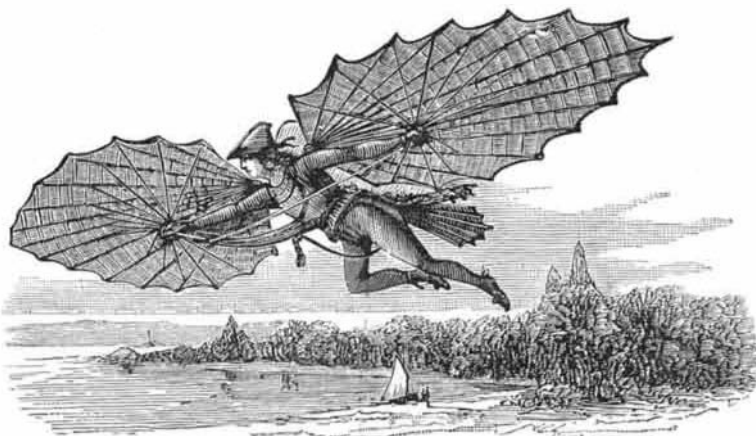


distilled over chloride of calcium and cooled, when he observed a large absorption of the gas. When he treated this liquid with concentrated aqueous hydrochloric acid and shook the two liquids they refused to mix, but formed two layers. On removing the vessel from the cooling mixture the liquid gave out a steady stream of pure carbonic oxide. After some time the evolution of gas became stronger, especially when warmed by the heat of the hand. Prussic acid was then mixed with the carbonic oxide. Finally, the liquids mix with violent gas evolution. The products correspond to those of pure prussic acid. He was unable to obtain glyoxylic acid in this manner. The experiment was repeated a second time with precisely the same results.—*Berichte d. D. Ch. Gesell.*

SIGNOR IGNAZIO'S "FLYING MAN."

Signor Capretti Ignazio, of Milan, has recently added to the list of avatars with which attempts have been made to navigate the air, an apparatus which he designates the "Flying Man." Like his predecessors, he has chosen the wings and tail of a bird as models for his machine. Each wing is composed of sixteen pieces of cane, which are connected by sets of movable fans. The tail resembles a section of an umbrella. The canes in the wings are adjusted to a shell working on a universal joint, which in turn is attached to a framework that is strapped to the body. At the furthest stretch of the arm is a band ring, to which are bound sticks of cane connected with the larger ones on which the fan moves. There is also strapped upon the back of the wearer a large folded bag, which, by a simple movement, can be converted into a sort of parachute in case any portion of the flying gear gets out of order. By the arrangement of a large number of movable fans, the operator is relieved of a great amount of resistance which it would be natural to suppose the air would offer; and the entire apparatus is said to be readily manipulated by a cool-headed adventurer.



SIGNOR IGNAZIO'S "FLYING MAN."

NEW SMOKE-BURNING FURNACE FOR STEAM BOILERS.

The novel smoke-consuming furnace herewith illustrated is the invention of M. Ten-Brink, of Arlen, Baden, and is now in use on some 500 locomotives on the French Chemin de Fer de l'Est. The engraving, which we extract from the Belgian *Bulletin de Musée*, exhibits the application of the system to a simple cylindrical boiler with the heater, K, placed below, with its major axis at right angles and horizontal to that of the boiler. One or two furnaces, F, traverse the heater, making with the horizon an angle of about 48°. In these furnaces is placed the grate formed of the table, P, and bars, R, the latter resting on the table at one extremity, and at the other on a support riveted to the end of the furnace. The table has two lateral sides surmounted by a cover, so that a close four-sided box is formed upon the door and grate extremities. The front piece to which this box is attached is a plate of cast iron in which several different openings are made. The aperture, s, serves to remove the ashes, etc., and thus to facilitate the descent of fuel on the grate; a second opening, l, affords passage to the draught under the grate. Fuel is inserted through the door, p, and a hinged cover, r, admits air in order to insure the complete combustion of disengaged gases. The heater is connected to the boiler by short tubes through which the cooler water at the bottom of the generator descends into the heater while the steam formed in the latter passes up into the boiler through an annular space formed by larger tubes surrounding those above mentioned.

The following figures show the results of a comparative test made between a boiler provided with this furnace and one having the ordinary plane grate. The trials lasted five consecutive days. Both boilers were alike and each had three heaters and two water tubes. The heating surface of the two principal boilers was 172 square feet 33 inches; of the two water tubes, 70 square feet, and of the three heaters 341 square feet 31 inches, or, in all 583 square feet 63 inches. Boiler I had a Ten-Brink furnace of 48 square feet 63 inches. Boiler II had an ordinary plane grate.

	I.	II.
Quantity of water vaporized	112640 lbs.	78100
Temperature of feed water	63.5° Fah.	63.5° Fah.
Water vaporized reduced to 32° Fah	109047.4 lbs.	77394.8 lbs.
Consumption of fuel	11825 "	11819 "
Ashes per 220 lbs. of fuel	20.24 "	23.98 "
Pure coal consumed	10738 "	10080 "
Vaporization per 2.2 lbs. of fuel	20.3 "	15 "
calculated by reducing water to 32° Fah	22.3 "	16.76 "
Water entrained by steam calculated by Hirn's method	4.5 per cent	4.4 per cent.
Temperature of gases in chimney	321.8° Fah.	390.2° Fah.

New and Remarkable Galvanic Battery.

In ordinary galvanic batteries the electric current results from the chemical action of a liquid acid upon a metal, but according to the invention of Mr. Paul Jablochhoff, of Paris, whose name has recently been mentioned in the SCIENTIFIC AMERICAN in connection with an improved electric light, the current is produced by the action upon carbon of a solid body in a state of fusion. Instead of taking a metal for the negative electrode of a battery—that is, the electrode which is consumed in the action—he takes coke or an artificial conglomerate of carbonaceous matter possessing the same qualities, and acts upon this electrode by means of nitrate of potash or of soda or of ammonia in a state of fusion. He prefers to employ the nitrate of soda on account of its cheapness.

The carbonaceous matter is acted upon by the molten nitrate in the same manner as zinc is acted upon by the different acids or salts in the ordinary batteries. As the

second electrode, he places in the same liquid either platinum or other metals that are not acted upon by the liquid in the presence of carbon. The crucible itself, in which the nitrate is fused, may constitute the positive electrode. For introducing the carbon into the liquid, the former may have attached to it a metal rod which serves for attachment of the conducting wires, or he places a metal grating or perforated metal receptacle in the liquid in which the carbon is contained, such grating or receptacle being insulated from the crucible if this constitutes the second electrode. In the latter arrangement the carbon may be added from time to time, as in a furnace, in proportion as it is consumed.

For bringing the battery into action in the first instance, the nitrates may either be fused in advance in the crucible, and the carbon be then introduced, or the nitrate may be placed in the crucible in a pulverulent state, and the carbon be ignited and plunged into the nitrate, which will become fused thereby. While the battery is in operation, large quantities of gases are developed similar in their nature to

attached to a cross bar, the ends of which rest upon a ring of insulating material on the top of the crucible. The latter is closed in by a hinged cover having an aperture, to which is connected a pipe for conveying the gases generated to wherever required. According to another arrangement, the crucible is made of earthenware, glass, or other non-metallic substance, centrally within which is placed the wire gauze cylinder containing the carbon, and surrounding this is a metal cylinder constituting the positive electrode, or this may simply consist of a rod or bar of metal. If it be desired to employ the battery principally or entirely for utilizing the gases generated as motive power, the crucible or vessel containing the nitrate and carbon is closed at top, and is provided with a pipe leading to a boiler or closed vessel for collecting the gases under any desired pressure. The top or dome of the crucible may in this, as also in the previous arrangements, be provided with a hopper by a valve, through which carbonaceous matter may be introduced from time to time, and also with a second hopper for the addition of nitrate when required.

British Official Reports on the Philadelphia Exhibition.

The following are the classes treated of by Mr. Barlow, in this report: "Water Wheels, Water Engines, Hydraulic Rams, Windmills, etc." and "Apparatus for the Transmission of Power," "Shafting, Belting, Cables, etc.," "Hydraulic Jacks, Presses, Elevators, etc.," "Pumps and Apparatus for Lifting and Moving Fluids."

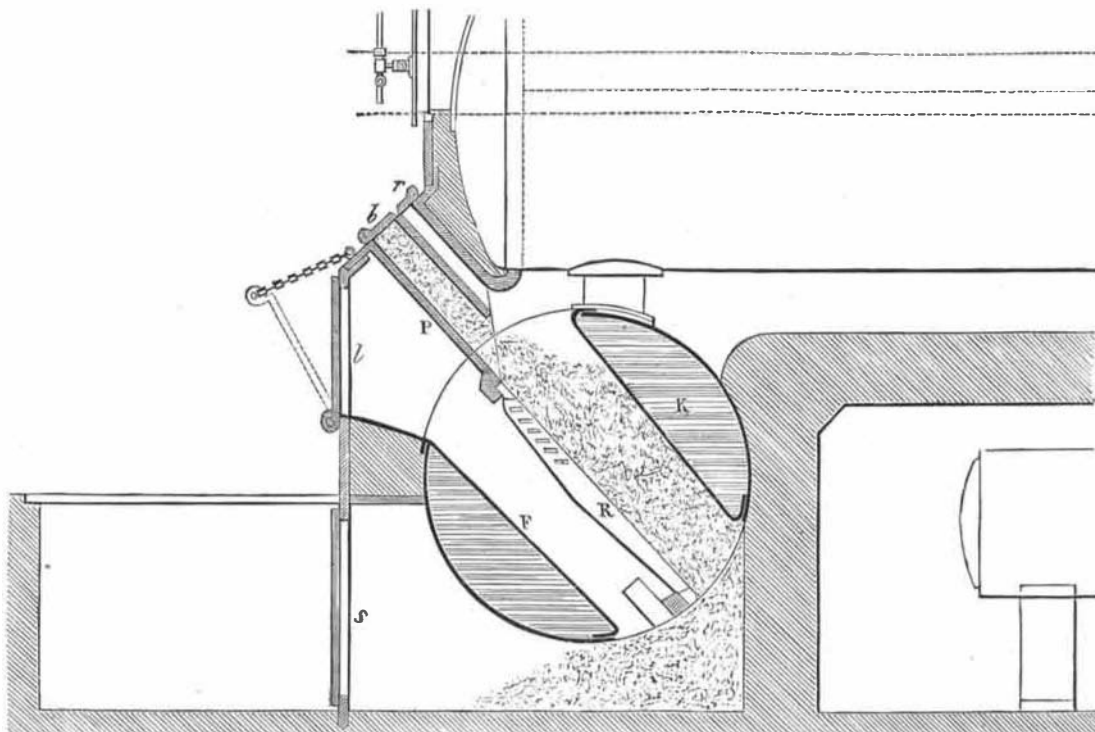
In the first class, Mr. Barlow noticed an extensive display of turbines, which seem to have superseded water wheels and other water motors. There were also some ingenious contrivances for applying small amounts of hydraulic power. In the second class, leather belting occupied a prominent position from the extensive use made of it in the States as a transmitter. The Belgian hair machine belting is also noticed. Wire rope also was extensively shown, and there were some driving chains working over cogged chain wheels, and constructed so as to be detachable for lengthening or shortening, which attracted notice. In the shafting, the shafts made by a process of cold rolling afforded the greatest novelty. These are first rolled hot, then treated with acid to remove scale and oxide, and finally subjected to cold rolling in cast steel rollers. In the elevator class, a curious safety device was noticed. The lifting chain is a strong flat-linked endless chain, arranged so that it can only move in the direction of its length. If the chain breaks, the lower part below the carriage, being unable to move laterally in its groove, becomes a rigid support to the carriage. Among the pumps were some pulsometers and vacuum engines. The former are characterized as being cheap in construction and repair, but wasteful in steam from condensation. As the latter are intended to be worked by exhaust steam from other engines, all the work they do is so much utilization of

waste power. Other pumps, hydraulic rams, etc., are also noticed.

Looking at the exhibits of the whole group, Mr. Barlow was struck by the great fertility of invention displayed in America, and the excellent workmanship. American machinery seems somewhat lighter than English, and therefore less steady and free from vibration. "The aim at improvement takes two different directions: one being that of obtaining simplicity and cheapness of construction, putting the cost of working as of secondary importance. The other being the endeavor to obtain high perfection in the details and great economy of working, treating the cost of construction as of less importance. The one, in fact, being aimed at cases where engines and machinery are employed for temporary purposes, the other directed to those cases where continuous working is the object."

The Machinery Hall, as a whole, gave "a high opinion of the mechanical skill of the

SMOKE-BURNING FURNACE FOR STEAM BOILERS.



those produced by the combustion of gunpowder. These gases, collected by any suitable arrangement, as, for instance, in a boiler or closed chamber, may be utilized as motive power, so that this improved battery serves as a source both of electricity and of motive power. By mixing various metallic salts with the nitrates, the double effect may be obtained of regulating the intensity of action of the battery, and of obtaining metallic deposits upon the positive electrode, as in the ordinary electroplating process.

According to one arrangement of batteries, constructed according to this invention, the crucible containing the nitrate and carbon forms the positive electrode, the carbon being suspended in the liquid nitrate in a wire gauze cylinder

Americans."

A Watch.

[Lines Printed on an old English Watch Card.]

Could but our tempers move like this machine,
Not urged by passion or delayed by spleen;
And true to Nature's regulating power
By virtuous acts distinguished every hour.

Then health and joy would follow as they ought
The laws of nature and the laws of thought—
Sweet health to pass the present moments o'er,
And involving joy when time shall be no more.

ASPHALTUM may be used to advantage in staining in imitation of hard woods.

Inventions Patented in England by Americans.

From August 28 to September 11, inclusive.

BREECH-LOADING GUN.—A. J. Crocker, Providence, R. I.
 BINDING WIRE.—S. G. Mason, Vicksburg, Mich.
 CONVERSION OF IRON ORES.—M. J. Hamilton, St. Louis, Mo.
 LABELS.—A. Kimball, New York city.
 LOOM.—W. Riding, Norristown, Pa.
 PROPELLING CARS.—J. B. Tibbitts, Hoosic, N. Y.
 REFRIGERATING APPARATUS.—G. C. Roberts (of New York city), London, England.
 RESTORING CRAPE, ETC.—Eva B. Reid, New York city.
 SEWING THREAD.—A. R. Arnold, Newark, N. J.
 SHOE STIFFENINGS.—D. Scrymgeour, Boston, Mass.
 SPRING TRAP.—I. A. Paine, New York city.
 TACKS FOR SHOE SOLES.—L. Goddu, Winchester, Mass.

Recent American and Foreign Patents.**Notice to Patentees.**

Inventors who are desirous of disposing of their patents would find it greatly to their advantage to have them illustrated in the SCIENTIFIC AMERICAN. We are prepared to get up first-class WOOD ENGRAVINGS of inventions of merit, and publish them in the SCIENTIFIC AMERICAN on very reasonable terms.

We shall be pleased to make estimates as to cost of engravings on receipt of photographs, sketches, or copies of patents. After publication, the cuts become the property of the person ordering them, and will be found of value for circulars and for publication in other papers.

NEW MECHANICAL AND ENGINEERING INVENTIONS.**IMPROVED MACHINE FOR BUNCHING HAY FOR FUEL.**

Marcus E. Getter, Alden, Minn.—The box or frame of this machine is supported upon legs, and a shaft is journaled in the side of the box, and is provided with steel tines which extend horizontally through the box and project through a circular opening in the side of the box opposite that in which the shaft is journaled. Short tines are placed in alternation with longer tines, and both are tapered throughout their entire length. A semi-cylindrical presser is placed directly under and parallel to the tines, and is connected by a bar with a foot lever which is pivoted to the crossbar that connects the legs. A slide, moving in guides at the side of the box, closes the opening, and is notched to fit over the ends of the tines, and prevents the hay from escaping at the side of the box. The operation is as follows: Hay is introduced into the box as the tines are revolved, and as it is wound upon the tines the presser is thrown upward by means of the foot lever. This causes the hay to wind closely upon the tines. When the bunch is sufficiently large the slide is raised by moving the lever. The bunch is then discharged from the tines through the opening by throwing the forked lever forward.

IMPROVED APPARATUS FOR HEATING AND LIGHTING.

Charles Ritchie, Brixton, Eng.—The vapors arising from the combustion of coal gas are highly injurious to health, and greater in volume than is generally supposed, exceeding, as they do when condensed into liquid form, a half ounce to every foot of gas that is burned. These vapors contain sulphurous acid, carbon, and other deleterious matters, which, especially the sulphurous compounds, have great affinity for water, and may hence be gotten rid of by condensation. The object of this invention is to condense the vapors and separate them so far as possible from other products of combustion; also to heat and ventilate the apartment in which the gas is burned for illuminating purposes. Siphonic action results naturally from the arrangement of passages or flues so that the combined currents of heated air, vapors, and products of combustion from the gas flames at burners are curved downward and then upward through a long circuitous route, whereby the heat becomes mostly radiated or absorbed from the traveling vapors, and the vapors and gases, being rendered heavier than the air, fall to the bottom of the apparatus, where condensation takes place. The noxious substances are thereby eliminated, and the heated air and certain light products of combustion pass on into an apartment which is ventilated by the constant change of air without the delivery of noxious matter into the same.

IMPROVED BEDPIECE FOR CLOTH-PRESSING MACHINES.

Herman Springborn and Christian H. Baush, Holyoke, Mass.—The present invention relates to improvements in that class of cloth-pressing machines in which a pressing roller is fitted to a heated concave bed. The invention consists in a hollow bedpiece, made in two parts, and connected by means of dovetail projections and recesses, and having between them air spaces. The object of the invention is to provide a bed for cloth-pressing machines in which both heat and cold may be employed, so that the cloth may be both hot and cold pressed in passing over the bed. The side parts of the bed are made of cast iron or other suitable material, and are each chambered out or made hollow—one to receive a current of water, cool air, or other suitable medium for cooling the bed, and the other for receiving steam, or for containing a gas flame or other suitable heating medium. The parts are connected together by dovetail projections formed on one part and a dovetail slot formed in the other part, the side of which is cut away, forming air spaces that prevent the intercommunication of heat and cold. The parts are put together by sliding the dovetail projections of the one part into the dovetail slot of the other part. This arrangement permits of the expansion of one part of the bed independently of the other part, so that as one part of the bed is warmed and the other cooled, neither part will be strained. Steam is taken into one part through an aperture and the water of condensation is removed through another aperture, and cold water is taken one part through one aperture and escapes through the other aperture. Cloth, in passing over the concave surface of the bed, is first subjected to hot pressure between the roll and the bed, and is afterwards subjected to cold pressure beneath the same roll.

IMPROVED COTTON GIN.

Robert Dickinson, Darlington Court House, S. C.—This invention relates to cotton gins, and consists, first, in constructing the ribs forming the breast in pairs or gangs, for the purpose of allowing them to be secured firmly and substantially in their places; second, in flanges or fins fixed to the ribs, and so constructed and arranged that foreign substances cannot be brought in contact with the saw teeth; third, in clearing-brushes arranged between the saws and the brush cylinder, and receiving the saw teeth through them, for the purpose of preventing clogging and danger from fire, and also for the purpose of carding and straightening out the lint on its way to the brush cylinder. The saw shaft is journaled in boxes on the main portion of the frame, and is consequently detached from the driving shaft, and will not be thrown out of true thereby, nor caused to heat in its bearing. This arrangement prevents any grinding or rubbing of the saws against the ribs or bars, and lessens vibration and wear. Hitherto the ribs have been made separate. In this improvement they are constructed in pairs or gangs, for the purpose of more rigidly securing them to the end rails. Single ribs work loose, and have less bearing on their rails than the double or triple ribs, and are more liable to cause clogging. The ribs are all provided with flanges, which are constructed of an angular form, with the lower ends rounded and the upper edge sloping upward. These flanges serve as guards, and protect the saw teeth from contact with sticks, nails, matches, and other foreign substances which might be in the cotton. This brush cylinder is constructed in the usual manner, and its shaft is entirely independent of the saw shaft; consequently the latter will not be subjected to strain or wear, which is so objectionable in gins where the saw shaft and brush cylinder are geared or bolted together. The

brushes are designed to extinguish fire which may take place, from any cause, in the gin, and they also operate to card and straighten out the lint on its way to the brush cylinder.

IMPROVED JACQUARD MACHINERY.

Warren P. Jennings, Brooklyn, N. Y.—This invention has relation to jacquard machinery, and the nature of the invention consists, first, in the employment of a cam wheel of peculiar construction, in combination with gearing and rotating arms, for giving more positive intermittent rotation to a card cylinder during its vertical movements; second, in combining a heater with the cards, which is so arranged that the latter are prevented from being injured by moisture in the air. A cam wheel communicates a positive rotary motion to the card cylinders, giving them one eighth of a revolution at each stroke, and bringing them into proper position at the termination of every ascending stroke. The movements are so direct and timed that there will be no tendency to displace the cards on the cylinders while bringing them successively into position for operation. The chain of cards is constructed in the usual well known manner, and near the guide roller, over which the cards pass to the cylinder, is arranged a heater, covered by a shield. This heater may be a perforated gas pipe, where it is desired to use gas jets, or a lamp or steam may be used where gas is not to be had. In damp weather cards absorb moisture and swell, so that they do not work true. To prevent this the heater is so arranged that the cards are kept dry.

IMPROVED MACHINE FOR PICKING STONES, ETC.

Charles Fuller, Little Marsh, Pa.—The object of this invention is to furnish an improved machine for picking, hauling, and delivering stone, manure, dirt, etc., which shall be simple in construction, effective in operation, and conveniently operated and controlled. The invention consists in the combination of the hinged crossbar and the U-roads, connected by crossbars with the frame work of the machine; in the combination of the adjustable crossbar and the guide rods with the hinged crossbar to which the U-roads are attached, and with the frame of the machine; in the combination of the lever provided with the slotted curved arm and the pin with the frame of the adjustable crossbar and the hinged crossbar, to which the U-roads are attached; in the combination of the notched fulcrum bar with the crossbar of the U-roads, and with the axle of the carriage; in the combination of the ratchet bars, the pawls, the rod, and the lever with the crossbar of the U-roads, and with the frame of the carriage; and in the combination of the scraper provided with the keepers and the flange socket with the lower arms of the U-roads. When the machine is to be used for handling dirt and other fine substances a scoop or scraper is placed upon the lower arms of the U-roads. The scraper has two or more keepers formed upon its bottom to receive two or more of the rods, and thus keep the rear part of the scraper in position.

IMPROVED WINDMILL.

Oscar B. Fuller and Leonard A. Fuller, Mount Pulaski, Ill.—The object of this invention is to furnish an improved windwheel, which shall be simple in construction, inexpensive in manufacture, reliable in operation, and easily controlled. The wheel is formed by attaching wings to the radial arms of a hub, which revolves upon a journal formed upon or attached to the outer end of a bar or beam. To the inner side of the wheel is attached an eccentric flange to receive the forked outer end of a lever. The lever is pivoted to a short fulcrum post, the lower end of which has a T formed upon it to fit into a T groove formed in the plate attached to the bar or beam, so that the fulcrum point may be adjusted as required. To the inner end of the lever is attached the upper end of the rod, which passes down through the tube and hollow stop, and from the lower end of which motion is taken to the machinery to be driven. Upon one end of the shank of the vane is formed an arm which strikes against a shoulder formed upon the side of the inner end of the bar or beam. By this arrangement the vane cannot turn out of line with the bar or beam in one direction, but may turn in the other direction into a position at right angles with said bar or beam. A special advantage of this improved windwheel is that the lever so greatly increases the power of the wheel that it may be used for raising water from deep wells while using a small wheel, which could not be done with the old construction, as the resistance of the pump was so great that the wheel had to be made very large, and on this account was very expensive in construction, and very liable to be broken by a heavy wind.

IMPROVED DRILL CHUCK.

Henry B. Beach, West Meriden, Conn.—This invention relates to an improved chuck of simple and effective construction, which grips the object with considerable power as the same is inserted into the chuck, passing nearly through the entire length of the same, so as to obtain a greater bearing surface, and hold the object rigidly and without vibration. The solid center piece is made in one piece with the spindle to be placed in the arbor of the lathe, or to be screwed to the face plate. The center piece is provided with an exterior screw thread, and with guide recesses for the jaws, which are side grooved to receive tenons of the part, so that no vibration of the ends of the jaw may be produced, and are pressed in outward direction by spiral springs resting between the center piece and in sockets of the rear ends of the jaws. The jaws are moved inward by an outer cap that turns by an interior thread on the center piece. The cap bears, by its conical front end, on the corresponding tapering jaws, exerting a uniform pressure upon the outer tapering surface of the same, so as to accurately and steadily draw in the jaws on screwing back the cap over the center piece, the springs returning the jaws when the pressure is relaxed by the forward screwing of the outer cap. The chuck is readily adjusted to the work by turning the cap forward or backward on the center piece, the jaws clamping by their interior faces the work with great power.

IMPROVED BULL WHEEL FOR DERRICKS.

William J. McKee, Petrolia, Pa.—The object of this invention is to furnish an improved bull wheel which shall be stronger, and at the same time lighter, than wheels constructed in the usual way. The outer ends of the arms or spokes are notched and slotted, so that the segments of every other one of said layers may pass through the ends of the said arms or spokes, and the segments of every other layer may abut against said arms or spokes. By this construction the strain will come right over, and will be distributed among the arms or spokes of the wheel, and a lighter and stronger wheel will be produced. The face of one of the wheels is grooved to receive the driver or tug rope, and the other has a wide flat groove formed upon it to receive the brake strap or band.

IMPROVED MIDLINGS SEPARATOR.

Myron H. Alberty, Cherokee, Kan.—The object of this invention is to purify midlings and separate the fuzzy and branny particles, and at the same time separate the heavier from the lighter midlings, by subjecting them to currents of air while passing through the machine. The invention consists in the combination of a series of air passages provided with gates at their outer and inner ends, with a blast fan and a set of air chambers; in the combination, with the blast fan and the inlet air passages, of adjustable riddles, an exhaust or settling chamber, and an exhaust fan. The midlings are introduced through an opening in the case into the chamber and fall upon inclined boards, and pass through an opening between said boards into the first air chamber, where they are met by one or more currents of air from one or more of the passages, and by currents of air through the holes in the first riddle, and the fuzzy and branny particles are carried over the upper end of the riddle into a chamber. The heavier midlings fall upon the riddle and pass down through its holes against the air passing through said holes into the second air chamber, where they are met by a current or currents of air. The fuzzy and branny particles are again blown off by the air from the passages and the air passing up through the holes in the second riddle, and are driven over the upper end of the said riddle into a chamber. The heavier midlings fall upon a riddle and pass through its holes into the third air chamber, where they are again

met by a current or currents of air, and the fuzzy and branny particles that may still remain are driven over the end of the inclined board into a chamber.

IMPROVED SPINDLE, BOLSTER AND STEP FOR SPINNING MACHINE.

John T. Beall, Petersburg, Pa.—This invention relates to certain improvements in the construction and adaptation of the spindle, bolster, and step of a spinning machine, designed to secure automatic lubrication, the best bearing surfaces for the parts, and to prevent the tendency of the oil to exude at the joints and spread over the entire surface of the same. The invention consists mainly in arranging the bushing in the upper end of the bolster slightly below the upper edge of the bolster, so as to form a cup or recess to receive the oil, which has a tendency to rise upon the spindle and spread upon the outside of the bolster, and in surrounding said upper bushing with a packing of fibrous material which retains and filters the oil and resembles that which accumulates in the cup or recess. It also consists in the particular arrangement of parts whereby the two bearings of the bolster and the toe of the spindle in the step are all oiled at a single joint instead of permitting the spreading of oil upon the outside surfaces.

IMPROVED TREADLE-OPERATED CONFLUENT PUMP.

Richard H. Schenck, New York city.—This invention relates to an improved suction and force pump of effective construction, that is operated by the feet, and arranged to throw a uniform stream of water; and it consists of two cylinders with alternately treadle-acted pistons, that are connected by a chain or rope passing over a central pulley between the same, each stroke of the pistons producing the induction and eduction of the water, in connection with suitable valves and channels connecting the cylinders, suction and discharge pipes. The stroke of each treadle produces the lowering of one piston and the raising of the other piston, the pistons exerting thereby, simultaneously, a suction and force action, so as to draw in the water by the induction pipe and discharge it by the eduction pipe. The eduction pipe takes up the water in the air chamber and passes out at the top of the same, the air in the air chamber regulating the flow of water and keeping it up in uniform manner.

IMPROVED SCRAPER AND DITCHER.

Joel Rice, Liberty, Mo.—The object of this invention is to furnish an improved machine for opening ditches, grading and repairing roads, grading yards, lawns, etc., and for various other uses where earth is to be moved short distances. The sides of the ditcher are jointed together at one end, set at an angle to each other, and connected adjustably by means of curved overlapping arms which are perforated to receive locking pins. Said arms support a platform, upon which the driver is to stand or sit, when he desires to add his own weight to that of the scraper. To the bars, at their angle, is attached a notched bar to which the draught is applied. The outer side of the side bar is made straight, and is designed to rest against the land side of the furrow opened by the plow which the scraper is following, and the outer side of the side bar, that pushes back the dirt, is slightly concave. With this construction the scraper may be used to throw the dirt to the right hand or to the left, as may be desired, or in following a left or right hand plow, or to throw the dirt to the same side while passing back and forth along the same furrow in opening a ditch, by using it with one or the other side upward, as may be required, to throw the dirt in the desired direction.

IMPROVEMENT IN SECURING HANDLES IN TOOLS.

Lazare Landecker, San Luis Obispo, Cal.—The object of this invention is to furnish an improvement in securing handles in hammer heads, and in all other tools in which the handles are inserted in eyes, by means of which the handles will be held firmly and securely in place. The invention consists in the teeth, points, or other projections formed upon the surface of the eye of a tool, to be forced into the handle as it is spread by the wedges, for securing said handles immovably in said eye. The projections also prevent the handle from turning in a round eye, and hold it immovably in place.

IMPROVED HYDRAULIC CEMENT.

James C. Gostling, New York city.—This invention relates to an improved hydraulic cement; and it consists in a composition formed by mixing together calcareous shell marl, containing from seventy to eighty per cent of carbonate of lime, silicious clay, pozzolana or anthracite coal ashes, and ribbon stone containing a large percentage of magnesia. When sufficiently dry, place it in a kiln, in alternating layers with coal or coke, and burn it to a moderately hard clinker. After burning, grind it, by means of burr stones or other suitable machinery, to a powder sufficiently fine to pass through a sieve of fifty meshes to the square inch.

IMPROVED TYPE-DISTRIBUTING MACHINE.

Robert T. P. Allen, Farmdale, Ky.—This invention consists in the construction and combination of devices whereby the types (composing the column or page of matter to be distributed) are individually and successively forced into spring clamps, or holders, that are carried by a rotating wheel, and by such holders delivered to automatic releasing mechanism, and distributed into separate receptacles. For details, see patent.

IMPROVED ROAD SCRAPER.

Samuel Pennock, Ithaca, N. Y.—This invention relates to machines for scraping and leveling roads, and it consists in a scraper supported by a suitable frame carried by wheels, and adjustable as to its height, and in a toothed bar carried in front of the scraper, to be used or not, as occasion may require. By operating one or the other lever the end of the scraper bar may be raised, so that by driving up on one side of the road and down on the other the road may be ridged or rounded, as may be desired, or by arranging the scraper bar in a horizontal position the road may be made level. The bar is adjusted so that its teeth cut away the projecting and uneven portions of the surface before it is scraped.

IMPROVED DIRECT-ACTING FORCE PUMP.

John K. Van Pelt and Washington Lee, Texarkana, Ark., assigns to themselves and William H. Elliott, of same place.—This invention has reference to an improved direct-acting force pump of extremely simple and durable construction, that is adapted particularly to mining and other purposes, as no valves are used and no parts are liable to get out of order by sand and grit. The invention consists of direct-acting plungers that force the water from the cylinders, having supply holes through bottom channels to a discharge pipe having a swinging or sliding cut-off that alternately establishes and interrupts communication with the cylinder and channels. The top part is provided with cylinders and plungers, sliding therein, and being operated by plunger rods and a fulcrum lever. The water enters the cylinder through supply holes at both sides, and is forced by the direct action of the plungers down into the water channels of base part and into a connecting chamber, with which the discharge pipe communicates. A swinging and balanced cut-off is arranged in connecting chamber at the foot of discharge pipe, and carried by the alternating action of the plungers from one side to the other, so as to rest on seats of chamber. The cut-off produces the connection of the cylinders with the discharge pipe at the descent of the plungers, and forces at each stroke the water through one of the channels into the discharge pipe. The pump works in simple and effective manner, without valves or suction, and is readily filled at each upward stroke of the plungers as it is submerged in the water. When the motion of the plunger is stopped the water falls back into the water chambers, and remains cool, without being exposed to freezing as in the valve pumps, in which the water is sustained above the plungers. The pump is not liable to become filled with sand or sediment, so as to get out of order, being thereby of special advantage for pumping gritty or impure water.