a beveled index piece, k, about 1/2 inch wide. A line somehow. Generally they bore holes in it with an left in the chamber had been destroyed. The ceiling drawn down the face of the piece, k, serves as an in- auger, put in a stick of dynamite, and blow the ice had been lined partly with plaster of Paris and partly dex. In a similar way a ring, j', fitted to the boss, g, into fragments, which are then shoveled out." serves to carry an index for the circle, K'.

The circles here shown are electrotypes made from a galvanometer scale, soldered to brass plates and silvered, some black varnish being rubbed into the graduations to render them more distinct.

the wooden stand by the rod, v. screwed into the block, A, and provided with a milled nut on its lower

In Fig. 1, the mounting is shown adjusted for the latitude of New York, 40° 41'. The screw, c, and nut, f, being loosened, and the polar axis being parallel with the earth's axis, the telescope is pointed to a star or other object, when the nut, f, is tightened, thus clamping the declination axis. The screw, c, is also umns, bed plates, and pedestals, and to the failure of high velocities obviously present dangers of breaking tightened, when the instrument will be made to follow the object by turning the screw, H.

may be omitted and the instrument may be guided by fractures and blisters, 150 safety valves dangerously checks, about 20 feet in diameter, are bolted. The the hand. The mounting may be further simplified overloaded, and 175 water gauges out of order. The peripheral space between the disks is filled in with by omitting the graduated circles, and still possess report finally states that out of nearly 1,000 boilers some 70 tons of No. 5 steel wire, completely wound great advantages over the altazimuth mounting.

large enough for a three inch telescope. It has a smooth and steady, otion and does not vibrate. There is, however, no objection to the use of larger stopcocks.

The hints here given may serve as suggestions. The amateur may carry out the work in different ways. The reader is referred to Gibson's "Amateur Telescopist's Handbook" for simple instructions for using and adjusting the equatorially mounted telescope.

Four Year Old Ice.

the best year for business on the Kennebec since the great season of 1890. One man says that some ice four there samples of fusible metals, and which should serve years old has been sold. "This is very unusual," says as a gauge of the temperature attained. the Portland Press. "Ice that is four years old costs more to get out of the houses than it costs to cut it in the first place. For it is the ice that is at the bottom of the house, and has been consolidated into a solid mass by the water flowing down from the melting cakes above and freezing these underlying cakes together. To run out a block from this is very difficult, for it is like quarrying stone from the solid ledge. It is a good thing that it can be sold, if only for the cost of handling it, because it must be got out of the building retained their strength, while most of the natural stone cause bright.

Report of an Engineering Insurance Company.

The equatorial mounting is secured to the head of | boilers. During the past year the company found that 33 | being unscorched, and the fusible plugs only showed a per cent of the accidents to the boilers insured in their company were owing to weakness, faulty construction, and bad workmanship; 27 per cent were due to purely accidental causes; and only 12 per cent were the result of carelessness of owners or attendants. The great majority of the accidents were owing to the failure of spur gearing and to defects in valves and valve gear. screws, bolts, cotters, and straps. The company made a sunder from the great centrifugal force developed. Although the slow movement is of great utility, it the discovery of 575 cases of defective grooving, 146 iron hub or boss to which two steel plate disks or found to require immediate attention, a great many round the hub, and the tensile resistance thus ob-A stand formed of three-quarters service cocks is would have been run without repair until they had tained is far superior to any casting. This huge fly

Protection of Iron Columns,

Some experiments were recently made by the Building Inspection Department, Vienna, says Engineering, on the protection of iron from fire by incasing it with brick. A wrought iron column 12 feet long, and built up of two channels connected by lattice bars, was used. This was set up in a small chamber constructed of brick, and the column was loaded by levers. This done, it was surrounded by a 41/2 inch brick wall laid It is stated by Portland ice dealers that this has been in fire clay mortar. The wall did not fit closely around the column, and advantage was taken of this to fix

> Various samples of stone concrete and other materials were also placed in the chamber within the column. This chamber was then filled with split firewood, which was lighted and the doors immediately walled up with slabs of plaster of Paris. After the fire had burned out, the doors were broken in and a stream of water turned into the room from a 14 horse power fire engine. An examination of the room next showed that the walls of brick laid in Portland cement

with terra cotta tiles. Both were damaged. The inclosure around the iron pillars was still standing firm, though corners of the brickwork were clipped one A prominent engineering insurance company in Eng-|inch or so, and the fire clay mortar was largely washed land has recently made public some very interesting out of the joints. On removing the casing, however, figures concerning the causes of accident to engines and the pillar was found to be uninjured, even the paint temperature of 149 degrees Fah.

A Wire Fly Wheel.

Among the most recent and novel applications of wire, perhaps none has greater interest to the mechanical world than that presented by the new wire fly wheel lately erected at the Mannesmann "ube Com-A large number, however, were due to defective col- pany's Works, Germany. Heavy fly wheels Criven at in all some 40,000 boiler inspections, and these led to The wheel at the factory mentioned consists of a cast wheel is driven at a speed of 240 revolutions per minute or a peripheral velocity of about 2.8 miles per minute, which is nearly three times the average speed of any express train in the world. The length of wire upon such a constructed fly wheel would be about 250 miles.—American Manufacturer.

Business Aphorismus.

Carlyle wasn't a man of business, but he would have made a success of it, had he tried it. In his writings one finds these lines of solid business truth:

A laugh is worth a hundred groans in any market. Have a smile for all, a pleasant word for everybody.

To succeed, work hard, earnestly and incessantly. All honest men will bear watching. It is the rascals

who cannot stand it. Better have the window empty than filled with unseasonable and unattractive goods.

When you hang a sign outside your place of business, let it be original in design and of good quality.

Wondrous is the strength of cheerfulness; altogether past calculation its power of endurance. Efforts to be permanently useful must be uniformly joyous, a spirit of sunshine, graceful from very gladness, beautiful be-

RECENTLY PATENTED INVENTIONS. Engineering.

m ans of jets of steam. From a valved pipe connected boiler, each of the branch pipes being provided with bearings on which they rest in the flue, and having also inclined nozzles, so that when the steam is turned on it block to the similar conductors of the next. strikes the inner wall of the flue at an angle, the jets thus removing and washing outward all impurities.

Railway Appliances.

CAR COUPLING. - Alonzo C. Packer, Pittsburg, Pa. This is an improvement in couplers of place being held with the necessary rigidity. The improvethe Janney type, and is adapted for automatic coupling ment is also adapted for use on any wheeled vehicles as with another of the same kind, and for safe uncoupling from either side of the car. The recessed drawhead is vertically slotted and transversely apertured, there being a pivoted latch block, and a locking key being shouldered on the front edge and working in the vertical slot. The key locks the latch block when depressed and a lifting bar passing through a lateral slot in the key has a cam slope on its top edge engaging the upper edge of the key slot to elevate the key when the bar is

New Castle, Ky. This is a simple coupling which couples automatically when the cars come together, the rail bearings, whereby the tie is more firmly engaged by the car. The drawhead has a transverse coupling eral displacement of the track. shoulder at the front end of the bottom of the mortise, in which is held a yielding member, and a coupling jaw in the top of the mortise is pivoted at its rear end and has its front end spring-pressed toward the bottom of the mortise. The front end of the coupling jaw has a transverse flange on its under face, and the link has its ends beveled and formed with transverse coupling shoulders. The link members can be readily coupled with the ordinary link and pin couplings.

STATION INDICATOR. — Dennis B. D'Orsey Blake, Denver, Col. Attached to a street car, this device automatically indicates to the passengers the name of the street or station passed or approached. It comprises an operating shaft geared to the car axle and formed in telescopic sections, there being a cam or spiral groove in one shaft section and in the other section a pin entering this groove, and gear wheels on the shaft sections, with shafting geared to the indicator, intermediate gears being alternately and automatically engaged when the rotation of the axle is reversed. A suitable dial in the car is marked with the points to be indicated in their relative positions, and a pointer actuated by the axle connections traverses the dial as the car moves over the route in either direction,

BLOCK SIGNAL.—James V. Richard-

this inventor the signaling apparatus is carried by the engines on the line, the arrangement being such that two engines cannot run upon adjacent blocks, either toward FLUE CLEANER.—Joseph O. Frazier, each other or in opposite directions, without operating the McCall, La. This is a readily applied apparatus for quick isignals in both engines. Parallel line conductors are arly removing all soot and other impurities in the flues by ranged in blocks, and the locomotives carry contactblocks with a signal in circuit. A circuit breaker con with the steam supply a series of branch pipes are nects the blocks of line conductors, and has cross connec adapted to be extended centrally through the flues of the tions to connect the positive conductor of one block to the negative conductor of the next, and connections to

> Brake Shoe.—Henry A. Lewis, Norristown, Pa. This shoe and attachments are so made that the shoe may be readily reversed, or a new shoe be substituted for an old one, the holder being conveniently removed from the brake beam, and the shoe when in dovetailed, notched rib, and the holder has a dovetailed arms having jaws engagingth; sides of a tooth, one of the groove and dovetailed socket, with a slot in which is pivoted a spring-pressed pawl whose lower end engages the notch of the rib while its upper end projects out

TIMBER TIE.—Luman C. Ingersoll, Keokuk, Iowa. Excepting at the two places on its top where the rails are attached, the sides and ends of this tie are beveled outwardly, thus giving a larger flat sur-CAR COUPLING. - Blan B. Haydon, face on its bottom than on top. Square shoulders are uncoupling being effected from either the top or side of the ballast, affording a high degree of safety against lat-

> ELEVATED RAILWAY.—John N. Valments, and may be built at comparatively low cost without the aid of skilled workmen. Suitable posts support transverse girders to which are secured hangers of inverted U-shape, to the depending arms of which are secured angle irons carrying channel iron tracks. The tracks are adapted for reversal to bring the flanges either inside or outside the structure, and the rails are secured to the channel irons.

> ELEVATED ROAD CARRIAGE. - The same inventor has devised wheeled hangers especially adapted to suspend a car, or k gs or other loads, the carriage being of simple and inexpensive construction, with proper strengthening members, a novel propelling me chanism and suspension devices. The improvement affords safety against derailment, and the driving mechanism is capable of producing high speed, the car being cushioned in a simple and efficient manner.

CONDUIT RAILWAY TROLLEY.—Walter E. Delabarre, Francis M. Frazer, and Robert A. Carrick, New York City. The construction of this conduit is such that the main electrical conductor is protected from son, Farmville, Va. According to the system devised by the action of the weather, and the opaning through which against puncture or penetration, the armor possessing air sleeve adjustable with regard to the nozzle, and

erve as a channel for the flange of the wheels. The terfere with these qualities in the tire as a whole. trolley is connected to a transmitting arm projecting through the slot, there being secured to the arm a cover- Julius Tullius, New York City. In the driving ing of insulated material having at its ends bevels facing mechanism devised by this inventor a sliding pedal shaft through the slot, there being secured to the arm a coverin the opposite direction from that of the trollev.

REAMER. - Foist Hatmaker, Ithaca, connect the positive and negative conductors of one N.Y. For the use more especially of plumbers, in the loosely connected with the ends of the sleeve. By repair of faucets, bibs and similar articles, this inventor has designed a reamer having a hollow handle and adapted to carry a reversible shank formed at one end the right or left, to change the mechanism for speed or with a fixed cutter head, while supporting at its other end a reamer with adjustable cutters

Fritz, Rib Lake, Wis. This inventor provides a device provement the ordinary sextant may be converted into for use on band or gang saws after they are swaged, to well as on railway cars. On the back of the shoe is a quickly dress both sides of the tath. It comprises two arms supporting a tooth guide to engage the front and back of a tooth; a guide bolt passes through the arms, and on it one of the arms moves toward and from the other, while a cam lever fulcrumed on the bolt engages | indicating on a graduated arc. the movable arm.

Agricultural.

THEASHING MACHINE.—Isaac W. Woodburn, Rock Rapids, Ia. In this thrasher the power and the machine are mounted on the same wheels, and the engine may also be utilized to move the machine from privated a pen support, a pin being held adjustable on place to place. The construction is simple, strong, and inexpensive, and the machine is operated without end or side shake, the various rotating cylinders for cleaning Tilton, Brooklyn, N. Y. This improvement consists of ley, Jersey City, N. J. The structure for an elevated purposes, together with the conveyers and air supply, a board, cut away for a hand space at opposite sides, ectually cleaning the grain after it is senarated machine does not need leveling and setting, and the blower does double duty, drawing the chaff from the grain and expediting the exit of the straw from the machine.

> FODDER OR FEED LOADER AND SLED. -Edwin F. Lewis, Vine Creek, Kansas. This is a lowwheeled sled for gathering and carrying hay, and is to be used in connection with a slatted gathering platform or loader upon a single axle, the loader being entered beneath the shock to gather a certain amount of hav and then being carried a portion of its length over the sled, one hand. to which the nav is thus readily transferred.

Miscellaneous.

B. Sheldon, Brooklyn, N. Y. This is a tubular tire transferring grain and other granular matters in bulk whose inner portion may be stretched at one or more by an exhaust current of air. The height above the points more than its outer periphery, whereby the tire inlet of the nozzle at which the air sleeve should termimay be readily slipped on or off without collapsing and nate being dependent upon various circumstances, it is without the use of special tools. This tire is also ar | necessary to vary the relative positions of the nozzl, mored in an improved manner, to render the tire proof and its air sleeve. The invention consists in making the

connection is made with the car is so located that it will such a degree of flexibility and resilience as not to in-

MOTIVE POWER FOR BICYCLES, ETC. projects through a bearing sleeve having cupped ends in which socket plates are fitted and secured to the shaft, there being balls in the bearings formed by the cupped ends and socket plates, and gear wheels of different sizes loosely mounted on the pedal shaft and pressing with the foot on either the right or left crank arm with the foot the operator may carry the shaft to for power, according to the road being traveled.

SEXTANT ATTACHMENT.—Thomas SIDE DRESSING SAW TEETH.—George H. Ferguson, Hankow, China. By means of this imar, instrument for measuring large angles, say from 120 to 240 degrees, as well as angles from zero to twenty degrees. The invention consists principally of a full silvered glass or mirror and a half silvered glass, the latter being substituted for a horizon glass in the plate of the instrument and the mirror being attached to a vernier

Ellipsograph.—John A. Caldwell. Vancouver, Canada. This is a device to facilitate the drawing of almost any kind of an ellipse. A sleeve is fitted to slide loosely on one of the legs of a compass, a rod adjustable in the sleeve standing at right angles to the leg carrying the sleeve. A holder is held on the rod and in it is adjustably held a second rod in which is the pivoted support.

MANIFOLDING DEVICE. - Edwin B. and with right angled flanges on adjacent edges, together with projecting pins near one end, affording a cheap and simple contrivance for the use of typewriters. to facilitate the quick and accurate assembling of sheets of paper and carbon sheets.

INK WELL. - William B. Pratt, Rahway, N. J. This inventor has devised a cover attachment which may be applied to an ink well of any description, in such manner that it may be sealed air tight when not in use. The cover is held closed under tension, but the opening and closing may be effected with

PNEUMATIC GRAIN CONVEYING. -Frederic E. Duckham, Millwall Docks, London, England. This invention relates to former patented inventions of the same inventor, and particularly to the suc-PNEUMATIC BICYCLE TIRE.—Cevedra, tion inlet nozzle of apparatus for loading, unloading and

providing means of adjustment and means of regulating the air supply through the sleeve to the nozzle

INLAYING METAL GOODS.—Henri F. L. Aumont, London, England. This inventor has de vised a mode of inlaying with terteiseshell or celluloid watch cases, jewelry, ornaments, etc., of gold and silver and other metals without the use of cement, producing a transparent, enamel-like effect. The pieces of material to be inlaid, when softened by heat, are squeezed into interlocking engagement with the grooved or beveled edges of through apertures in the metal, the pressure being maintained until the work is cold, when any superficial excess of the inlaid $\mbox{material}$ is re-

MANHOLE FOR SEWERS.—George Wright, Winnipeg, Canada. To ventilate the manhole of sewers and purify their obnoxious or deleterious gases, the manhole is, according to this invention, fitted internally with a cast iron cylinder provided with a ventilating cover, near which is held a mud pan, while a deodorizing basket is removably supported at the lower end of the cylinder. This basket is charged or re charged with deederizing material, preferably broken charceal, er lime, tar, etc., as eften as may be desired, er when disease is raging in a town a grate may be sub stituted for the basket and ordinary charcoal burned

UMBRELLA.-William R. Tebow, Tiskilwa, Ill. This inventor has devised a strong and durable runner and improved the construction of the crownpiece, connecting the ribs and braces with the crownpiece and runner by ball joints, to cause the parts to work easily. The crownprece and runner are small, and without prejecting pertiens to injure the fingers or tear the cloth, and their construction is such that any brace or rib may be easily taken out and repaired. The umbrella joint combines strength, lightness and durability with handsome appearance and capacity for a targe number of braces without making the joint large

POCKET KNIFE. -- John P. Nordlow Wercester, Mass. In the knife devised by this inventor the blade is so held in the handle that the blade may be quickly and easily opened and rigidly held in open position, no matter how long the blade may be. The blade may be opened from its heel or tang, and it may also be locked in upright position, or at right angles to the handle, so that it will not move backward or forward.

POCKET KNIFE.—Carl C. Moritz and Stephen D. Greenwood, Salt Lake City, Utah. This knife costs but little more than an ordinary one, but it is so constructed that it may be easily separated into its parts, and the blades, partition plates, and springs readily removed and new parts substituted. The parts are so arranged that they may be firmly put together and the knife externally presents the usual appearance.

HAIR CURLER. — Thomas C. Moore, Great Falls, Montana. This implement has a tapered tubular body at whose larger end is a radial flange on which is loosely fitted a ring $\bullet r$ $c \bullet llar$ to which is piv $\bullet t \bullet d$ a clamp arm. When a lock of hair is wound close to the head or face, and, on the last turn, the clamp does not come into due position to enable it to hold the lock tightly curled, it may be adjusted or revolved to enable it to do so.

HOOK AND EYE. - Joseph F. Schoeppl, Pittsburg, Pa. This mvention provides a connecting de vice formed of a body portion with hook members extended from one side, wings projecting from the ends and an extension from the body between the wings. It is inexpensive, being stamped out of resilient sheet metal, is readily attached to the garment without stitching, does not flap or bend outward from the fabric and when once secured in the garment cannot be pulled out in ordinary use.

HEAD REST FOR BEDSTEADS.—George G. J. Millar, Grevepert, Ohie. This is an improvement npon a formerly patented invention of the same inventor, providing for invalids a head rest which is readily adjustable to any desired position without throwing the body out of a straight line, and without much exertion of the attendant. The invention consists of a covered U-shape frame having a pivoted leg or brace, fastened in place by a cord, the covering material being permanently secured to one side of the frame, and laced to the other side, whereby it may be always drawn

BEER DRAWING AND SAVING APPAR-ATUS.—William R. Dales, New York City. This apparatus comprises a vacuum tank and a beer discharge pipe connected by a two-way faucet to which a hood is applied, with means for controlling the discharge and inlet pipes. The improvement enables the froth to be sucked from the top of a glass of beer as it is drawn, the froth being delivered into a separate receptacle from which, after it settles, it may be sold by measure.

Horseshoe. - Erasmus Richardson, Esbon, Kansas. This is a compound or double shoe, one section being a light racing shoe permanently nailed on, over which fits a recessed heavier section, temperarily nailed in place, and to be used only when training. The two sections are wholly disconnected from each other when off, and when the outer one is removed for racing the horse will have a practically new, light, sharp-

CASKET HANDLE.—Lyman E. Wood ard. Owosso, Mich. The wall of the casket, accord ing to this invention, has a recessed and perforated ear, in which is a washer, the ear and washer being seared in place by a screw, and forming a base for attachable handles. The improvement, in use, affords strong, rich base piece for handles, either of the drop style or rigidly projected from the coffin.

DESIGN FOR A ROPE CLAMP FRAME. -Per O. Olsson, Marshall, Minn. The edge contour of this frame presents a series of alternate convexities and concavities, the plate being essentially a plane surface, disposed on which is a ridge-like figure.

send name of the patentee, title of invention, and date all newsdealers. of this paper.

NEW BOOKS AND PUBLICATIONS,

ND BOOK OF PRACTICAL MECHANICS. For use in the shop and draughting room, containing tables, rules, formulas and solutions of practical problems by simple and quick methods. Logarithm, sine, cosine and tangent tables, areas and circumferences decimal equivalents of an inch, a foot, and a pound, bevel and spur gears, worm and worm gears, United States standard bolts and nuts, tapping drills, lathe thread cutting, cams, etc. By Charles H. Saunders. Hartford: Student Publishing Company. 1895. Pp. 116. Price \$1.

The Pope Manufacturing Company. manufacturers of the Columbia bicycles, are now sending out their desk pad calendars for 1895, affording space for memoranda for each day of the year. This is the tenth annual issue of this style of calendar by the Pope Manufacturing Company, and their very extensive experience has afforded them a vast deal of bicycle literature, points illustrating which bristle upon every page.

The Overman Wheel Company, manufacturers of the Victor bicycles, have issued a neat desk calendar for 1895, consisting of a memorandum pad with blanks on which to jot down brief reminders of things to be remembered, etc., for every day in the year. It goes without the saying that it is embellished with numerous apothegms as to the excellences of the Victor wheeland the advantages of bicycle riding.

The Link Belt Manufacturing Company, of Chicago, sendout a very ornamental calendar for 1895, in which a leaf of a small pad is given to each week, the pad being attached to the face of a card in colors. This company furnish shafting, pulleys, gearing, etc., and labor-saving machinery for handling any material in bulk or package.

SCIENTIFIC AMERICAN

BUILDING EDITION

DECEMBER, 1894.-(No. 110.)

TABLE OF CONTENTS.

- 1. Plate in colors, showing a residence at Bronxwood Park, N. Y. Two perspective elevations and floor plans. Cost complete \$3,500. A picturesque de sign. Mr. Chas. N. Hear, architect, New Yerk City
- 2. Elegant plate in colors, showing a residence at Ches ter Hill, Mt. Vernon, N. Y. Two perspective elevations and floor plans. An attractive design in the Colonial style. Messrs. Rossiter & Wright, architects, New York City.
- 3. A cottage at Mt. Vernon, N. Y., erected at a cost of \$4,500. Perspective elevations and floor plans. Mr. Walter F. Stickles, architect, Mt. Vernon, N. Y. An attractive design.
- 4. The handsome residence of W. K. Clarkson, Esq., Brooklyn, N. Y., erected at a cost of \$15,000. Two perspective elevations and floor plans. Messrs. J. C. Cady & Co., architects, New York City.
- A residence of moderate cost at Bronxwood Park, N. Y. Perspective elevation and floor plans. Mr. A. F. Leicht, architect, New York City. A pleasing
- The residence of W. D. Love, Esq., at Bronxwood Park, N. Y. Two perspective elevations and floor plans. Mr. W. H. Cable, architect, New York City. A neat design treated in the Queen Anne
- cost of \$7,500. Two perspective elevations and floor plans. Mr. John J. Petit, architect, Brooklyn, N. Y.
- the Colonial style. Mr. Chas. E. Miller, architect, New York City.
- A picture $\mbox{\it que}$ and $\mbox{\it well}$ appointed $\mbox{\it residence}$ at Belle Haven, Conn., recently erected for E. C. Converse, Esq. Four perspective elevations and floor plans. An excellent design. Mr. Bruce Price, architect, New York City.
- 10. A Colonial cottage at Bayonne, N. J., recently erected for Joseph Thomas, Esq., at a cost complete \$2,700. Perspective elevation and floor plan. Mr. A. C. Longyear, architect, New York City.
- 11. Miscellaneous contents.—Hints to readers.—The education of customers.-How to catch contracts.metal ceilings, illustrated.—New wood stains—
 Woodwork vs. flame.—Ebonizing wood.—A stove
 for heating water, illustrated.—Columbian Exposition award for copper and brass goods.—An improved band saw file, illustrated .- How to move elevator, illustrated.

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(6331) S. M. B. asks: What is the proper size of steam ports and exhaust ports and bridges between ports of cylinder 21% inches by 3 inches streke, 34 inch travel of valve, also the power of engine at 300 revolutions per minute with 70 pounds steam pressure? Would an oscillating engine develop the same power, of same dimensions? What size boat would above engine run? Give height of frame and length of pitman rod for A Colonial residence at Flatbush, L. I., erected at a upright engine of above dimension, proper size of link and length of eccentric rods and size of belt and flywheel; also would small boiler, 22 inches high, 12 inches diameter, fire box 10 inches high, 10 inches diame-8. A residence at Mt. Vernon, N. Y. Two perspective ter, flues 12 inches long, 2 inches diameter, upright, elevations and floor plans. A pleasing design in generate enough steam to run above engine? If not, what size should I have? A. Steam ports and bridges may be % inch wide, exhaust port ¾ inch, all 1 inch long. The engine should develop an indicated % horse power at 3/2 inch cut-off. An oscillating engine of the same size should develop the same power, but its structural defect does not recommend it. The power is suitable for a 14 feet sharp built boat of the row boat type. Connecting rod should be 8 inches long, center to center. Other details can only be made from a detail drawing. A 11/2 inch belt and 16 inch flywheel. The vertical boiler should be 25 inches high, 15 inches diameter, with twenty 134 inch tubes for the above engine and speed,

(6332) B. F. E. asks: What are the The latest and best designs for houses.—Diamond A. The central negative electrode is silver; the depolarmetals and fluids used in the chloride of silver battery? cement plaster.—Preserving "metals in roofs, bridges, etc.—A perfect roofing material.—Stamped

(6333) Denver House asks: Given a large maples.—Value of coverings for steam pipes. perfect wheel made to revolve free on a perfect axle, will -Watering garden plants.-Earthquake effect on it return from its forward motion npon stopping? A. brick buildings.—The trouble New York builders On a horizontal axis the wheel will have a tendency to have.-Foothold on pavements.-Milwaukee water slightly turn back from the instant of stopping, to come to an equilibrium. The small difference in the size of the journal and its bearing allows the arnal to roll up returns to a center bearing by gravity. which gives the wheel a backward metion. This should not take place in a vertical axle.

(6334) V. B. C. asks: 1. Is there any reason why steam or water could not be used internally in a gasoline engine to cool the cylinder ? A. No reasons beyond those based on practical points can be given. It seems neater and simpler to cool externally. 2. A pint of gasoline will make how much volume of vapor at atmospheric pressure? A. Two and one-half to three cubic feet, depending on the composition of the gaso-

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INDEX OF INVENTIONS

For which Letters Patent of the United States were Granted

December 18, 1894,

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

| · i | Addressing envelopes, etc., machinery for, G. | |
|-------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|
| ١, | Clark Advertising machine, sign, Briggs & Patterson | 531,021 531,018 |
| ı | Agricultural machinery, gearing and gear covering for, J. D. Schoffeld | 531,278 |
| - ¦ | Air brake governor, T. H. Haberkorn | 531,181 |
| - | rating, J. H. Fox | 530,937 530,939 |
| • | Addressing envelopes, etc., machinery for, G. Clark. Advertising machine, sign, Briggs & Patterson. Agricultural machinery, gearing and gear covering for, J. D. P. Schefield. Air brake J. D. P. Schefield. Air brake governer, T. H. Haberkern. Air brakes, block system for automatically operating, J. H. Fox. Air brakes, mechanism for automatically actuating, J. H. Fox. Air brakes, mechanism for automatically actuating, J. H. Fox. Air brakes, mechanism for automatically operate, J. P. Clifton. Alarms. See Burglar alarms. Alakali, process of and apparatus for the production of constic C. T. I. Vautin | 530,938 |
| f r | Air brakes, track device to automatically operate, J. P. Clifton | 531,100 |
| 3 | Alakali, process of and apparatus for the produc- tion of caustic, C. T. J. Vautin | 531,235 |
| t | Alakali, process of and apparatus for the produc- tion of caustic, C. T. J. Vautin Apartment house, M. L. Ungrich Apples, pears, etc., machine for pulping, C. J. Ollagnier | 531,141 |
| ì | Ollagnier. Ax polls, machine for making, E. Rogers. | 531,058 531,221 |
| | Baling press, A. L. Cox | 531,163 531,240 |
| 3 | Apples, pears, etc., machine for pulping, C. J. Ax pells, machine for making, E. Regers. Bait receptacle, W. B. Glimore. Baling press, A. L. Cex. Baling press, C. E. Whitman. Ball. See Bewling ball. Bandage, suspensery, J. Teuscher, Jr. | 531,252 |
| • | Bandage, suspensory, J. Teuscher, Jr. Barrel making machine, Vale & Shl Bearing wheel, ball. H. F. Coates. Beit, electric. Fuller and Taylor. Bench stop. J. Daily. Bicycle brake, J. itchfield & Sanford. Bergele brake, J. itchfield & Sanford. | 531,252 531,283 531,101 |
| • | Belt, electric. Fuller and Taylor. Belt, electric. Fuller and Taylor. Biovele brake. Litebfield & Sanfard | 531,109 531,102 531,050 |
| | Rievelo eafoguard and sunnert T. I. Riesell | 531,176 531,016 |
| | i Binder for milsic, magazines, etc., Boeing & | |
| | Stork | 520 OOG |
| | | 530,996 531,284 |
| | Beard. See Sheet heard. Bettle stepper and filler, combined, I. Pemerey Bettle steppers, machine for feeding crewn, N. | 531, 1 33 |
| r | Dowling hall E () Dekkonwadal | |
| l | Box. See Match box. Box. Z. B. Webb. Bracket. See Dental bracket. Brake. See Air brake. Bicycle brake. Car brake. | 5 31,083 |
| t | Brake. See Air brake. Bicycle brake. Car brake. Wagon brake. | |
| , | Brake. See Air brake. Bicycle brake. Car brake. Waken brake. Bridge, truss, D. F. Lane. Bridle bit, F. Swales. Brooder, chicken, L. C. Billings. Broom, D. A. McDonel. Brooms, manufacturing, D. A. McDonel. Brush bandle, flue, E. P. Hunt. Buckle, suspender, J. N. McGriff. Burghar alarm, detonating, J. W. Horn. Burghar alarm systems, directic closer for, A. Stremberg. | 531,048 531,230 |
| ì | Broom, D. A. McDonel | 531,255 531,056 531,055 |
| f | Brush handle, flue, E. P. Wunt Buckle, suspender, J. N. McGriff | 531.639 530.960 |
| f | Burglar alarm, detonating, J. W. Horn, Burglar alarm system, A. stromberg. | 530,947 53 0 ,976 |
| 1 | Burgiar alarm systems, circuit closer for, A stremberg. Burner. See Hydrocarbon burner. Lamp burner | 5 30,975 |
| f | Burning granular fuel apparatus for C W Clay | |
| , | bourne Button setting machine, A. J. Shipley | 531,160 531,224 |
| | bourne granda luc, apparatus, c. of shourne string machine, A. J. Shipley. Cabinet, statemery, L. C. Beardsley. Cables, tension device for towing, Humphrey & Hoffman. | 530,995 |
| | Camera. See Folding camera. Candle grasp, H. Glaser | 531.028 |
| 8 | Cables, tension device for towing, Humphrey & Hoffman. Camera. See Folding camera. Candle grasp, H. Glaser. Candw, machine for cutting stick, J. M. Allardyce car brake, E. Allen. Car brake and power controller, electric, A. W. Mitchell. Car brake, automatic, H. E. Olson. | 531,084 531,287 |
|) | Mitchell | 531,268 531,131 |
| ? f . | Car construction, railway, C. A. Smith | 531,131 530,969 531,145 |
| | Mitchell. Car brake, automatic, H. E. Olsen Car construction, railway, C. A. Smith Car coupling, J. Cark Car deer, R. T. Garland Car fender, Engel & Jurom Car fender, Engel & Jurom Car fender, automatic struct, J. T. Van Gestel Car fender, struct, W. H. Breck | 531, 059 531,110 531,026 |
| r | Car fender, automatic street, J. T. Van Gestel Car fender, street, W. H. Brock | 531,234 531,258 |
| - | Car motor, street, J. Radomski. Car sear, reversible, S. Hoffman. | 531,275 531,122 530,010 |
| 2 - 1 | Cartridge shell for practice shooting, W. M. Thomas. | 531,233 |
| , | Car fender, Endet K. Jurom. Car fender, automatic street, J. T. Van Gestel. Car fender, street, W. H. Brock. Car motor, street, J. Radomski. Car seat, reversible, S. Hoffman. Card, reinforced stenetl, F. D. Belknap 530,518, Cartridge shell for practice shooting, W. M. Thomas. Case. See Gear case. Pencil case. Piano case. Cash registers, multiple adding machine for, C. J. Ryberg. Cash registers, sealing device for, J. O. Byrns Chain link, R. A. & C. Breul. Chair, See Rail chair. Railway chair. Charging apparatus, E. Solvay Churn, J. A. Maddex. Clay product machines, cutter for, J. H. Omwake | 591 97W |
| , ' | Cash registers, sealing device for, J. O. Byrns Chain link, R. A. & C. Breul. | 530,924 53 0 ,921 |
| | Chair. See Rail chair. Railway chair. Charging apparatus, E. Solvay | 531,282 |
| 9 | Chart, astronomical, F. E. Ormsby | 531, 0 60 531, 2 04 531,212 |
| l r | Cleaner. See Wheel cleaner. Clipper attachment, hair, C. O. Bechstedt | 530,984 |
| - | Clock, electric programme, J. L. McCaskey Clothes line fastener, C. Barts ch. | 531,002 531,248 |
| | Chart, astronomical. F. E. Ormsby. Churn, J. A. Maddex. Churn, J. A. Maddex. Clay product machines, cutter for, J. H. • mwake Cleaner. See Wheel cleaner. Clipper attachment, hair, C. O. Bechstedt. Clock, electric programme. J. L. McCaskey. Clothes line fastener, C. Barts ch. Clutch, friction, J. A. Barnes. Coffee pot, C. C. Davis. Cein belding and delivering device, C. F. Kraump Compound engine, J. Feebles. Confectionery machine, S. J. Hicks. Controller handle. H. Mittelsderf. Corset, T. S. Gilbert. | 531,164 530.997 |
| r | Compound engine, J. Peebles. Confectionery machine, S. J. Hicks | 531,272 531, 0 33 |
| 7 | Corset, T. S. Gilbert | 531,179 530 041 |
| • | Controller handle. H. Mittelsderf. Cerset, T. S. Gilbert. C. F. Geedwin. Cetton gin, relier. O. F. Geedwin. Cotton opener. A. Kirschner. Cotton opener. A. Kirschner. Cotton opener. A. Kirschner. Cotton opener. A. Kirschner. Coult, bed. and be at the shifter and brake for, T. M. Wallace Coult, bed. and be at the bed. B. S. Maben. Coupling. See Car coupling. Pipe coupling. Coupling. S. A. Stabley. Cribs or bedsteads, support for canopy rods in metallic, W. T. Mersereau. Cultivator. See Ore crusher. Cultivator. A. Lindgren. Cultivator. disk, H. B. Dodson. Cultivator, disk, H. B. Dodson. Cultivator. Cyclometer, J. A. Mosher et al. Cyclometer, J. E. Moss. Danger signal and lock for switches. G. E. Ed- wards. | 531,193 |
| ? | ror, T. M. Wallace. Couch, bed, and b athtub, combined, B. S. Maben Coupling Sec Cor coupling Pine combined. | 530,978 531,202 |
| e | Coupling, S. A. Stabley | 531,071 |
| 1 | metallic, W. T. Mersereau Crusher. See Ore crusher. | 530,953 |
| е | Cultivator, A. Lindgren. Cultivator disk. H. E. Dodson. | 531,252 531,200 530,932 |
| | Cultivator standards, device for adjustably attaching weed cuttersto, W. A. McCoy | 531,054 |
| l l | Cyclometer, C. E. Mosser et al. Cyclometer, C. E. Moss. Denger signal and lock for switches (2. E. Ed- | 531,269 531,207 |
| | wards. Dental bracket, A. Bond. | 531,025 531,257 |
|) } ! | Dental napkin holder, G. A. Bronson531,093, Dental plates, forming, M. P. Boyd | 531,094 531,092 |
| f | Display rack, combined folding and revolving. W. H. Conrad | 531.099 |
| t | Ditching machine, A. C. Carter Door check, C. W. Hamshaw | 531,097 531,116 |
| e e , | Door operating device, W. C. Lucas. Door operating device, W. C. Lucas. Dears device for encosting sliding W. H. Parato | 530,952 531 154 |
| ا ً | Danger signal and lock for switches. G. E. Ed- wards. Dental bracket, A. Bond Dental bracket, A. Bond Dental plates, forming, M. P. Boyd. Derrick, M. Beal Display rack, combined folding and revolving. W. H. Conrad Ditching machine, A. C. Carter Door check, C. W. Hamshaw Door, texible, A. S. Spaulding. Door operating device, W. C. Lucas. Doors, device for operating sliding, W. H. Brodie Devetalling machine for preparing edges of parts of electrotype or sterestype plate blocks, E. C. Williams. | J51,10 U |
| - | C. Williams. Draughtsman's instrument, O. F. Hill. | 531,24 1 531,186 |
| 8 | Drilling machine, F. W. Williams | 530.979 |
| t | Dye, blue, Bierer & De la Harpe. Dye, substantive red. J. J. Brack. | 531.148 531,149 |
| t - | Draightsman's instrument, O. F. Hill. Drill. See Rock drill. Drilling machine, F. W. Williams. Dust pan, G. H. Gere. Dye, slue, Bierer & De la Harpe. Dye, substantive red. J. J. Brack Dynamometer, R. J. Roifson. Eaves tro ugh, A. C. Kanneberg. Electric conduit, T. T. La Pointe et al. Electric converter, F. C. Priestly. Electric meter, T. Bruger. Elevator controlling device, C. E. Fos er. Elevator controlling device, See & Tyler. | 531,006 531,044 |
| е | Electric converter, F. C. Priestly. Electric meter, T. Bruger | 531,005 531.153 |
| | Elevator controlling device, C. E. Fos er | 530,936 531 ,070 |
| | | |