroy. Door closer and check, W. K. Henry. Door closer and check, W. K. Henry. Door nanger, J. W. Harris Door hanger, J. W. Harris Door hanger, J. W. Harris Door operating mechanism, R. F. Le Bro Door, rolling, J. Erwood Double flange trap and sink, G. E. Dunst. Dough dividing machine for bread makin G. T. Pendrith Drawer support, C. A. Gehne Drawing instrument for parallel rulin T. English Drying and ventilating system for house factories, or buildings, G. Muller. Dumb bell, magneto electric, J. Moores. Dumb bed, automatic, C. C. Taylor, et al Dust collector, G. H. Forsyth. Dyeing, H. Toepfer Easel, photograph, H. C. Itter Eaves strip, W. Behl Eaves trough support, C. H. Molyneux. Edger, G. M. Hinkley Electric accumulator, Marino & Barto Wight Electric apparatus, H. L. Beach Electric apparatus, H. L. Beach Electric apparatus, H. L. Beach Electric theater, M. Landry Electric machine, dynamo, J. E. Noe gerath Electric apparatus oil, P. MacGahan, Electrical drop, G. J. Galbraith Electric machine, dynamo, J. E. Noe gerath Electric machine, dynamo, J. E. Noe gerath Elevator bucket, A. W. Berkner Eleva	a	Hoo
collecting receptacle, device for aut matically, P. Raabe Dental broach, C. A. Skalstad Dental chair, A. W. Browne Derailer, M. C. Sloderbeck Derrick, E. E. Jenkins Detinning, E. A. Sperry Digger. See Compost digger. Directory, telephone, C. E. Napp Display can, sheet metal, F. Rudolphi. Display cand, rack, F. L. Stone. Display cand, sheet metal, F. Rudolphi. Display device, C. C. Fleming. Distribution system, J. B. Taylor. Door attachment, screen, C. S. McElroy. Door closer and check, W. K. Henry. Door closer and check, W. K. Henry. Door closer and check, W. K. Henry. Door parain, W. H. Ascue Door hanger, J. W. Harris Door hanger, J. W. Harris Door operating mechanism, R. F. Le Bro Double flange trap and sink, G. E. Dunst: Duny bed, uttomatic, C. C. Taylor, et al. Dust collector, G. H. Forsyth. Dust pan, S. C. Courtney. Dyeing, Waldinger & Iserloth Dyeing, H. Toepfer Easel, photograph, H. C. Itter. Eaves strip, W. Behl Electric acoumulator, Marino & Barte Wright Electric acoumulator, Marino & Barte Wright Electric acoumulator, Marino & Barte Electric cable, C. W. Davis Electric machine, dynamo, J. E. Noe gerath Electric machine, dynamo, J. E. Noe gerath Electric machine, static, W. C. Shinn. Electric machine, static, W. C. Shinn. Electric machine, static, W. C. Shinn Electric machine, static, W. C. Shinn Electric apparatus coil, P. MacGahan. Electrical apparatus coil, P. MacGahan. Electrical graper son special process of the suspension of, C. E. Buckbee Eletrical apparatus, E. Busch Electric apparatus, E. Busch Electric apparatus, E. Busch Electric apparatus, C. P. Hollister Elevator bucket, A. W. Berkner Elevator bucket	a	Ho H
collecting receptacle, device for aut matically, P. Raabe Dental broach, C. A. Skalstad Dental chair, A. W. Browne Derailer, M. C. Sloderbeck Derrick, E. E. Jenkins Detinning, E. A. Sperry Digger, See Compost digger. Directory, telephone, C. E. Napp Display can, sheet metal, F. Rudolphi. Display cand, rack, F. L. Stone. Display cand rack, F. L. Stone. Display device, C. C. Fleming. Distribution system, J. B. Taylor. Door attachment, screen, C. S. McElroy. Door closer and check, W. K. Henry. Door closer and check, W. K. Henry. Door parain, W. H. Ascue Door hanger, J. W. Harris Door hanger, J. W. Harris Door operating mechanism, R. F. Le Bro Door, I. Erwood Double flange trap and sink, G. E. Dunst. Dough dividing machine for bread makin Grawer support, C. A. Gehne Drawing instrument for parallel rulin T. English Drawer support, C. A. Gehne Drawing instrument for parallel rulin T. English Drill, S. Lake Drying and ventilating system for house factories, or buildings, G. Muller. Dumb bell, magneto electric, J. Moores. Dump bed, automatic, C. C. Taylor, et al Dust collector, G. H. Forsyth. Duveing, H. Toepfer Easel, photograph, H. C. Itter. Eaves strip, W. Behl Eaves strip, W. Behl Eaves trough support. C. H. Molyneux. Edger, G. M. Hinkley Electric apparatus, H. L. Beach Electric capparatus, H. L. Beach Electric apparatus, H. L. Beach Electric machine, dynamo, J. E. Noe gerath Electric machine, dynamo, J. E. Noe Electric machine, dynamo, J. E. Noe Electric machine, dynamo, J. E. Noe gerath Electric machine, dynamo, J. E. Noe Electrical testing system, H. E. Miller. Elevator bucket, A. W. Berkner	a	Hoo

irearm s	sight	Windridge	& Wilcox		Mold attachment, H. A. & H
irearms	liøht	nrojecting	& Wilcox, 873,112,	873,281	Molding machine, J. H. Koont
C. R.	Penfie	ld	rn	873,591 83.23 1	Mold attachment, H. A. & H Molding machine, J. H. Koom Molding machine, H. Pocock Molding process, A. B. Mars Monkey wrench, C. & G. C. Wortar mixer, C. E. Oelman . Motor I. Schroder
lat iron, loat fabr	C. G.	Avery W. Knox	873,112, attachment for, orn. ing machine, G. Kadow & Lyons Heine Ballou. the like, W. & H. Holdren. for opening the oosing, E. R. &	873,202 873,378	Mortar mixer, C. E. Oelman . Motor, J. Schroeder
loor finis	shing a llings	nd smooth	ing machine, G.	873.207	Motor, J. Schroeder Motor control, electric, W. C. Motor control system, W. L. Motor control system, W. J. Motor control system, W. J. Motor control system, electropic system, e
lushing o	device,	automatic, ombined. R	Kadow & Lyons	873,55 4 873,431	Motor control system, W. J. Motor control system, W. F.
ocusing is olding to	attachn able, f	nent, E. S. orm, and	Ballouthe like, W. &	873,204	Motor control system, electr pinwall
W.J. oot rest,	C. P.	ls Earley		873,118 873,521	pinwall Motor controller, electric, W. Motor starting and controlle electric, A. Taylor, et al Mounds, graves, and other si cover for decorating, C. Mouse trap, J. A. Vincent Mower, lawn, T. J. Dunning Mower, lawn, I. Ellwood Music cornet, automatic sh Skamer
ork. Se owl behe	e Carv	ing fork. device, H.	H. Holdren	873,436	electric, A. Taylor, et al Mounds, graves, and other size
ruit picl urnace (ker, B loor a	. Hestness nd device	for opening the	87 32 34	cover for decorating, C. Mouse trap, J. A. Vincent
same, J. Ma	auton ırkmanı	natically cl n	osing, E. R. &	873,573	Mower, lawn, T. J. Dunning Mower, lawn, I. Ellwood
urnace g urnace s	rate, l shaft,	H. C. Char roasting, G	or opening the ossing. E. R. & aberlin. E. B. Shipley E. T. A. Edison on Sing coal for the Glover. Maloney Loney Loney I. Beaudette i mechanism for der E. Angell ame, closure, J.	873,411 873,687	Music cornet, automatic sh Skamper
alvanic ame boa	battery rd, Do	, reversibl an & Hans	e, T. A. Edison on	873,220 873,031	Skamper
arden re arter sli	el, R. ide, J.	D. Wirt Maltby		873,143 873,445	Music sheet holder, F. W. B Musical instrument, J. A. Ba
as, appa produc	ratus 1 ction o	for carboniz f, Young	ing coal for the & Glover	873,647	Musical instrument keyboard riance
as burn	er, Sp er, J.	ringer & l Ball	Maloney	873,182 873,485	riance Musical instrument, mecha Lynde Newspapers and the like, co
as burne as burne	er, J. er, Spri	W. Farnoff inger & Ma	loney	873,525 873,624	Newspapers and the like, co
as gener as gener	rator, a rators,	cetylene, T carbid feed	'. J. Beaudette I mechanism for	873,406	Nozzle, Cummings & Hanna Nut, axle, N. H. Roe
acetyl as manu	lene, A facture	. E. Schlie , H. I. Leg	der	873,176 873,250	Nut lock, F. Greene Nut lock, A. H. Reade
as or st as produ	team se icer, C	eparator, J. Gamer .	E. Angell	873,336 873,037	Newspapers and the like, co G. Thomas Nozzle, Cummings & Hanna Nut, axle, N. H. Roe Nut lock, F. Greene Nut lock, A. H. Reade Ores, chloridizing, J. E. Gree Ores from the rocky consti apparatus for separating particles of, D. H. Norr Ornamental article for pers E. McDonnell
as produ asket ar	icer, A.	. J. Gifford king the s	ame, closure, J.	873,039	apparatus for separating particles of, D. H. Norr
S. Gil ate, E. l	les L. McM	Iichael		873,366 873,135	Ornamental article for perse
ear, cha ear, fric	nge sp	eed, Sizaire raft, J. R.	e & Naudin Cardwell be ,, and polishing gnall ser Ifenden, et al	873,461 873,210	ornamental arricle for pers. E. McDonnell
em displ lass gri	laying inding,	ring, C. Mo smoothing	e , and polishing	873,156	Package tie, O. S. White Packing, metallic, E. M. Coo
machi love, ap	ne, pla parel,	ite, E. Baş B. J. Ricl	nall ker	873,340 873,608	Pail and heater, dinner, E. Paper box, G. R. Wyman .
o-cart, c olf club	collapsi , J . G	ble, J. Wo ovan	lfenden, et al	873,283 873,423	Paper coating or treating m Hilbert
oods cor ductio	mposed on of	of cotton effects on	and wool, pro- mixed, G. Ru-		Hilbert Paper sacks and roll paper, c for, W. E. Burks Paper softening apparatus, T
dolph rain sho	ocking	apparatus,	J. Calder ochel	873,613 873,500	Paper softening apparatus, T. Peter
rave pro ridiron,	A. C.	G. H. Kno Parry	ochel	873,052 873,589	Phonograph, Bornand & The Photograph cabinet or rack,
rinding Edisor	machii	ne feed r	egulator, T. A.	873,219	Photographic flash lamp, J. Piano sling, H. H. Hanson
rinding	and jo	shing whee inting macl	l, C. B. Wattles nine cutter head,	873,398	C. C. De Witt
H. B. round pl	Ross late, B	J. Jones		873,093 873,375	Paper softening apparatus, T Pencil sharpener, A. T. Peter Phonograph, Bornand & Th Photograph cabinet or rack. Photographic flash lamp, J. Piano sling, H. H. Hanson. Piling, compressed air cush C. C. De Witt Pipe bending machine, J. F. Pipe threading machinery, V. Carty
rout mi pneun	xing a natic, 1	and discha W. L. Cann	rging apparatus, iff	873,345	Carty Pipe wrench, J. L. Brown Planers, work support for heads of wood, Blood & (
un case N. T.	Velique	ammunition uette	belt, combined,	873,140	Planers, work support for heads of wood, Blood & (
un sight Iair pin,	D. W	ison & Hil McNeil	lis	873,535 873,163	Planter, corn, C. E. Mentzer Platen gage, O. V. Stapp
lammock Iarness l	suppoi hanger,	F. Hof	anks	873,652 873,549	Planter, corn, C. E. Mentzer Platen gage, O. V. Stapp . Plow, auto steam, C. G. Ha Pneumatic despatch appar
larvester Jarvester	, beet, knott	M. Goodfe er, R. H.	Moore	873,040 873,158	Pneumatic despatch tube app
iat faste Iat holde	ener, M er, R.	W. Bock	ю	873,057 873,490	Pearsall
lides and	makin	g same, su	ine cutter head, riging apparatus, ifff belt, combined, lis anks llow Moore ch hmidt betance for treat-	979 074	Pneumatic despatch tube a minal for, I. W. Litchf Pneumatic tube apparatus Fordyce
Iides ai Picha	nd ski	ins, carrot	ing, C. & E.	873,594	Fordyce Pocket knife, H. Berns Pole, sheet metal, W. L. W Polishing machine, C. M. N Porch cleaner, M. Mueller . Postal mailing card, D. W. Powdered substances, recep
linge, do	or, W.	K. Henry W. A. Ha	rris. Davis Monks	873,432 873,543	Polishing machine, C. M. N. Porch cleaner, M. Mueller
log catch	ner and	holder, J.	Davis Monks	873,514 873,157	Postal mailing card, D. W. Powdered substances, recen
Ioof par Iook rod	er, J. I disco	Hedrick . nnecting d	evice, Allison &	873,546	K. Buell Power transmission mechanis
De w	ein			873,695	Pressure, machine for exe
Iop jack Iop wire	, O. S detacl	elg hing device	, J. A. Grover	873,330 873,227	Guenther
lorse gai	ting de	evice, E. A	. Hyde	873,240 873,373	Printer's registering device,
Iorseshoe	H. J	Ross	Rornhorn	873,611 873 119	Printing attachment for pap J. L. Lamboley Printing film frames, film f
lot air i	furnace	, A. C. Mo	ott	873,449 873,111	B. Day
Iub, veh	icle, A	Hart	Storm	873,428 873,629	slow
ce mach llusion d	ine, T	obey & Fr	eeman	873,189 873,447	slow
ncubator, ndex. ca	, J. E. ard. E.	Chambers Eckart .		873,295 873,305	i Puid screening abbaratus.
nstep su nsulated	rail j	F. N. Mc	Kinnon Brother <u>s</u>	873,677 873,492	l White
nternal nternal	combus combus	tion engine tion engin	, J. A. Grover z Haines Hyde & Bornhorn ott son Storm eeman saad Kinnon Brothers A. M. Brown e, H. S. Ander-	873,493	Pump, H. Wahler Pump, air, G. H. Mohler Pump, centrifugal, P. J. Wi Pump, chain, C. J. Willian Pump, combined wet and d
nvanu n	rter, o	isen & Jon	uson	813,016	Pump, combined wet and d
Aikan	•		making, R. H.	873 648	Pump, vapor, H. A. Fleuss
oining d	evice,	H. Pohlma	asse & Normand nn G. S. Blakeslee liamson	873,599	Pumping cylinder valve, M. Punch, paper bag, R. Munda
Cnife swi	itch, H	I. P. Ball	in Billianson	873,005 873 110	Puncture closer, D. Apstein
amp, A.	H. H:	andlan, Jr. E. Daniels.	873,414.	873,427 873,415	Punch, paper bag, R. Munde Punching bag hanger, E. K. Puncture closer, D. Apstein Puzzle, C. Hunt Puzzle, M. O. Mertes Race course barrier and s
amp bui amp, ga	rner, F as, E.	ain & Heni W. Cornel	liamson	873,360 873,663	McGladdery & Pawolows Rack. See Display card ra
amp hol amp rec	lder, el eptacle	ectric, Thr , J. S. Stev	oop & Freeman wart	873,108 873,104	McGladdery & Pawolows Rack. See Display card ra Rack. H. M. Manheim Radiator, E. L. Ogle
amp sha ast, H.	F. Lo	ewer	reytag	873,665 873,060	Rail magnetic brake, V. L. (Rail, third, R. K. Eddowes Rail tie, L. R. Nordquist
asting i	machine	. J. Cavar	nagh, Jr	873,018	Rail tie, L. R. Nordquist Railway switch, Gilmore & (
atch hoc	ok, E.	A. Hill	nagh, Jr on	873,235	Railway switch, Gilmore & (Railway tie, L. Blessing Railway tie, W. H. Castle . Railway tie, A. F. Gustafso
Gevae Lifting a	ert-Nae	rt ving jack.	combined. A. W.	0.0,002	Railways, automatic block si for electric, F. Townsend Receptacle, J. A. Hoffmann Refrigerators and alarm t
White Linotype	eford machii	ne, G. G.	Babcock	873,194 873,203	Receptacle, J. A. Hoffmann Refrigerators and alarm t
Linotype Linotype	machi:	ne, Libby eceiver, G.	Babcock	873.251 873,642	tacle for the drain wate Register, L. A. Schmidt
Joading	iack. l	ı, J. Fitzı umber. G.	Rynkema	873 096	Register hook, W. L. Hami Rheostat, H. P. Ball
Lock, A. Lock, F.	S. A	au liano		873,212 873,481	tacle for the drain wate Register, L. A. Schmidt Register hook, W. L. Hami Rheostat, H. P. Ball Riveting apparatus, B. Wat Rock crusher, E. S. Philips Rock crusher, multiple, E. S. Rocking, horse, traveling, B.
Locomotiv J. Ba	ve, N. ve driv	ing boxes,	wedge for, W	873,442 873,148	Rock crusher, multiple, E. S. Rocking horse, traveling, B. Roll holder, H. Thumann
Log finde	er and	lifter for	submerged logs	873,579	Rolling apparatus, E. E. Slic Rolling irregular shapes. m
			E. Rhoades	873,606	Slick
ing, Looms, w	M. L.	Stone	tening means for	873,467	Roofing materials, device for
∟ubricato	r. W.	&c.J.W.L	evland	873.319	Rotary engine, B. F. August Rotary engine, V. Pingret Rotary engine, E. C. Rhodes Rubber boot and shoe, T. C.
Machine Mail deli	frame, iverer	long, W. and receive	D. Richter r. O. Fisher	873,088 873,527	Rotary engine, E. C. Rhodes Rubber boot and shoe, T. C.
uan pou	ch rece	iving and	delivering device	,	Rubber boot and shoe, T. I
mail rece Mantle b	older,	s. F. Kuhl Welsbach, (C. R. Warner & Rice mith E. E. Hippe Gardy cirts, machine o	873,247 873,690	Rug fastener, N. K. Davidy Saddletree plate, J. E. L. (
Manure s	spreade Spreade	r, Dennis r, C. W. S	or Kice	873,030 873,465	Rug fastener, N. K. Davidy Saddletree plate, J. E. L. (Safe, provision, O. E. Kearn Safety pin, L. C. Wicks Sand molding machine, W.
mardie, i Massage	implen	artincial, ient, H. D.	Gardy	873,371	Sand molding machine, W. Saponification process, M. R.
devic Meganric	e to be	cutting Sk used in,	V. A. Phoebus.	873,266 872,454	Sash lock, C. Smith
Mechanic Messages	al mov al mov	rement, L.	irts, machine o V. A. Phoebus. L. P. Normandir Griffith Daratus for receiv	873,426	Sash supporter, W. W. Swee
ing a	and str	engthening agemann	the reproduction	- 1 . 873,042	isaw, Gray & Horning
Metal ho	op, J. naking	E. Wright a solution	the reproduction	873,114	Sawing machine, self-feed Kaiser
Basko Metallic	erville chair.	J. H. Petr	oskey	873,205 873,265	Sawmill set works, Bogie & Scaffolding bracket. G. E. F.
Metallic Meter, E	tie, W L. Scha	. D. Turne ttner	oskey	873,469 873,098	Scale, platform, M. H. Reed Scraper, disk, W. E. Wilhe
Meters, p	repayn F. J. I	nent attach Dowling	ment for electric spindle lock for metals of differen H. Leiser	- . 873.356	Sawmill set works, Bogie & Scaffolding bracket, G. E. I Scale, platform, M. H. Reed Scraper, disk. W. E. Wilhe Screw driver, C. H. Chappell Screw driver, ratchet, B. F. Seal, A. B. Schofield
starr Starr	ett &	es, etc., and and an arrangement of the second seco	spinale lock for	873,626	Screw driver, ratchet, B. F. Seal, A. B. Schofield
Microtom	e, H.	Lebrun		873,059 873,505	Seasoning machine, F. F. Seeder and fertilizer distrib
Microtom	е. к			,	Songrating process and and
Microtom Mill, Se Mixing fl	e, R. l e Roll uids ar	ing mill. Id molten n	etals of differen	t	Separating process and app Pearse

SANITARY UNDERWEAR

The ideal underwear

for outdoor recreation.

No Motorist, Golfer or

Yachtsman should be with-

Special Weights for Fall

Write for samples and booklet

of particulars. Dr. Jaeger's S. W. S. Co.'s Own Stores

New York: 306 Fifth Ave., 22 Maiden Lane.

Brooklyn: 504 Fulton St. Boston: 228 Boylston St.

Phila.: 1516 Chestnut St. Chicago: 82 State St. Agents in all Principal Cities

Classified Advertisements

Advertising in this column is 50 cents a line. No less than four nor more than ten lines accepted. Count seven words to tne line. All orders must be accompanied by a remittance. Further information sent on request.

BUSINESS OPPORTUNITIES.

ARE YOU LOOKING for a sound, secured (non-speculative) investment? For particulars address General Agent, Room 9, Citizens and Marine Bank Building, Newport News, Va., U. S. A.

TWELVE OFFICES covering entire business world. Office, Sales and Technical positions open for ambitious men. For full particulars write Hapgoods, 305 Broadway, New York.

INVENTORS.—Send for free sample copy "World's Progress," devoted to interests of inventors. All latest developments in scientific and industrial world. World's Progress, 510 12th St., Washington, D. C.

PATTERN LETTERS AND FIGURES (White Metal and Brass) for use on patterns for castings. Large variety, prompt shipments. Send for catalog. H. W. Knight & Son, Seneca Falls, N. Y.

PATENTED KEROSENE INCANDESCENT BURN-ER. 70 candle power; used on any lamp; saves 50 per cent. kerosene. Ready seller everywhere. Exclusive territory. Write for particulars. F. C. Gottschalk, 255 Broadway, New York, START A NEWSPAPER IN SOME LIVE TOWN. Good money in it for a hustler. Cost \$5.00 weekly. I will tell you how to do it. G. Tunison, 15 Vandewater Street, New York.

PATENTS FOR SALE.

FOR SALE. American patent rights on Reinforcing Bar for concrete construction. Patent No. 857,671. For full particulars address A. V. Reyburn, Jr., 13 Hortense Place, St. Louis, Mo.

FOR SALE.

YOUNG & SONS' Combined Transit and Level. Powerful telescope, vertical circle, 6½-inch graduations Almost brand new. Rubber cover, tripod, box included. Price \$110. R. B. Turner, Station E, Baltimore, Md.

FOR SALE.—Scientific American, 13 vols., 1882 to 1894 inclusive; Scientific American Supplement, 19vols., 1876 to 1894 inclusive, bound in half leather. One dollar per volume. W. J. Carpenter, M.D., Katonah, N. Y.

AGENTS WANTED.

NEW YORK BRANCH of leading European engine packing firm wants agent in every city. High commission. Give references. For information and full particulars address Agent, Box 773, New York.

TYPEWRITERS.

START MAKING MONEY by buying a reliable rebuilt typewriter. Remingtons, \$15; Hammonds, Caligraphs, Williams, Blickensderfers, Franklins, \$10 up. Rentals, re-pairs. "Atlantic" Typewriter Ex., Dept. S, 245 B'way, N.Y.

TYPEWRITERS.—Hammond, \$10; Remington, \$12; Smith Premier, \$18: Oliver, \$29. All guaranteed for one year. Send for catalogue. Harlem Typewriter Exchange, Dept. B, 217 West 125th Street, New York.

AUTOS.

WE TEACH YOU TO DRIVE AN AUTOMOBILE at once, and explanations after. No theory, all practice on cars in actual use. Particulars, Automobile Sales Corporation, 1661 Broadway, New York.

MOTION PICTURES.

THE MOVING PICTURE WORLD, weekly, 10 cents per copy; yearly subscription, \$2. The only paper devoted to the moving picture, illustrated song and lantern lecture field. Moving Picture World, Box 450, N.Y.

WANTED.—Addresses of enterprising men contemplating entering the moving picture business. Biggest paying proposition for small capital known. Write for information. The Actograph C. ●., 50 Union Square, N.Y.

SOUVENIR POST CARDS.

25 SOUVENIR POST CARDS FREE with 6 months for 55c. to largest and oldest 100-page monthly on Coins, Stamps. Post Cards, Curios. Minerals, Photographs, Relics, Old Books, etc. Phil West, Superior, Nebr.

EXPERIMENTAL WORK.

TURN YOUR MECHANICAL OR ELECTRICAL IDEAS into money! Let us develop them. We have the finest equipped plant in New York. Splitdorf Laboratory, 261 Walton Avenue, New York.

BOATS AND LAUNCHES.

BUILD YOUR MOTOR BOAT from Skene plans. Send for free booklet describing my designs for racers, cruisers and runabouts. Norman L. Skene, 2 Lewis Street, Boston.

BOOKS AND MAGAZINES.

"TROPICAL AND SUB-TROPICAL AMERICA," the new illustrated magazine on South and Central America, Mexico and West Indies. First number is out. Price \$1 a car. 3 months' subscription, \$5c. will show its value. Tropical America Pub. Co., 18 Frankfort St., N.Y.

ELECTRICIAN AND MECHANIC.—Practical monthy magazine for electrical and mechanical students and ly magazine for electrical and mechanical students and workers. Publishes illustrated directions for constructing dynamos, motors, gasoline engines, wireless telegraphy, electroplating, electrical wiring, mechanical drawing, using tools, furniture construction, boat building, all kinds of mechanical work. One dollar yearly: trial subscription for three months, twenty cents. List of electrical and mechanical books free. S. A. Sampson Pub. Co., 6 Beacon St., Boston, Mass.

ASTRONOMY.

STARS AND PLANETS.—Learn to know them at a glance! Astronomy in simplest and most fascinating form. The Lumin was Revolving Planisphere shows clearly principal stars visible amy hour in year Simple, handy reliable. Only 85c, T. Whittaker, 123 Bible House, N. Y.

PHOTOGRAPHY.

AMERICAN PHOTOGRAPHY succeeds American Amateur Photographer, Camera and Dark Room and Photo Beacon. The editors of each now join in making a magazine which should be in the hands of every photographer, professional or amateur. He cents monthly, \$1.50 per year. Three specimen copies for a quarter, Am, Photographic Pub. Co., 361 Broadway, New York.

TALKING MACHINE NEEDLES.

I SEND FREE, samples of patented improved Petmecky Multi-tone Needles to all interested in talk-ing machines. Each needle plays 10 records. Millions sold weekly. Petmecky, 348 Broadway, New York.



Sole support, shoe, J. W. Arrowsmith. S73,043
Spectacle clamp, S. A. Asquith. Spectacle clamp, S. A. Spectacle clamp, S. A. Spectacle clamp, S. A. Spectacle clamp, S. A. Stamp, Spining, machinery ring, C. T. Atherton. S73, 323
Spinining mule, H. S. Golland. Spining, Spectacle clamp, S. B. Bynum. Springs, making coil, N. S. Harter. S73, 499
Springs, making coil, N. S. Harter. S73, 499
Springs, making coil, N. S. Harter. S73, 499
Springs, making coil, N. S. Harter. S73, 349
Steam generators, electrical control apparatus for, Lomax & Tomlinson. S73, 361
Steam or vacuum gag. J. Ely. S73, 304
Steel, manufacture of high per cent manganese, C. H. Kelsall. S73, 556
Steering wheel, E. F. Upton. S73, 512
Steering sear, Fay & Elisworth. S73, 526
Steering wheel, E. F. Upton. S73, 304
Stool, Lang & Kalbe. S73, 526
Stoot attachment, A. H. Merrill. S73, 364
Stove attachment, A. H. Merrill. S73, 364
Stove attachment, A. H. Merrill. S73, 365
Street sweeping machine. C. Malmquist. S73, 569
Switch, M. B. McConnell. S73, 368
Switch, M. B. McConnell. S73, 368
Switch, M. B. McConnell. S73, 368
Swivel, water, K. Brooks. S73, 369
Telegraphone, Poulsen. S73, 369
Telegraphone purposes, electromagnet for, Pedersen & Poulsen. S73, 363
Telegraphone purposes, electromagnet for, Pedersen & Poulsen. S73, 369
Telegrophone purposes, electromagnet for, Pedersen & Poulsen. S73, 369
Telegrophone purposes, selectromagnet for, Pedersen & Poulsen. S73, 369
Telegrophone purposes, electromagnet for, Pedersen & Poulsen. S73, 369
Telegrophone, Poulsen & Poulsen. S73, 3

 Valve for muss under pressure, H. Woods.
 873,476

 Valve for gas apparatus, hydraulic reversing, F. H. Wagner
 873,393

 Valve for bydraulic transmission devices, controlling. W. C. Schwarz
 873,627

 Valve for hydrocarbon engines, throttle, C. Schmidt
 873,621

 Valve, trap. J. L. Donat
 873,518

 Vaporizer, G. H. Bell
 873,554

 Vehicle, motor, W. C. Schwarz
 873,652

 Vehicle spring, P. J. McGinn
 873,325

 Vehicle spring, G. Schmitt
 873,325

 Vehicle top, J. A. Hensley
 873,325

 Vehicle top support, G. Lake
 873,035

 Vehicle top support, G. Lake
 873,125

 Vehicle top support, G. Lake
 873,032

 Vehicle top support, G. Lake
 873,032

 Vehicle top support, G. Lake
 873,125

 Venitlator, W. Hammann
 873,401

 Voting machine, grouping mechanism for,
 C. C. Abbott
 873,401

 Wagon, dumping, A. L. Warner
 873,574

 Wajon, dumping, A. L. Warner
 873,572

 Waistband, J. C. Stanford
 873,372

 Water, bendent winding and setting, D. A. Lindgren
 873,172

"Star" Foot and Power Screw Cutting Tross Feed Lathes FOR FINE, ACCURATE WORK SENECA FALLS MFG. CO. 695 Water Street, Seneca Falls, N. Y., U. S. A.

Engine and Foot Lathes

MACHINE SHOP OUTFITS, TOOLS AND SUPPLIES. BEST MATERIALS. BEST WORKMANSHIP. CATALOGUE FREE SEBASTIAN LATHE CO., 120 Culvert St., Cincinnati, O.

Improved Combination Lathe



for mechanics, model makers. experimenters and amateurs. Hollow steel spindle. The foot motion is of the improved grasshopper type. Circular saw has iron saw table perfectly adjusted. Guide and slide move to and fro readily, and are all ways true to the saw. Slide may be set at any angle. \$45, \$50, \$55 and \$60.

A. J. WILKINSON & CO. Machinery, etc. 184=188 Washington St. BOSTON, MASS.

The Lambert 18 "Friction Flyer" \$800,00 Write for catalogue describing our full line

THE BUCKEYE MFG. CO. Anderson, Indiana

HOME MADE DYNAMOS.—SCIENTFIC AMERICAN SUPPLEMENTS 161 and 600 contain excellent articles with full drawings. Price 10 cents each, by mail. Munn & Company, 351 Broadway, New York City, and all newsdealers. ORIGINAL BARNES

Send for Drill Catalogue.

W. F. & JNO. BARNES CO. (Established 1872) 1999 Ruby St., Rockford, III.

Positive Upright Drills 10 to 50-inch Swing

Engineering New York **New York**

The leading Engineering paper of the world. 1,600 pages of news and informa-tion relating to engineering progress in all parts of the world, amply illustrated with drawings and photographs. 10 weeks' trial, \$1.

ECHNICAL ITERATURE 917 St. Paul Building, NEW YORK.

Condenses the **best** articles of general technical interest from all sources—thirty to forty every month—and **indexes** all the rest. Keeps you informed regarding all branches of industrial progress. The most instructive periodical for engineers and the general reader. \$2.00 per year, 20 cents per copy. Send 25 cents for a two months' trial subscription.

BOUND VOLUMES OF American Homes and Gardens

480 Pages. 1,050 Illustrations. Price \$5.00

American Homes and Gardens covers a wide scope; it deals with house building from the design and construction of modest cottages on tiny lots to the building of mansions on large estates. All

degrees of gardening, from laying out a landscape to the planting of a window-box, are dealt with. Practical questions of water supply, of sanitation, or of the arrangement of the kitchen receive equal treatment with draping of windows or the arrangement of old china.

American Homes and Gardens is beautifully year's volume contains more than a thousand engravings, as full of detail and finish as actual photographs. They depict some of the old and historic mansions of America, and the most beautiful of gardens or of natural scenery. The following list of a few of the principal practical articles appearing in American Homes and Gardens during 1907 will show the

Historic Mansions of the James River-Small American Homes—Inexpensive Log Bungalows—The Iris Garden—House-boating in America—A Boy's Summer Camp—The Choice of a Dog—Ventilation—The Water Garden— The Choice of a Dog—Ventilation—The Water Garden—Curtains and Draperies—The Wild Garden—Concerning Driveways—Heating the House—The Modern Bedroom —Touring in an Automobile—Flowers for House and Table Decoration—What is a Fireproof House?—Interior Woodwork — White Lilac Culture — How to Arrange Window Curtains—Street Entrances—Collections of Old Blue Staffordshire Ware — Novel Uses of Electricity—The Question of the Fireplace—Orchid Culture — Handwrought Ironwork—Kitchen Furniture—Water Supply.

A limited number of volumes for 1907 are available. 480 pages. 1,050 illustrations. Price \$5.00.

MUNN & CO., Publishers, 361 Broadway, New York

都的都都的都的都的都的都的都的都的

wide choice of subject:

LET US BE YOUR FACTORY

STAMPINGS, MODELS, EXPERT WORK We publish "The Silent Partner," a brainy little magazine, full of good thoughts. Sample free. Write us. THE GLOBE MACHINE AND STAMPING CO. 970 Hamilton St., Cleveland, O.

and Bottlers' Machinery. THE VILITER MFG. CO., 899 Clinton St., Milwaukee, Wis.

MODELS & EXPERIMENTAL WORK. Inventions developed. Special Machinery E. V. BAILLARD. 24 Frankfort Street. New York.

RUBBER Expert Manufacturers Fine Jobbing Work PARKER, STEARNS & CO., 228-229 South Street, New York

TO MANUFACTURERS

Substantial European firm with experienced (ravellers visiting educational institutions in all countries seeks sole assency or agencies for school articles. Satisfactory results assured. Address T. F. D., Hedge Company, II West 32d Street, New York.

MODELS & EXPERIMENTAL MACHINETY.
Gears. Dies, Tools. Novelties manufactured. Fine, Accurate Work a Specialty. M. P. Schell,
1759 Union Street, San Francisco.

MODELS INVENTIONS PERFECTED UNION MODEL WORKS

PATTERN MAKER

EXPERIMENTAL WORK.
ERNEST A. FUCHS, 113 Plymouth St., Jersey City, N. J.

WRITE FOR OUR 170 PAGE FREE BOOK ON ELECTRICITY OF A SECOND SECON





HOW TO MAKE ELECTRICAL

Full Directions and Working Drawings

20. An Ammeter. 21. A Thermostat. 25. An Electric Furnace.
22. Motor Rotation.
23. An Electric Soldering Iron.
24. A Small Electric Heater.
25. A Rheostat.
26. A Hand Feed Arc Lamp.
27. A Jump Spark Coll.
28. A Rheostat. BUBIER PUB. CO., Dept. S, Lynn, Mass.



Telegraphy Circular free. Wonderful automatic teacher. 5 styles 32 up. OMINIGRAPH 90 up. OMINIGRAPH 90 up. 10 up.



ANY ONE CAN PLAY ANY GUITAR |



BUSINESS OPPORTUNITY

Men of business interested in a new field for making money will find in our proposition what they are seeking. We have a New Plan in the Mail Order Line that will please those seeking a good investment the Mail Order Line that will please those seeking a good investment. with large profits. A Fortune for the right person. The F. II. Alden Co., 178 East 4th Street, Cincinnati, Ohio.

Instructive Scientific Papers

ON TIMELY TOPICS

Price 10 Cents each by mail

ARTIFICIAL STONE. By I., P. Ford. A paper of immense practical value to the architect and builder. Scientific American Supplement **1500**.

THE SHRINKAGE AND WARPING OF TIMBER. By Harold Busbridge. An excellent presentation of modern views; fully illustrated. SCIENTIFIC AMERICAN SUPPLEMENT 1500.

SUPPLEMENT 1500.

CONSTRUCTION OF AN INDICATING OR RECORDING TIN PLATE ANEROID BAROMETER. By N. Monroe Hopkins. Fully illustrated. SCIENTIFIC AMERICAN SUPPLEMENT 1500.

DIRECT-VISION SPECTROSCOPES.
By T. H. Blakesley, M.A. An admirably written, instructive and copiously illustrated article. Scientific American Supplement No. 1493.

HOME MADE DYNAMOS. SCIENTIFIC AMERICAN SUPPLEMENTS 161 and 600 contain excellent articles with full drawings.

PLATING DYNAMOS. SCIENTIFIC AMERICAN SUPPLEMENTS 720 and 793 describe their construction so clearly that any amateur can make them.

DYNAMO AND MOTOR COMBINED.Fully described and illustrated in SCIENTIFIC Fully described and illustrated in SCIENTIFIC AMERICAN SUPPLEMENTS **844** and **865.** The machines can be run either as dynamos

ELECTRICAL MOTORS. Their Construction at Home. Scientific American Supplements 759, 761, 767, 641.

Price 10 Cents each, by mail

Order through your newsdealer or from

MUNN @ COMPANY

361 Broadway

 Weighing and measuring device, A. E. Abbott
 873,694

 Wheel, G. B. Hurlburt
 873,048

 Wheel, Brinley & Bowen
 873,408

 Whiffletree book, L. J. Austin
 873,003

 Window, case nent, Hiltz & Smith
 873,003

 Wire crimping machine, J. L. Alley
 873,195

 Wire fabric blank, W. C. Willets
 873,195

 Wire stretcher, R. G. Larzelere
 873,562

 Wood splitting machine, P. Eckenroth, Jr. 873,418

 Wrench, H. A. Paquette
 873,202

 Wrench, H. Jeffrey
 873,437

 Wrench, C. Ahern
 873,480

	DIDIOIO.	
	Automobile body, F. S. Davis	38,946
	Book plate, A. E. Bachert	38,937
	Calendar blank, J. L. Knight	38,938
	Cream separator, centrifugal, T. W. Morgan.	38,944
	Drill housing, electric, E. F. Smith	38,945
ı	Fabric, woven, C. H. Landenberger. 38,948,	38,949
	Furniture handle, L. W. Bond	38,939
	Knob, door, E. T. Schoonmaker	38,941
ı	Lock trimming, E. T. Schoonmaker	38,940
	Neckwear fabric, L. Auerbach	38,947
	Phonograph horn, E. L. Aiken 38,942.	38,943
	Signet, C. E. Hansen 38,935,	38,936

TRADE MARKS.

Metal articles, certain, A. Dewsbury... 66,505
Newspaper, Evening Star Newspaper Co.
Sewspaper, Washington Times Co... 66,539
Newspapers, Washington Post Co... 66,558
Overalls, pants, and denim jackets, Happ
Brothers Co... 66,556
Paint and varnish solvents and removers,
T. R. Wyles ... 66,566
Paint, preservative and waterproof, W. J.
Watson 66,566
Paint, varnish, and enamel. certain, Hockaday Paint Co... 66,556
Paints, preservative, C. L. Miller & Co... 66,556
Paper, certain, Graham Paper Co... 66,549 to 66,557
Picture apparatus, animated and moving, J.
Blanchi ... 66,545, 66,546
Pipe fittings, brass and iron, H. Mueller
Manufacturing Co... 66,546, 66,546
Remedy, certain, Burlingame Chemical Co. 66,521
Remedy, certain, O. Wicke ... 66,548
Remedy, certain, O. Wicke ... 66,554
Remedy for coughs and colds of horses and
mules, H. E. Turpin ... 66,548
Remedy for disorders of the stomach, liver,
and blood, Hall & Cummings ... 66,514
Remedy for sleeplessness, S. Goldberg ... 66,514
Re

LABELS.

PRINTS.

"The sweet heart of the Corn," for toasted corn flakes, Toasted Corn Flake Co..... 2,172 "Water Mark of Quality," for paper, L. L. Brown Paper Co. 2,173

A printed copy of the specification and drawing of any patent in the foregoing list, or any patent in print issaed since 1863, will be furnished from this office for 10 cents, provided the name and number of the patent desired and the date be given. Address Munn & Co., 361 Broadway, New

Canadian patents may now be obtained by the inventors for any of the inventions name? In the foregoing list. For terms and further particulars address Munn & Co., 361 Broadway, New York.

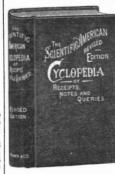
MUNN & CO., 361 Broadway, New York

Important Books

The Scientific American Cyclopedia of Receipts, Notes and Queries

15,000 RECEIPTS 734 PAGES

Price \$5.00 in cloth; \$6.00 in sheep; \$6.50 in half morocco, postpaid.



THIS splendid work contains a careful compilation of the most useful Receipts and Replies given in the Notes and Queries of correspondents as published in the SCIENTIFIC AMERICAN during the past sixty years; together with many valuable and important additions,

Over Fifteen Thousand

selected receipts are here collected; nearly every branch of the useful arts being represented. It is being represented. It is by far the most com-prehensive volume of the kind ever placed be-fore the public.

Mechanical Movements Powers, Devices and Appliances

By GARDNER D. HISCOX, M.E.

Large 8vo, 402 Pages, 1649 Illustrations, with Descriptive Text. Price \$3.00.

A DICTIONARY of Mechanical Movements, Powers, Devices and Appliances, embracing an illustrated description of the greatest variety of mechanical novements and devices in any language. A new work on illustrated mechanics, mechanical movements, devices and appliances, covering nearly the whole range of the practical and inventive field, for the use of Machinists, Mechanics, Inventors, Engineers, Draughtsmen, Students, and all others interested in any way in the devising and operation of mechanical works of any kind.

Mechanical Appliances Mechanical Movements and **Novelties of Construction**

A N Encyclopedia of Mechanical Movements and A Mechanical Appliances, including many Novelties of Construction used in the practical operation of the Arts, Manufactures, and in Engineering. For Engineers, Draughtsmen, Inventors, Patent Attorneys, and all others interested in Mechanical Operations.

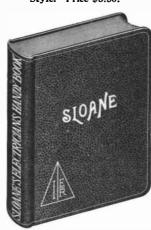
By GARDNER D. HISCOX, M.E.

Being a Supplementary Volume to the Author's Work entitled Mechanical Movements, Powers and Devices. Contains 1000 Special Made Engravings. 400 Pages. Cloth Bound. Price \$3.00.

The above two volumes sold together for \$5.00 Postpaid.

Electrician's Handy Book

By PROF. T. O'CONOR SLOANE, A.M., E.M., Ph.D. Handsomely Bound in Red Leather, with Titles and Edges in Gold. Pocket Book Style. Price \$3.50.



will also receive great benefit from its perusal and study.

It is a work of the most modern practice, written in a clear, comprehensive manner, and covers the subject thoroughly, beginning at the A B C of the subject, and gradually takes you to the more advanced branches of the science. It teaches you just what you should know about electricity.

Practical Pointers For **Patentees**

Containing Valuable Information and Advice on

The Sale of Patents

An Elucidation of the Best Methods Employed by the Most Successful Inventors in Handling Their Inventions. By F. A. CRESEE, M.E.

DON'T BUY GASOLINE ENGINES "THE MASTER WORKMAN," a two-cylinder engine; revolutionizing power. Its weight and bulk are half that of single cylinder engines, with greaterdurability. Costs to Buy—Less to Run. Quickly, easily started. Vibration practically overcome. Cheaply mounted on any wagon, It is a combination portable, stationary or traction engine. Send for Catalogue. The Temple Pump co., Mfrs., Meagher and 15th Sts., Chicago. THIS IS OUR FIFTY-FIFTH YEAR.



FURS

Whole Family

Our plan of making furs to measure and selling them by mail is a great convenience to fur buvers. It brings our big fur factory right to your home. From our Style Book you make your selection, send us your measures, we make the furs to fit at prices that will save you some money, and we send them to you on approval.

Our made-to-order furs and fur gar-ments have a distinctive and exclusive style; it well, sit well and have that com-fortable snuz feeling that cannot always be claimed for ready-made furs. They are handsomely trimmed and thoroughly well made throughout.

Made to Measure



Sold on Approval

We also remodel and repair all kinds of tur garments. Look yours over. It they need repairing let us quote you a price for making them practically as good as new.

We tan—we mount—we manufacture— are the biggest, best equipped mail order firm in the fur business with patrons in every City and State in the Union where furs are worn.

Send us your raw Skins and Hides and we will make them into Coats, Automobile Coats, Jackets, Robes, Gloves, Mittens, Rugs, etc. If we don't suit you we get no pay. We refer by permission to First State Bank and First National Bank, Three Rivers, Mich

Write today for Catalog B.

The National Fur and Tanning Co.





Rubber Pump Valves

For Cold and Hot Water, Oils, Acids, High Pressure Mine Service and for every pumping requirement. & & &

Mechanical Rubber Goods of every description Mechanical Rubber Goods of every description of unsurpassed qualities, including BELTING, HOSE PACKINGS, Gaskets, Mats and Matting, Tubings, Springs, Interlocking Tiling, Emery Wheels and MOULDED and CUT SPECI LTIES for any mechanical and commercial device.

NEW YORK BELTING & PACKING COMPANY, Ltd. 91 & 93 Chambers Street, New York

All varieties at lowest prices. Best Railroad Track and Wagon or Stock Scales made. Also 1000 useful articles, including Safes, Sewing Machines, Bicycles, Tools, etc. Save Money. Lists Free. CHICAGO SCALE Co., Chicago, Ill.



TRY IT YOUR SELF FOR IO DAYS WITHOUT DEPOSIT

If not satisfactory, return it and no questions asked. Daus' improved Tip Top Duplicator is the result of 25 years' experience, and is used and endorsed by thousands of usiness housesand individuals. 100 copies from pen-written and 50 copies from type-written original – Clear, Clean, Perfect. Complete Duplicator, \$7.50 cap size (prints 8% x13 in.), price,

Felix U. Daus Duplicator Co. Daus Building, 113 John Street, New York

Bausch @ Lomb

Analytical Chemicals

are recognized as "Standard" by scientific men everywhere, and are used in the leading laboratories. We shall be glad to send catalogs and estimates upon request.

"PRISM" IS A LITTLE MAGAZINE we publish monthly, beautifully made and printed. Send us your name and we will enter your subscription FREE.

Bausch & Lomb Optical Company, Rochester, N. Y. New York Boston Washington Chicago San Francisco

UNIVERSITY SHOE

(Trade-Mark.)

Heaviest oily grain leather—tan colored. Watertight construction. Comfortable and near.y indestructible. Send for pamphlet

1. P. TW ADDELL.

1210-1213 Market St., Palladelphia



as our instruction Book and "Business Guide" tells all. We furnish Complete Outfits with Big Advertising Posters, etc. Humorous dramas brimful offun, travel, history, religion, temper-ance work and songs illustrated.

a man with a little money to sin churches, school houses, lo halls, theatres, etc. Big profits each entertainment. Of do it, why not you? It's easy; write to us and we'll tell how. Catalogue free. AMUSEMENT SUPPLY CO. 467 Chemical Bank Bidg., CHICAGO



UFKIN TAPES AND RULES

ARE THE BEST.
For sale everywhere. Send for Catalog No. 16.

JFKIN RULE C Saginaw, Mich., U. S. A. New York and London.



COPYRIGHTS &C.

ng a sketch and description may
in our opinion free whether an
obably patentable. Communicanddential. HANDBOOK on Patents
t agency for securing patents. st agency for securing patents. n through Munn & Co. receive ithout charge, in the

Scientific American.

MUNN & CO. 361 Broadway, New York Branch Office. 626 F St., Washington, D. C.

Electrical Toys for Boys Real Scientific Novelties Practical, Complete, Harmless, Durable JUST THE THINGS FOR CHRISTMAS

Every Boy a Railroad President

THERE'S great fun owning a railroad and bossing the job. Our Models of Locomotives, Trains, Trolley Cars, Dynamos, Lamps, etc., are practical and durable inventions. They amuse and instruct. They point many a boy to a useful career. Equipped with dry batteries, no acids or liquids used, perfectly safe and harmless. Prices from \$1 up.

LLUSTRATED BOOKLET SENT FREE

THE CARLISLE @ FINCH COMPANY

233 E. Clifton Ave., Cincinnati, O. Largest Manufacturers Electrical Novelties in the World

POCKET WITH INSTRUCTIONS GIVES PRACTICE IN NAVIGATION, SURVEYING, &c. A USEFUL PRESENT: SENT ON RECEIPT OF PRICE.

L.DUERDEN. 50 PUTNAM AVE BROOKLYN, N.Y. COR. IRVING PLACE



We Will Make You **Prosperous**

If you care honest and ambitious write us today. No matter where you live or what your occupation, we will teach you the Real Estate business by mail; appoint you Special Representative of our Company in your town; start you in a profitable business of your own, and help you make big money at once.

Tunusual apportunity for men without capital to become independent for life. Valuable book A120 and full particulars free, Write today, Address nearest office.

NATIONAL CO-OPERATIVE REALTY CO.

Phelps Bldg., Scranton, Pa. Marden Bldg., Washington, D. C. Atheuaenm Bldg., Chicago, Ill.

Would You "Make the Round Trip" Without Uncertainty? Investigate the Hildreth

Marine Motors We are ready to

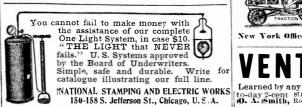
"SHOW YOU" Send for valuable facts about Marine Motors

THE HILDRETH MFG. CO.

TRIUMPH REVERSE GEAR

Sure to reverse-sure to hold on the "go-ahead" A strictly high grade gear, both in principle and worknanship. S-nd for descriptive book, read, and judge for yourself.

TRIUMPH GEAR CO. 300 Congress St,, West, Detroit, Mich



over-Ready's



GUARANTEED best of all safety razors. Complete for \$1.00 with silver nickeled frame -12 Ever-Ready blades, handle and blade stropper attractively cased. Extra blades 10 for 50 cents, which also fit Gem and Star frames. Ten new Ever-Ready blades exchanged for ten dull ones and 35 cents. On Sale Everywhere. Mail orders prepaid \$1.00.

(10) 3K With Every Set



"Porox" Ignitor Storage

rotox Ignitor Storage
BATTERIES
High Capacity. Light Weight.
Proved as the best for both ignition and light. No loss of current.
It sto es and returns the power to your machine. You can see and examine the interior without exposure and digging, because it is made up in transparent celluloid jars. No danger of breakage like hard rubber. Plates and jars are guaranteed for one year.
Send for catalog
Albert Muller, 2015 Wact 41ct St. Name Van

Albert Muller, 205 West 41st St., New York

WORLD'S MOTORCYCLES **CURTISS**



New Single and Double Cvlinder Models for 1908 now ready.
Diamond Medal, Highest
Award, National Endurance run, won on a Curtiss. Send for Catalogue H and Booklet 'Achievements.'

G, H. CURTISS MFG. CO., Hammondsport, N. Y.

Build It Yourself

Any boy or amateur can build this perfect little
1 H. P. ventical, 2 cycle gasoline engine on a foot
power lath from rough castings by following our
simple blue pr.nt working drawings. Others
are doing it, so can you. No engine equals it
for simplicity, strength and durability. Fills
every requirement where light motive power
is needed. Write for booklet and prices on
castings and finished engines. GARDNER MOTOR COMPANY

Keystone Well Drills



New York Office,

KEYSTONE WELL WORKS

170 Broadway

Steam Operating.

Gas Operating

For Drinking Water and Technical Use

PURE WATER H₂0

y operate automatically—delivering the distilled cold, aerated, palatable, crystal clear and germ

water cold, aerated, palataoic, crystal cital and proof.

Homes, Apartments, Office Buildings, Hotels, Schools, Clubs, Hospitals, etc., have installed them. Saves expense of buying bottled waters. Made any capacity. Your architect has full details—See Sweet's Index

November 1st, 1907, or write us.

We also manufacture water softening and filtering apparatus for industrial and municipal use.

JEWELL WATER IMPROVEMENT CO., 118 W. Jackson Boulevard, CHICAGO

Expansion Bolts



Star Expansion Bolt Co., Trask Ave. & 2d St., Bayonne, N. J

COLD GALVANIZING. AMERICAN PROCESS. NO ROYALTIES SAMPLES AND INFORMATION ON APPLICATION.



NICKEL

Electro-Plating Apparatus and Material Hanson & Van Winkle Newark. N. J. 28 & 30 S. Canal St. Chicago.

Get Lower Freight -Rates-

Investigate the advantages of Portsmouth, Virginia as a manufacturing center. Unusually low freight rates to every part of the country are assured by nine trunk lines of railway and a score of lines of water transportation that radiate from Portsmouth in every direction.

Cheap fuel and all kinds of raw material in abundance, reliable labor, healthful climate, pure water, good schools, beautiful homes and lew living expenses.

Splendid factory sites and business opportunities can now be secured at nominal cost. Interesting information furnished on request. Address

I. T. VAN PATTEN, SECRETARY, PORTSMOUTH, VIRGINIA.

We Wish to Genter Your Attention on the Lathe Driven

ALERT CENTER GRINDER

IT DOES THE WORK IN A RAPID, AC-CURATE, SATISFACTORY MANNER.

Muncy, Pa. ALERT MFG. CO.



DRILLING **Machines**

Over 70 sizes and styles, for drilling either deep er Shallow wells in anykind of soil or rock. Mounted on wheels or on sills. With engines or horse powers. Strong, simple and durable. Any mechanic can operate them easily. Send for catalog. WILLIAMS PROS., Ithaca, N. Y.





NEW YORK CITY STATIONS Foot of Liberty Street on the hour West 23rd Street ten minutes before the hour



