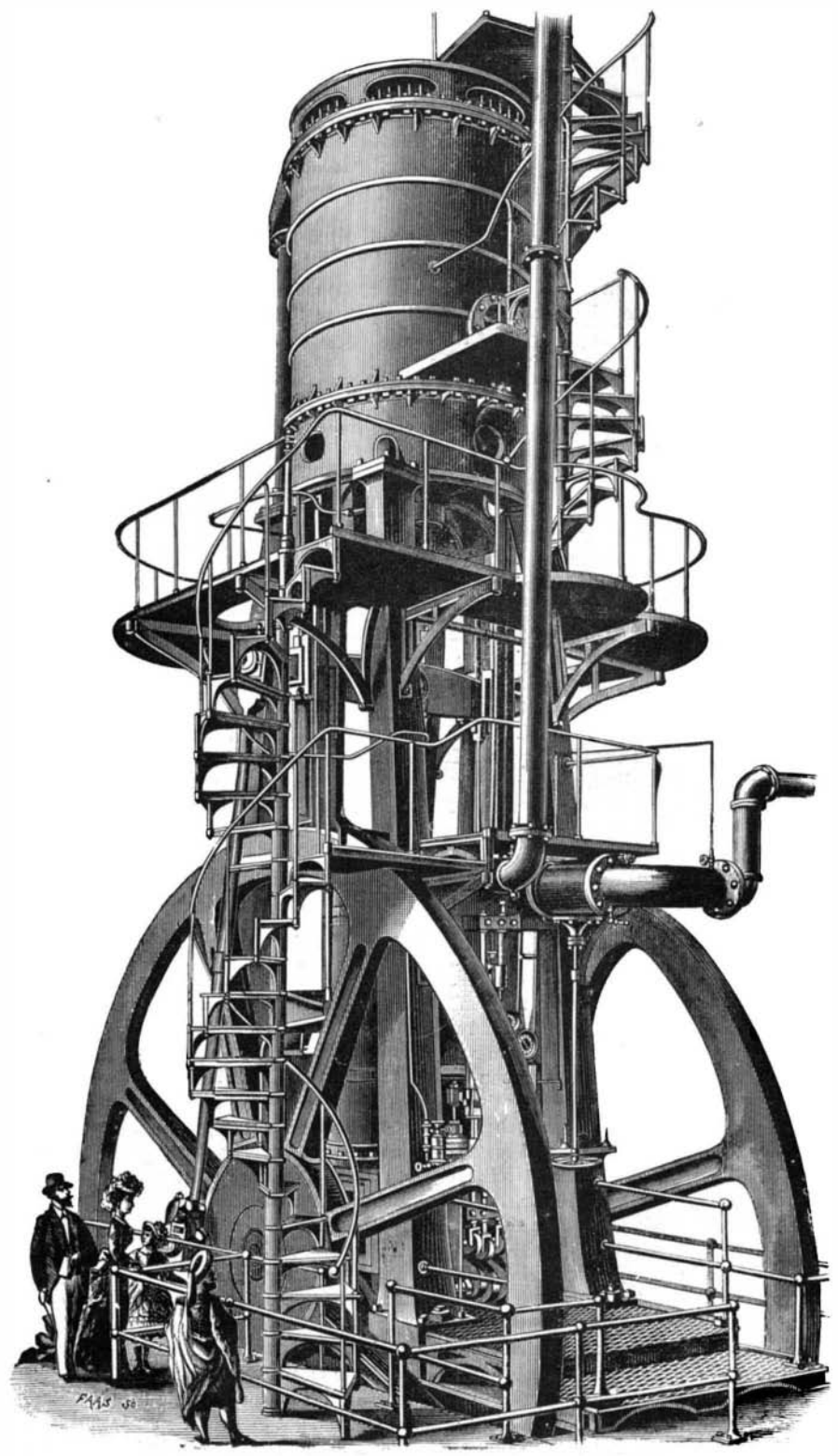
BLAST ENGINE.

The accompanying engraving represents a blast engine made by the I P Morris Company, of Philadelphia. This engine has been designed to meet the wants of American furnace managers, certain requirements having been laid down as a standard which the firm have endeavored to follow as closely as possible. These requirements are: "Completeness without sacrifice of accessibility to the moving parts, self-adjustment of parts liable to irregularities of wear, and steadiness of the whole structure and preservation of alignment by being self-contained." The first engines of this class—a pair having steam cylinders forty inches in diameter, and blast fifty-eight inches, with a stroke of four feet six inches, and producing a blast pressure of twenty-five pounds—were built about ten years ago for Bessemer steel production. Since that time a large number have been built and put into successful operation, showing that the efforts of the builders toward perfection of design have not been without their reward

The firm construct engines on this plan with blast cylinders varying from seventy-five inches in diameter and six feet stroke to one hundred and eight inches in diameter and nine feet stroke, and nearly all of them are provided with condensing apparatus sufficient for initial steam pressure of forty pounds per square inch, admitted during three fourths of the stroke, and producing a vacuum of twenty-four and one half to twenty-six inches.

The engines are fitted with the Wanich equilibrium valve. The essential feature of this valve consists in the use of a ring cast on the back of the main valve, extending upward and bored out so as to envelop and slide freely upon the outside of another ring cast on the steam chest bonnet above, extending downward and turned off evenly on the outer circumference. These rings are of course concentric, and the annular space between them is quite small, very much less than the aggregate area of the holes for the passage of steam below the pilot valve, consequently any steam passing this annular opening when the pilot is raised, goes freely through into the cylinder, exerting no appreciable pressure on the back of the main valve, and permitting it to rise easily. This has been confirmed by connecting an ordinary steam gauge with the space inclosed by the rings, showing the pressure, when the pilot was seated, to be, say, thirty-five pounds, and dropping suddenly almost to zero when the pilot was raised, until the main valve opened, when it rose again to thirty-five pounds. This valve has been in use for about four years with highly satisfactory results, saving steam and proving easily manageable.

The blast valves are of selected thick sole leather, backed with plate iron, and the blast piston is fitted for either metal, wood, or bag backing The steam piston is provided with metal double rings held out by springs. The valves are lifted by cams operating directly against rollers fitted into the bottom ends of the lifting rods, and these cams are adjustable but not variable, giving facilities for experimenting so as to determine the best distribution of steam without interference with each other. The cam shaft is driven by spur gears fitted to the main shaft. The rim of the fly wheels on the side in line with the crank pin is cored out, so that the excess of weight on the other side will counterbalance the weights of piston rods, crossheads, etc. The shaft is of wrought iron, and the crosshead swivels in the yoke connecting the two piston rods, so that it may accommodate itself to any irregularities of wear in the main shaft or crank pins.



I P. MORRIS COMPANY'S BLAST ENGINE.

The engine shown in the engraving has a height of thirty-six and one half feet, weighs two hundred and fourteen thousand seven hundred and ninety-four pounds, and exerts seven hundred and fifty horse power, delivering ten thousand cubic feet of air per minute. The bed plate upon which the whole construction rests is eight feet wide and thirteen feet long, weighs seventeen thousand pounds, and is laid on a foundation of hard brick or good stone at least ten feet in depth, and well anchored to it so as to insure stability. The steam cylinder is fifty inches in diameter, and the blast cylinder ninety inches, the stroke being seven feet. The fly wheels weigh forty thousand pounds each.

The height of the engine is principally due to the length of stroke, and this has been done so that a given quantity of air can be supplied by a less number of revolutions and with fewer beats of the blast valves than is generally adopted in other engines. The direct loss in delivery, due to piston clearance and space in the passage, being a quantity depending on the diameter of the blast cylinder, then if we take a fixed diameter of cylinder it is clear that the percentage of loss of useful effect will diminish as the stroke increases. The engine is provided with a condensing apparatus situated just back of the main working parts, and in the entire construction everything has been carried out with a view to proper economy both in first construction and in future use.

Machinery for Moving Cleopatra's Needle.

Mr Charles Roebling, who designed the machinery to be used in taking down the Obelisk of Alexandria and in setting it up again when it reaches this city, describes it, in the *World*, as a special structure designed to shift the position of obelisks from a vertical to a horizontal position In taking down the monolith the first thing done will be to cover it with a casing of two inch oak planking, which will be bound at intervals of three feet with strong iron bands. This done, the obelisk will be guyed at the top from four points, like the mast of a vessel, so that there will be no possibility of its falling over.

The center of gravity has been calculated to be at a point 26 feet above the base; here will be placed trunnions on either side, which will be bolted across the sides by eight one and three quarters inch iron and four two inch steel bolts. The trunnions are historical in their way. They are cast from cannon metal only, and many of the cannon used were captured from the Confederates during the war, besides which they are the heaviest castings of their kind ever made. The trunnion plates are four inches thick, nine feet wide, and 6 feet high. At the center is the turned trunnion, which is thirty-three inches long and eighteen inches in diameter. The weight of each trunnion and plate is 1,250 lb , making them together 1¼ tons. The metal used in the casting is of the best quality, a sample taken from the same heat having broken at a tensile strength of 2,900 lb. to the square inch. It is seldom that such excellent metal has been obtained.

The next operation will be to quarry out four six inch channel ways through the base of the obelisk and insert I beams, which are to assist in raising it from the foundation.

The foundations for the towers will next be constructed. They will consist of two platforms, one on each side, of three inch oak planking, each six feet wide and twenty-four feet long. On top of these will be set four oak sticks, twelve by eighteen, firmly bolted together. The iron work of the towers will then be built on top of the preliminary foundation. This consists of one wrought iron tower placed on either side of the monolith. Each tower is made of six twelve-inch heavy wrought iron I beams, spreading out at the base to a distance of twenty-one feet and converging at the top to within five feet. The beams at their base rest on four heavy I beams, and are securely riveted to the platform by means of plates and knees. Placed on top of these posts are caps, each five feet long and thirty inches wide, which are also secured by means of plates and knees. The posts are braced from top to bottom by angle and channel irons, making the towers perfectly rigid. Placed on top of the caps and securely bolted to the tower proper are cast iron journals which weigh 3,700 lb. each, forming the grooves for the trunnions to work in. A six inch rib is cast on the bottom of each of the trunnions, and in these ribs there are four two inch holes. Through each of these holes one and three-fourths inch iron rods are inserted, connecting with similar rods from the six inch I beams running through the base by means of right and left thread turn buckles, which will be used to raise the obelisk from its foundation and throw the weight on the trunnions. The foundation will then be removed and the obelisk will be left hanging free.

On account of the stone having an unknown factor of safety when supported at its center of gravity or at either end (according to some authorities as low as one and one half times), it has been deemed advisable to strengthen the stone by means of one and three-fourths inch (diameter) wire rope stays, which are run over a frame nine feet high resting on the trunnion, which is intended to be uppermost when the stone is in a horizontal position, to either end of the obelisk. The stays will relieve each end by some twenty-five tons, thus preventing any possibility of the stone cracking at its center of gravity. Having taken every precaution and got the obelisk into a free position it can then be easily turned. This will be a matter of very little exertion, provided the structure is perfectly aligned.

When the obelisk is placed in a horizontal position, Captain Gorringe, who is to have the work in charge, will next proceed to build two piles of beams placed crosswise. As soon as they reach the height of the stone jacks will be used to lift the latter out of its trunnion bearings and block it up. All the construction will then be taken away, and foot by foot the obelisk will be lowered to the ground by reducing the piles, first from one side and then from the other.

Once on the ground the obelisk will be incased in an iron cradle, which consists of a parabolic truss on each side, connected by means of heavy channel floor beams and braces. To the floor beams two heavy channel bars will be riveted, and corresponding channels will be laid on the ground to form the train for the obelisk to move on, which will be accomplished by inserting eight inch cannon balls into the grooves formed by the channel bars. The track will be laid sixty feet ahead of the cradles, so that as the stone is pushed along, the track behind will be taken up and placed in the front.

The machinery above described has been made at the works of John Roebling Sons, Trenton, N. J. The castings of the iron work were made by the Phœnix Iron Works Company, of Trenton, and the carpentering work will be done abroad. The description of the obelisk as used by Mr. Roebling to make his calculation is as follows: 67 feet 2 inches high, 8 feet 2½ inches by 7 feet 9¾ inches wide at base, 5 feet 2 inches by 5 feet wide at top. Substance, granite; center of gravity distant from base, 26 feet; surrounding (character of) soil, sand.

The same structure, with very little difference in the manipulation, will be used to erect the obelisk when it is brought to New York.

Electrical Camphor.

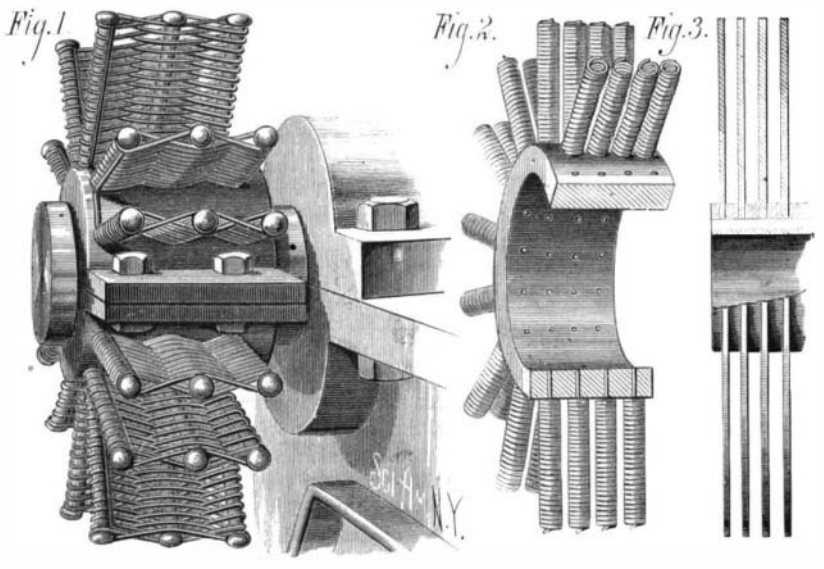
If a small bit of camphor is laid upon water it begins turning and moving about with great rapidity. If a few grains of lycopodium or other light powder have been previously scattered on the water they are drawn toward the camphor by eddies in an inverse direction. These phenomena were observed in 1748 by Romieu, who attributed them to a difference of electricity between the water and the camphor. Subsequent investigators thought they might be due to the camphor vapor striking the water and producing a recoil. M.

Casamajor has, says *Les Mondes*, resumed the study of the question and adopted the views of Romieu. He instances the following crucial experiment: At the same time that the bits of camphor are thrown upon the water insert a glass rod which has been rubbed with flannel; the motion immediately stops. If the electricity is removed from the rod by rubbing it with tinfoil, it loses its power of checking the eddies.

A NEW DEVICE FOR PREVENTING JOURNALS FROM HEATING.

It frequently happens that in spite of any amount of precaution the journals of machinery will heat and cause trouble and delay and work injury to the bearings. In many cases the difficulty may be overcome by the reconstruction of the entire machine, but this is expensive and inconvenient. The invention of Mr. James Dempsey, of Lewiston, Me., which is shown in the annexed engraving, is intended to obviate this difficulty by conducting away and dissipating the heat by means of metallic conductors, exposing a large surface to the air. Three forms of the device, all based on the same principle, are shown in the engraving. That shown in Fig. 1 consists of a copper collar fitted closely to the shaft near the bearing, and provided with a number of radial pins, around which copper wire is wound or woven so as to present a large radiating surface to the surrounding air. The temperature of the shaft can never greatly exceed that of the collar clamped upon it, and the temperature of the collar cannot become much higher than the air in which the pins and surrounding wires revolve.

In the form shown in Fig. 2, spiral copper wires are inserted in the collar to conduct away and dissipate the heat; and in the form shown in Fig. 3, metallic disks are employed as radiators instead of wires. There are, in fact, many forms in which the device may be constructed, and, as will be necessary, modify the apparatus for different applications, the inventor does not limit himself to any particular form. The device is applicable to the bearings of shafting, to car axles, to the shafts of calender rolls, and other journals liable to heating. The inventor says that in actual use it has proved very efficient.



DEMPSEY'S COOLER FOR JOURNALS.

NOVEL STEAM GENERATOR.

We give herewith an engraving of a steam generator recently patented by Mr. Charles Ward, of Charleston, W. Va., and lately tested both as to efficiency and economy on the experimental stern-wheel steamer Wild Goose, plying on the Kanawha river. We understand that the boiler easily evaporates 85 cubic feet of water per hour, with a natural draught, and supplies steam at 190 lb. pressure to an engine having a 9¾ inch cylinder and 3 foot stroke. The boiler occupies a space 7x8 feet on the deck of the boat, is 8 feet high, and has 28 square feet of grate surface; the smoke stack is 30 inches in diameter, and the weight of the boiler is only one-fourth that of flue boilers of the same capacity. Its construction is such that a perfect and rapid circulation of water is secured. The inventor claims that the effect secured in rotating boilers is secured in this without mechanical contrivances.

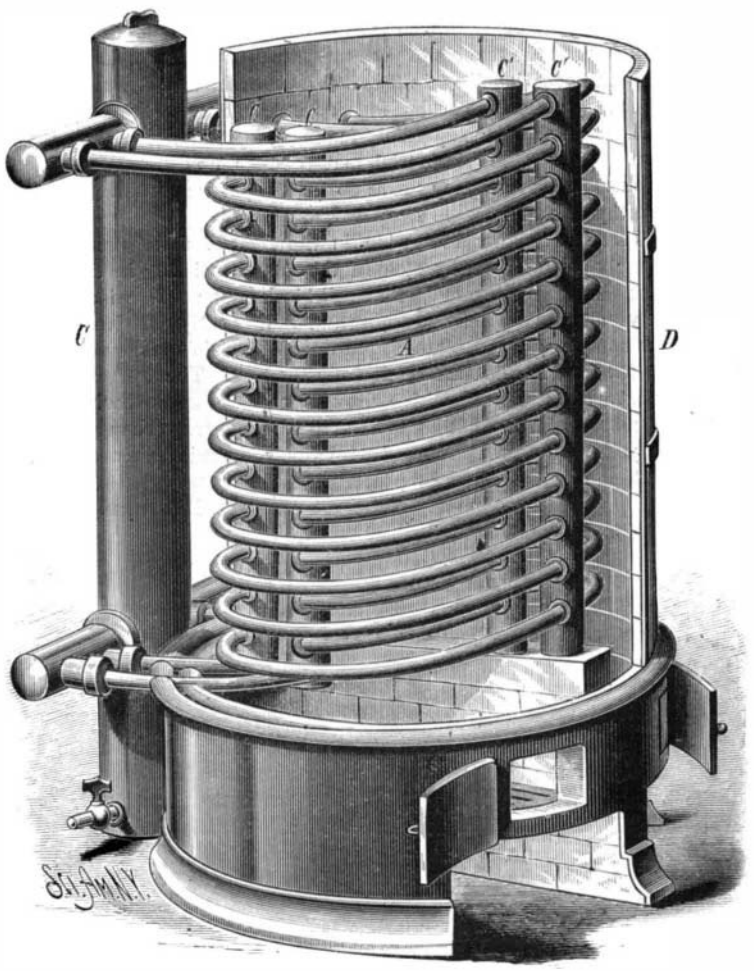
The Wild Goose is running daily, and is considered a perfect success by her projectors. The boiler has been twice inspected by the U. S. Steamboat Inspectors, and is allowed to carry 193 lb. per square inch. The boiler consists of 4 piles of 20 circular 2-inch iron tubes, the coils having respectively a diameter of 2, 3, 4, and 5 feet, all having perfect connection with each other, and by their arrangement securing compactness, lightness, a maximum of heating surface with a minimum of fuel, and practically absolute freedom from danger of explosion.

Our engraving represents a boiler having only two sets of curved tubes instead of four, but otherwise the same as that used on the Wild Goose. The connected series of curved pipes, A, are concentrically arranged and are inclosed by a concentric iron casing, D, having a firebrick lining. The inner series of pipes surrounds a vertical cylinder having a firebrick facing. The curved tubes are inclined and connected with vertical stand pipes, *c c'*, which are located on opposite sides of the boiler in line with the division wall of the fire box. The curved pipes are inclined, to facilitate the flow of water and steam toward the upper end of the stand pipes.

The flame and products of combustion pass up from each portion of the fire box in the spaces between the pipes, and between the pipes and the outer casing and the central cylinder. These firebrick surfaces reflect the heat upon the curved tubes, and this, together with the direct action of the flame and heat from the fire, insures the rapid generation of steam. The steam and water are separated by the cylinder, C, which is connected at its upper end with the upper ends of the stand pipes, *c'*, and at its lower end with the lower ends of the stand pipes, *c*. As the steam and water enter the cylinder, C, through the upper connecting pipes, the water falls while the steam is taken to the engine. A perforated diaphragm is placed across the cylinder just above the upper connecting pipes and below the engine supply pipe, to prevent the water from following the steam.

The water that falls in the cylinder returns to the boiler through the lower connecting pipes.

The stern-wheel steamer Wild Goose, upon which Mr. Ward's boiler is used, is said to be the lightest and fastest boat of its class ever built. It is 110 feet long, 16 feet beam, and 3 feet depth of hold, and draws but 16 inches. The wheel is 13 feet in diameter and 10 feet 6 inches wide. The boat has made 10 miles in 45 minutes, with a current of two miles, and it is claimed that it has no equal in stemming the chutes or rapids on shallow rivers.



WARD'S STEAM GENERATOR.

AGRICULTURAL INVENTIONS.

Mr. Moses N. Ward, of Cedar Rapids, Iowa, has patented a simple but efficient arrangement for operating the dasher of the churn. The invention consists in a short slotted lever and a long vibratory lever connected by a screw in combination with a shaft and dasher.

Mr. Will Adair, of Canmer, Ky., has patented an improved cotton and hay press for baling cotton, hay, etc., or pressing and packing other commodities. The platen is attached to a sliding beam, and the mechanism for actuating it is attached to another sliding beam, which is arranged in alignment with the platen beam, and is allowed to move downward alternately with the platen. The mechanism consists of a train of gears and an involute wheel or eccentric, which is operated thereby, and acts intermittently on the head of the platen beam or stem to force the follower downward.

Hose Pipes.

In a little pamphlet entitled "Fire Hose," the writer of which is an Englishman, and also evidently a firm believer in leather hose, we find the following:

"The history of flexible fire hose is not a long one. Its invention is claimed by two Dutchmen, both named Jan Van der Heide, who were inspectors of fire apparatus in the principal city of their country. In the year 1672 it was first publicly tried, and was found to be so successful that, within a twelvemonth, the old engines were discarded, and were replaced by new ones to work with flexible suction and delivery hoses. Five years later the Van der Heides were granted an exclusive privilege, which secured to them the right to manufacture these hoses for a period of 25 years. This hose was made in 50 foot lengths, and was coupled by brass connecting screws. We find also that at this time, besides the leather hose, pipe of sailcloth or canvas was manufactured, and that 'a seamless fabric, covered with cement or paint, was used.' Here, then, we have the canvas and woven hose which has lately been brought forward as a new invention. The reason of this is to be found in the fact that canvas hose rapidly gave way before its rival, leather, which, although it was by no means perfect, being 'sewn together like a boot leg,' and far from water tight, yet, to the mind of our forefathers, was evidently the superior of the two. It was not till 1760, eighty years after the invention, that flexible hose was introduced into this country. In 1808 copper-riveted leather hose was first made by Messrs. Sellers & Pennock, of Philadelphia; thus the honor of so great an improvement in such a valuable article belongs to an American house. Eleven years later Mr. Jacob Perkins introduced copper-riveted hose into Great Britain, and at the same time brought into use an improved coupling, which connected the hose without twisting it or diminishing the water-way, for which he was awarded a silver medal by the Society of Arts. Hempen hose, woven without seam, was made in Leipsic by one Beck, a lace weaver, in the year 1720. After this it was made by Erke, a linen weaver at Weimar; and at a later period of linen at Dresden, and also at Silesia. The canvas hose, recently introduced and flaunted before the public as something new, has been tried and abandoned 150 years ago. India rubber hose was brought out about the year 1827, by Mr. Thomas Hancock, of Fulham, and is thus the latest invented of any of the principal descriptions of hose that are in extensive use."

MECHANICAL INVENTIONS.

An improvement in plates for holding screw-cutting dies has been patented by Mr. Johan G. Geiser, of Fort Clark, Brackettville, Texas. This invention relates to hand plates for holding screw-cutting taps and dies. It consists in certain novel features by which screw threads may be more conveniently cut than heretofore, and whereby left hand taps may be formed from blanks by right hand screw-cutting devices.

Mr. Aaron T. Hammer, of Sedan, Kan., has patented an improved sewing machine motor, which consists in the combination of devices by which the vertical motion of a platform is converted into rotary motion and transmitted to the band wheel when the platform moves down.

An improvement in dumping wagons has been patented by Miss Annie McFarlane, of San Bernardino, Cal. The object of the invention is to provide a cheap, simple, and convenient dumping cart or barrow that will be especially serviceable in mines.

Mr. Benjamin F. Walters, of Norfolk, Va., has invented an improved machine for removing the stems, particles of dirt, and other adhering impurities from peanuts, and for polishing and assorting them for the market; and it consists in a peculiar arrangement of a polishing brush, and in means for rendering a picking apron detachable from the discharge end of the separator.

Mr. Daniel M. Holmes, of Arlington, N. J., has invented an improvement in the construction of the cake machines for which letters patent, Nos. 174,244 and 188,366, were granted, February 29, 1876, and March 13, 1877, respectively, to the same inventor. The object of this invention is to make the machines more convenient in use and more reliable and effective in operation.

Mr. Jackson M. Rose, of Abingdon, Va., has patented an improvement in the class of beds or bodies of farm wagons which are made in sections to adapt them for extension longitudinally.

Mr. Frank W. Devine, of Carrollton, Mo., has patented an improved chain pump and curb, which consists in constructing the curb or casing above the ground in a portable shape, and in combining the suspended chain with a pipe or tube terminating at one end in a discharge spout and at the other end in a bent neck having a funnel-shaped mouth, the bend being made larger than