G. J. MASHEK.

MIXING MACHINE.

APPLICATION FILED JAN. 14, 1913.

1,177,200.

Patented Mar. 28, 1916.

2 SHEETS—SHEET 1.

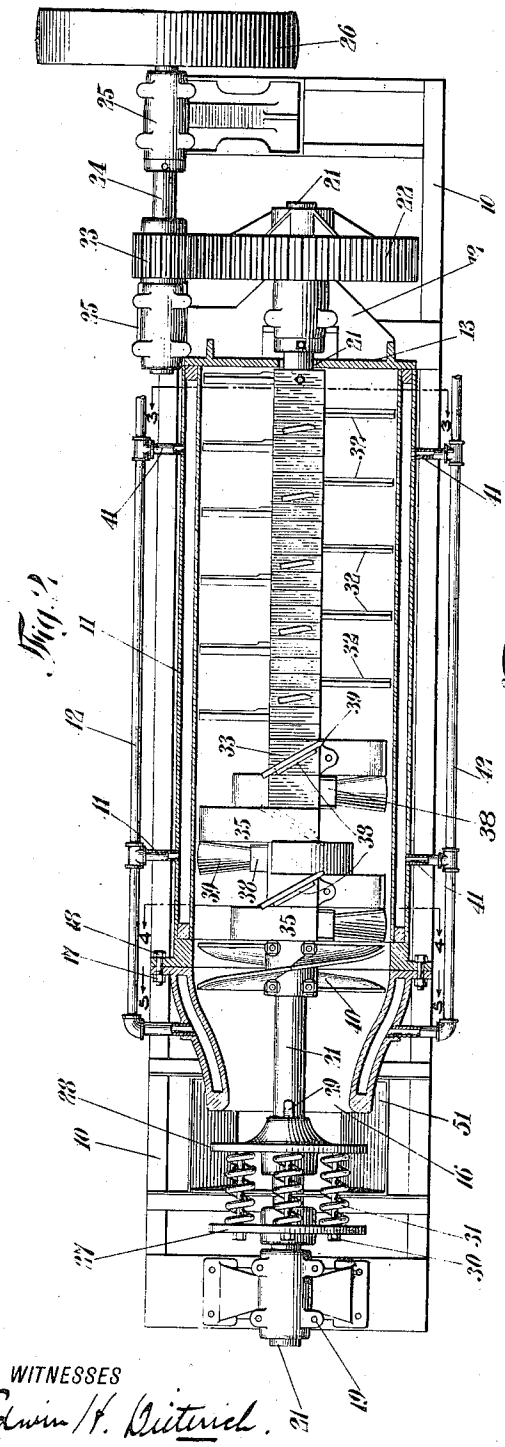


Fig. 2.

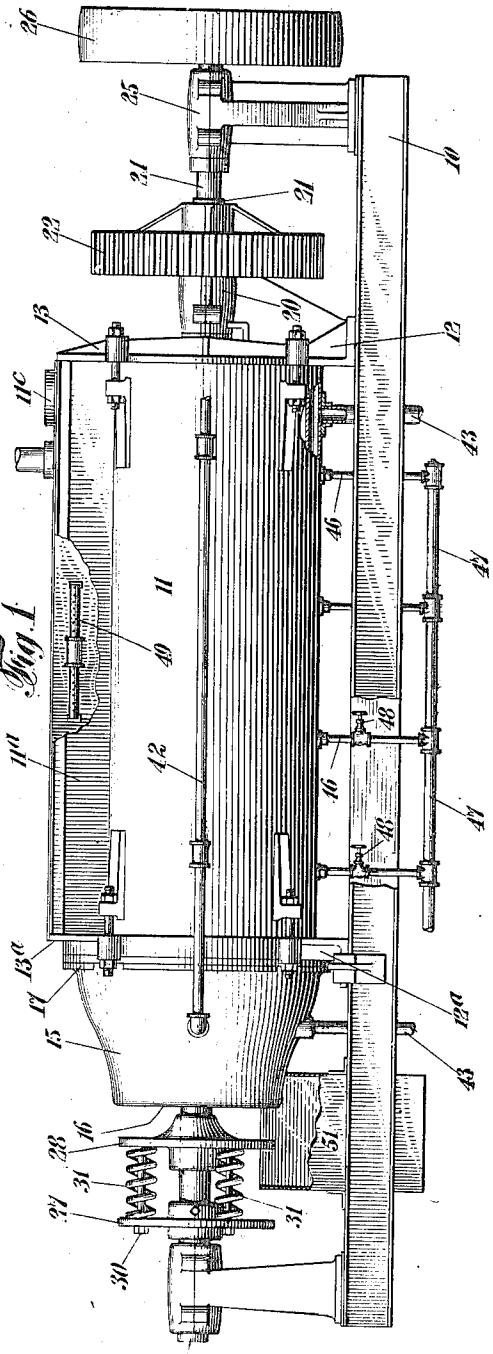


Fig. 1.

WITNESSES

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2 SHEETS—SHEET 2.

Fig. 3

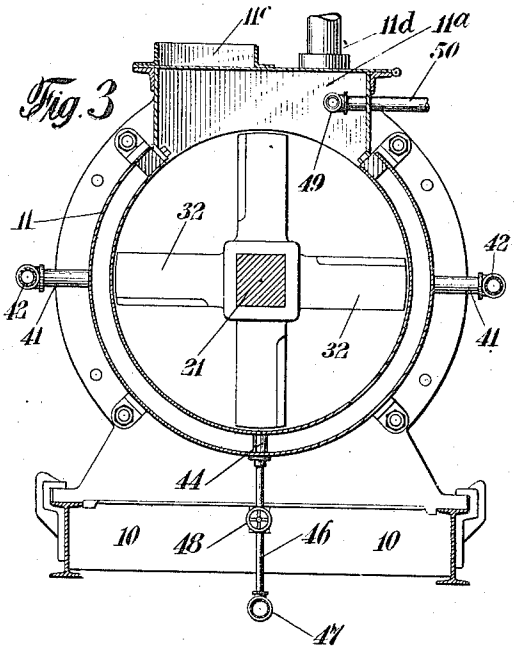


Fig. 4

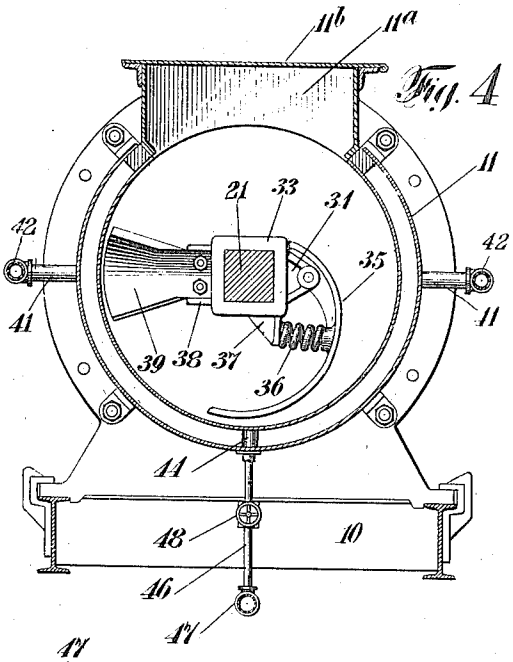


Fig. 5

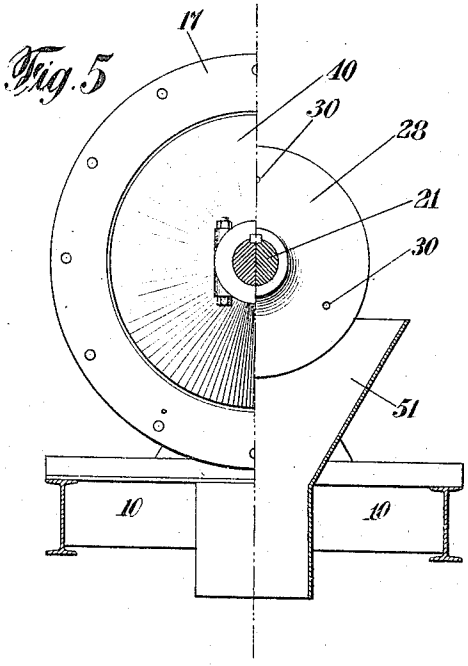


Fig. 6

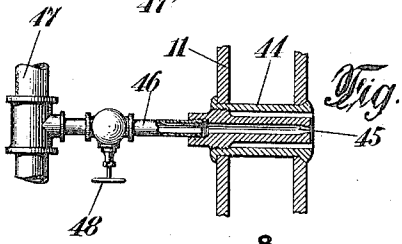


Fig. 7

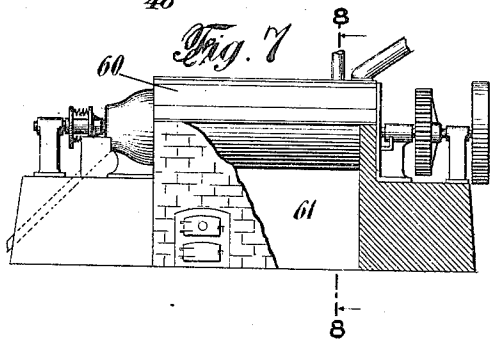
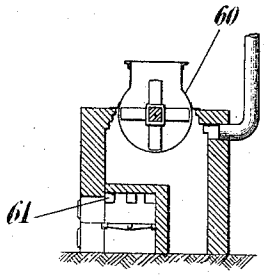


Fig. 8



WITNESSES

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UNITED STATES PATENT OFFICE.

GEORGE J. MASHEK, OF NEWARK, NEW JERSEY.

MIXING-MACHINE.

1,177,200. Specification of Letters Patent. Patented Mar. 28, 1916.

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To all whom it may concern:

Be it known that I, GEORGE J. MASHEK, a citizen of the United States, residing at Newark, Essex county, in the State of New Jersey, have invented certain new and useful Improvements in Mixing-Machines, of which the following is a full, clear, and exact specification.

My invention relates to improvements in machines for mixing materials, and the same has for its object more particularly to provide a simple, efficient and reliable machine by means of which materials may be thoroughly mixed with liquids during their passage through the machine.

Further said invention has for its object to provide a mixing machine by means of which the tendency of the materials to produce balls and thereby render the mixture ununiform will be wholly overcome, and an even, uniform mixture insured.

Further said invention has for its object to produce a mixing machine of the continuous feed and discharge type for mixing pulverulent or granular material with a liquid in order to produce a thick paste.

Further said invention has for its object to provide a machine for intimately mixing coal dust with tar pitch, asphaltum, etc., in liquid state, or for mixing said coal dust with a binder composed of other suitable substances.

To the attainment of the aforesaid objects and ends my invention consists in the novel details of construction and in the combination, connection and arrangement of parts hereinafter more fully described and then pointed out in the claims.

In the accompanying drawings forming part of this specification wherein like letters of reference indicate like parts—Figure 1 is a side view, partly broken away, showing one form of machine constructed according to, and embodying my said invention; Fig. 2 is a top view, partly in section taken essentially on the central horizontal plane of the mixing cylinder; Fig. 3 is a transverse section on the line 3—3 of Fig. 2; Fig. 4 is a similar view on the line 4—4 of Fig. 2. Fig. 5 is a transverse section on the line 5—5 of Fig. 2; Fig. 6 is a detail side view partly in section showing one of the liquid nozzles extending into the mixing cylinder; Fig. 7 is a detail side view, on a reduced scale, showing a modified construction, and Fig. 8 is a section taken on the line 8—8 of Fig. 7.

In said drawings 10 designates a base upon which is disposed a double walled mixing cylinder or casing 11 having its upper portion extended to form a top 11^a provided with hinged covers 11^b, and intake openings 11^c, 11^d. The cylinder or casing 11 is provided at its right hand end with a bracket 12 having a circular upper portion 13 conformed to, and bolted to the end of the cylinder or casing 11. At the opposite end of the cylinder 11 is provided a similar supporting bracket 12^a having an annular upper portion 13^a which conforms to, and is secured to the said end of the cylinder or casing 11. At the left hand end of the cylinder 10 is bolted a jacketed throat piece 15 having a constricted discharge opening 16 at its outer end, and a peripheral flange 17 at its inner end. The said throat piece 15 is secured by bolts 18 to the annular upper portion 13^a of the bracket 12^a. At the left hand end of the base 10 is secured a bearing 19, and upon the outer side of the bracket 12 is arranged a bearing 20.

21 denotes a shaft which extends centrally through the cylindrical casing 10, and has its ends supported in the bearings 19, 20. Upon the projecting right hand end of said shaft 21 is fixed a large gear wheel 22 which meshes with a pinion 23 fixed upon a shaft 24 mounted in bearings 25, 25 secured to the base 10, and to one end of the shaft 24 is fixed a large driving pulley 26. Upon the shaft 21 between the bearing 19 and the constricted end of the throat piece 15 is fixed a circular plate 27, and between said fixed plate and said throat piece is disposed a movable plate 28 which corresponds in diameter with the plate 27, and is adapted to move longitudinally upon said shaft but is held against rotation thereon by the spline 29.

30, 30 denote bolts which extend loosely through the plate 27, and have their ends secured in the plate 28, and 31, 31 denote coil springs disposed upon said bolts 30, 30 intermediate said plates 27, 28.

A portion of the shaft 21 within the cylinder 11 is squared, and upon the right-hand portion thereof are secured a series of mixing blades or knives 32, 32 which are set at a slight angle and arranged at an angle of ninety degrees to each other so as to form an interrupted spiral which serves to cut and turn over the material and at the same time propel it toward the discharge end of the cylinder.

Upon the left hand end of the squared portion of the shaft 21 are secured a series of hubs 33, 33 each of which has a bearing 34 arranged upon one of its sides in which is pivotally secured one end of a curved blade or wiper 35 held spring-pressed to its outer position by a spring 36 having one end bearing against the inner side of said curved blade or wiper adjacent to its pivoted end, and its other end supported upon and bearing against a stop 37 secured to an adjoining flat side of the hub 33. The inner end of each blade or wiper 35 is formed to engage the side of the hub when the free end of the blade or wiper 35 is fully extended and thus serves to limit the outward movement of its free end.

After the material is partly mixed by the simple cutting and propelling blades 32, 32 it then passes under the spring-pressed blades or wipers 35 which spread the material in a thin film or layer upon the inner side of the cylinder 11, and thus break or spread that part of the mixture which contains a larger percentage of liquid or material to be combined in the compound or mixture. The action of the blade or wiper 35 is similar to that of an ordinary mason's trowel rubbing down mortar or thick plaster on a board, that is spreading out all the balls that form at the beginning which contain at that time a larger proportion of the diluting or wetting material than is desired.

Upon the side of each hub, opposite to that upon which the bearing 34 is mounted, is secured an inclined projection 38 to which is fixed a blade 39 which acts as a plow to turn over the spread out or squeezed material and advance the same to the next blade or wiper 35, and so on in turn to the last one.

At about the point where the end of the cylinder casing 11 merges with the inner end of the throat piece 15 the shaft 21 is provided with a double helical expelling screw 40 which receives the material, after it has been finally acted upon by the blades or wipers 35 and the plow blades 39, and compresses it through the throat piece 15 from which it issues in a continuous cylindrical form. The yielding plate or disk arranged upon the left-hand end of the shaft 21 serves to insure the due compression of the mixture as it passes into and issues from the throat 15, and at the same time said disk or plate in rotating serves further to temper and season the material. At opposite sides of the cylindrical casing 11 are provided pipes 41, 41 which communicate with the jacket surrounding the inner shell of said casing 11, and the throat piece 15.

42, 42 denote pipes which are connected to the branch pipes 41, 41 and communicate with a suitable source of heat supply, such as steam or hot water.

43 denote drain pipes arranged in the bottom of the casing 11 and throat piece 15 for drawing off fluid therefrom. In the bottom of the casing 11 are provided a series of short pipe sections or thimbles 44, 44 which connect the inner shell with the outer wall of said casing 11, and within said thimbles 44 are secured nozzles 45 connected by branch pipes 46 to a main pipe 47 leading from a source of steam, gas or other fluid which is to be introduced into the mixing chamber and combined with the material therein. Each nozzle 45 is provided with a separate controlling valve 48.

49 denotes a perforated spray pipe arranged longitudinally in the upper or extended portion of the casing 11, which pipe is connected with a main pipe 50 leading from a source of fluid whereby additional fluid may be introduced into the mixing chamber, and combined with the material therein after the same has been partly mixed.

For the purposes of illustration I shall describe the operation of the machine in mixing coal dust with a binder to be subsequently molded into briquets. The coal dust is introduced into the top of the casing 11 through the intake opening 11^c and at the same time a binding agent such as pitch or asphaltum is introduced by a pipe through the opening 11^d. As the materials enter the interior of the casing 11 they are first engaged by the mixing blades or knives 32, 32 and thoroughly mixed and at the same time the material is propelled toward the left hand end of the cylinder by reason of the rotation of the shaft 21 to which said blades 32, 32 are attached. The shaft 21 and the blades carried thereon are revolved by means of the large gear 22, pinion 23, shaft 24 and pulley 26. As the mixture of materials is advanced toward the left-hand end of the cylinder 11 by the mixing and cutting blades the binder will become heated and melted by its contact with the heated inner wall of the chamber, and the steam ejected into the same by the nozzles 45, 45. After the mixture leaves the mixing and cutting blades 32, 32 it is next engaged by the curved blades or wipers 35 which act upon the material, which has by that time been sufficiently heated and mixed with steam entering through the nozzles 45, and spread the same in a thin film or layer upon the inner side of the casing 11. After the material has been so spread upon the inner side of the casing 11 it is next scraped up by the inclined blades 39, 39 which act as plows to turn the material over and then propel the same over toward the left where the same is again engaged by the succeeding spring-pressed blade or wiper 35 and the same spreading operation again performed. These operations are repeated in succession until the material is finally de-

livered to the double helical expelling screw 40 and forced thereby into and through the constructed throat piece 15 and out against the circular plate 28, mounted upon the shaft 21, in such manner that the same may yield longitudinally of the shaft under the pressure of the material as it is forced against the same by the helical screw 40. The material is finally discharged into the hopper or chute 51 from which it is then removed to be molded into briquets. Should it become necessary to add additional liquid to the mixture in order to make the binder operate properly, a mixture of water and flour (for example) may be sprayed by the pipe into the mixing chamber after the materials have been partly mixed.

It will of course be obvious that in mixing different materials different liquids or binders may be employed, and that when the material and liquids are preheated before their introduction into the casing 11, it will not be necessary, as a rule, to maintain the cylinder 11 heated, nor to inject steam into the same by means of the nozzles 45. Further, it is to be noted that in some instances, depending of course upon the nature of the materials to be mixed, it will not become necessary to spray liquid into the cylinder by means of the spray pipe 49. Further it will be obvious that the apparatus is susceptible of use in connection with various different industries or arts in which it becomes necessary to form a mixture consisting essentially of a solid or dry substance combined with a liquid or semi-liquid.

In the modification illustrated at Figs. 7 and 8 the casing 60 and its operating parts are the same as these hereinabove described, except that in this construction the casing is single walled, instead of double walled, and the casing heated by direct heat produced by a furnace 61 arranged below said casing.

Having thus described my said invention what I claim and desire by Letters Patent is:—

1. A machine of the character described comprising a cylindrical casing, a shaft supported centrally thereof, means for rotating said shaft; said shaft having arranged thereon means for mixing and propelling the material, means for spreading the same yieldingly supported upon said shaft, scraping means for acting upon the spread material, and means for expelling the material from said casing, substantially as specified.

2. A machine of the character described comprising a cylindrical casing having an inlet and a constricted outlet, a shaft supported centrally within said casing, means for rotating said shaft; said shaft having fixed thereon mixing and propelling blades, yielding spreading blades, scraping blades and an expelling screw, and yielding means for resisting the discharge of material from said constricted outlet, substantially as specified.

3. A machine of the character described comprising a cylindrical casing having an inlet and an outlet therein, a shaft supported centrally within said casing, means for rotating said shaft; said shaft having fixed thereon mixing and propelling blades, spreading blades, scraping blades and an expelling screw, and a resisting plate yieldingly mounted on said shaft in front of the outlet in said casing, substantially as specified.

4. A machine of the character described comprising a cylindrical casing having an inlet and an outlet therein, a shaft supported centrally within said casing, means for rotating said shaft; said shaft having fixed thereon, in the order named, a plurality of mixing and propelling blades, and spreading blades, means for maintaining said spreading blades under tension against the inner side of said casing, scraping blades and an expelling screw, a plate mounted upon said shaft opposite the outlet in said casing and adapted to move longitudinally upon said shaft, and spring means for resisting the movement of said plate, substantially as specified.

5. A machine of the character described comprising a casing having an inlet and an outlet, the latter at one end thereof, a longitudinal shaft supported centrally within said casing, means for rotating said shaft; said shaft having arranged thereon a series of mixing blades, a series of spreading blades, scraping blades arranged intermediate said spreading blades, and an expelling screw adjacent to said constricted outlet, a plate rigidly fixed upon said shaft adjacent to the outlet in said casing, a movable plate arranged upon said shaft intermediate said fixed plate and said outlet and adapted to move longitudinally of said shaft, and means arranged intermediate said fixed and movable plates for yieldingly resisting the movement of said movable plate, substantially as specified.

Signed at the city of New York, in the county and State of New York this twenty-fourth day of December, nineteen hundred and twelve.

GEORGE J. MASHEK.

Witnesses:
CONRAD A. DIETERICH,
JOSEPH G. QUINN, Jr.