No. 752,780. PATENTED FEB. 23, 1904.

J. G. JOHNSTON.

POWER ACTUATED MOLDING APPARATUS.

APPLICATION FILED JULY 30, 1903.

NO MODEL. 3 SHEETS—SHEET 1.

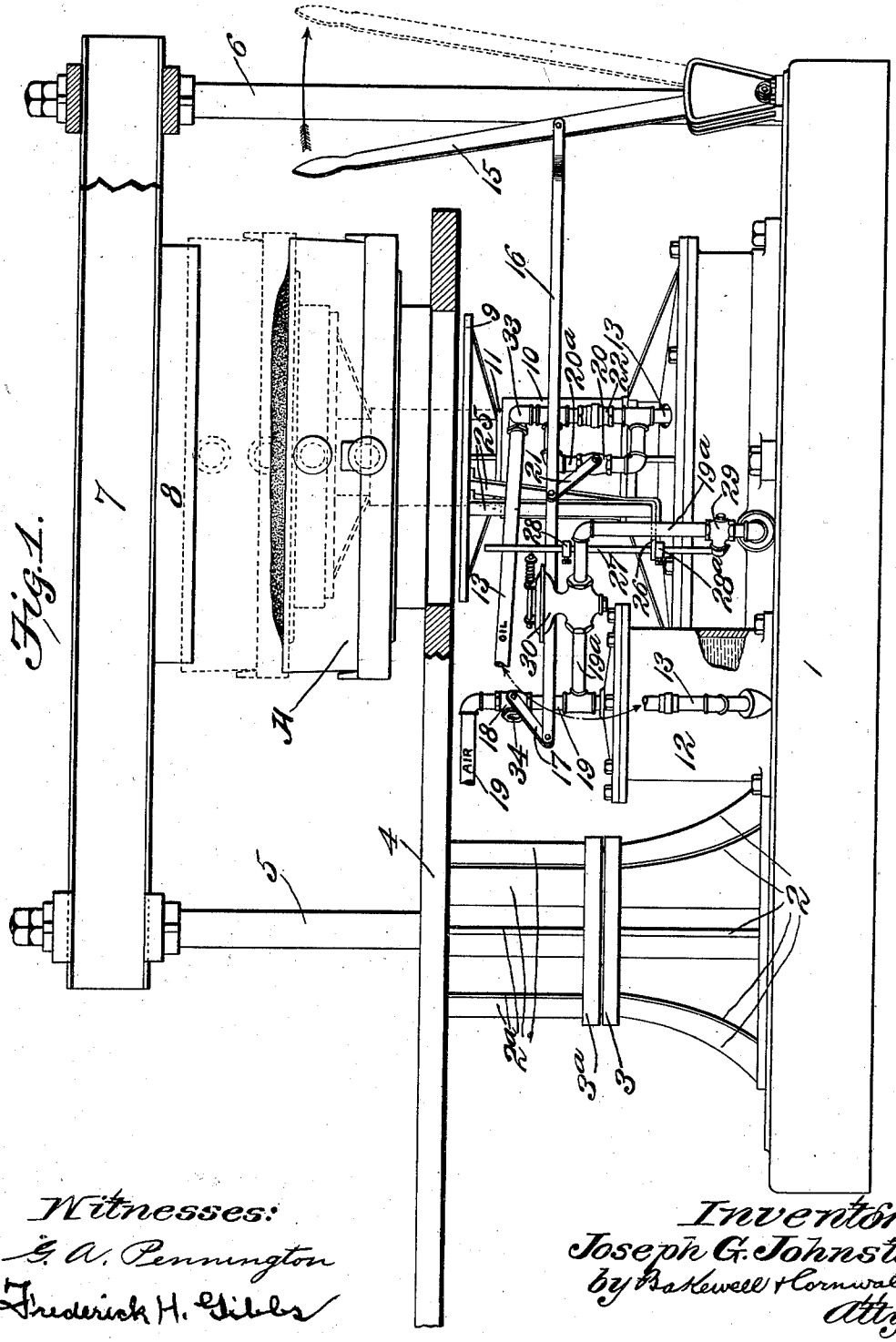

Fig. 1.

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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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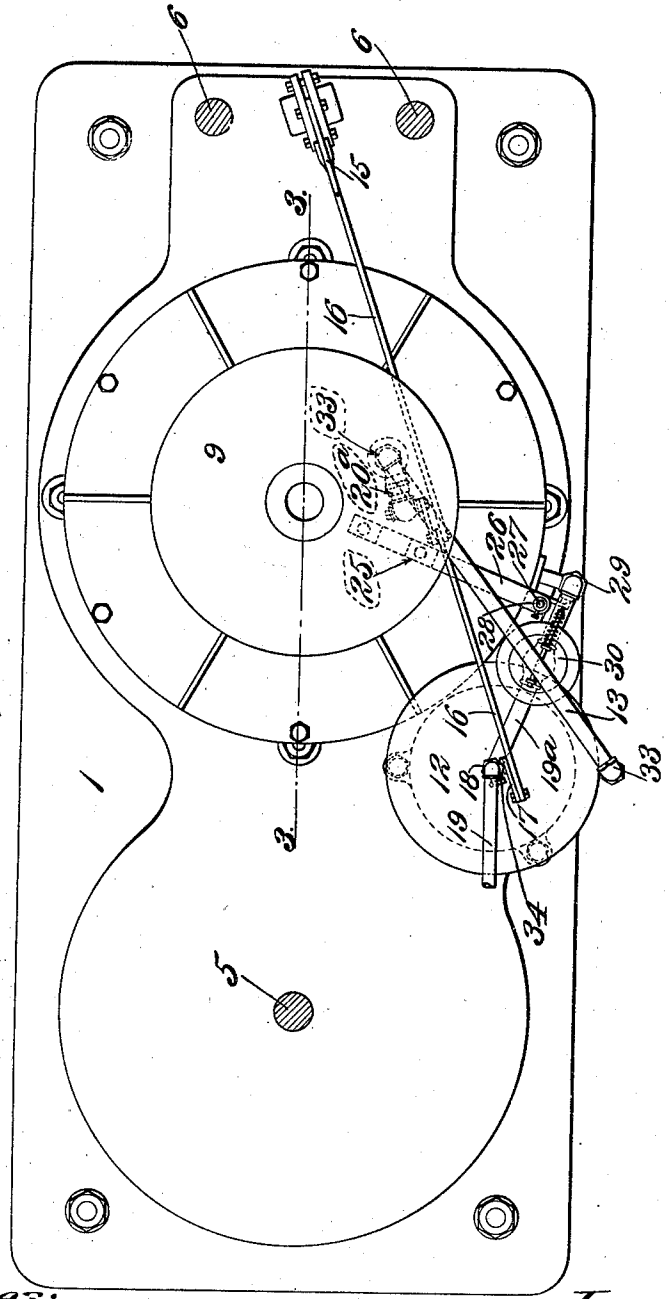
NO MODEL. 3 SHEETS—SHEET 2.

Fig. 2.



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NO MODEL. 3 SHEETS—SHEET 3.

Fig. 5.

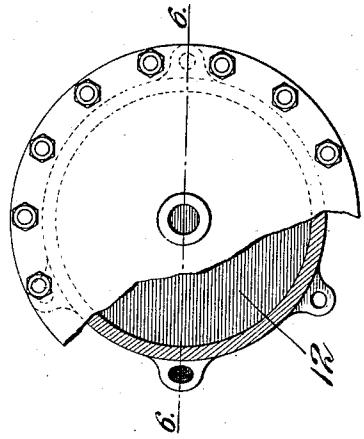

Fig. 6.

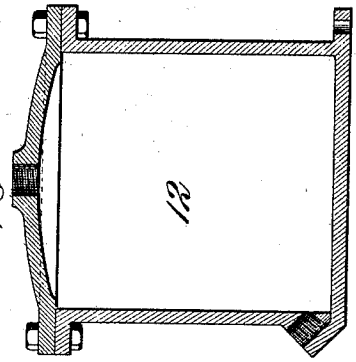

Fig. 3.

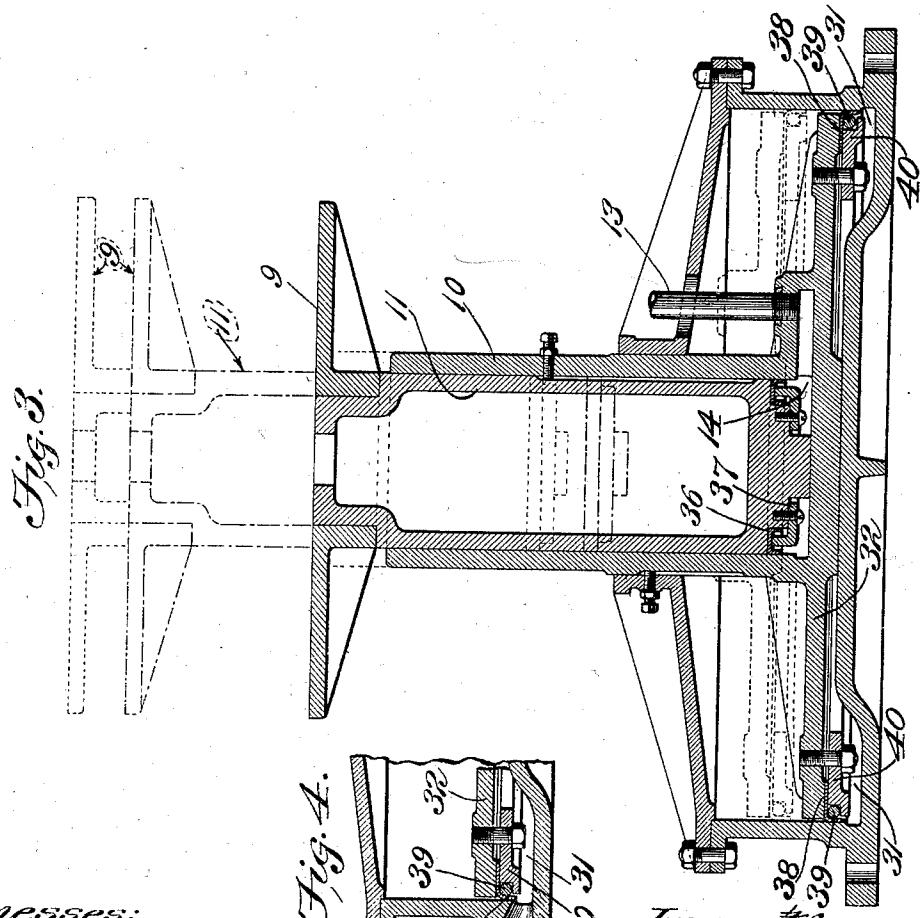

Fig. 4.

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No. 752,780. Patented February 23, 1904.

UNITED STATES PATENT OFFICE.

JOSEPH G. JOHNSTON, OF DETROIT, MICHIGAN, ASSIGNOR TO AMERICAN CAR & FOUNDRY COMPANY, OF ST. LOUIS, MISSOURI, A CORPORATION OF NEW JERSEY.

POWER-ACTUATED MOLDING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 752,780, dated February 23, 1904.

Application filed July 30, 1903. Serial No. 167,543. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH G. JOHNSTON, a citizen of the United States, residing at Detroit, Michigan, have invented a certain new and useful Improvement in Power-Actuated Molding Apparatus, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is an elevational view of a molding apparatus provided with the invention. Fig. 2 is a plan view of the same. Fig. 3 is a sectional view on line 3 3 of Fig. 2. Fig. 4 is a fragmentary section of the larger cylinder hereinafter described. Fig. 5 is a broken top view, and Fig. 6 is a vertical sectional view, of the oil-cylinder on line 6 6 of Fig. 5.

This invention relates to new and useful improvements in wheel-molding machines designed especially for use in preparing the molds for casting car-wheels.

The object of the present invention is to provide a machine of the character described for packing the sand around the pattern and forming the different molds or matrices in such work.

The invention consists in arranging a turn-table on which the patterns are placed, said patterns coöperating with skeleton flasks designed to receive the sand, and the particular feature of the machine comprising the present invention is the construction and arrangement of a hydraulic or other press adapted to coöperate with the pattern to compress the sand, all as hereinafter more fully described, and particularly pointed out in the claims.

Referring to the drawings, 1 is a base-casting.

2 represents supports for a turn-table, comprising the two members 3 3^a, from the latter of which rise supporting-legs 2^a for the rotatable bed 4, upon which the patterns are placed. This bed 4 may be provided with any number of openings, though for convenience of illustration it is shown as provided with two only, a centering-shaft 5 extending downwardly through the middle portion of the table around which it is rotatable.

Rising from the bed 1 is a post 6, and extending horizontally from the post 6 to the shaft 5 and parallel with the bed 4 is a girder 7, having secured thereto a "follower" 8, adapted to be used in pressing sand within the cope or drag portion of the mold to form the matrix therein, the girder 7 being locked in position to prevent vertical movement thereof when pressure is applied below the same.

Conveniently supported upon the bed 1 is a lifting device adapted to coöperate with the pattern and force the sand thereinto for the purpose of compressing the sand and forming the matrix. This lifting device comprises two cylinders, one of which, hereinafter called the "primary" cylinder, is of relatively small diameter, and said primary cylinder 10 has therein a vertically-movable and preferably hollow piston portion 11, which supports the vertically-movable platform 9, upon which the patterns are carried during the time of compressing the sand within the mold. In the operation of the machine a cylinder 12, preferably filled with oil or liquid, is connected by means of the pipe 13 with the chamber 14 beneath the piston 11, and when the lever 15 is thrown in the direction of the arrow of Fig. 1 a rod 16, connected by a link 17, rotates a three-way valve located in a coupling 18 in such manner as to establish communication between said cylinder 12 and a suitable source of compressed-air supply (not shown) through the pipe 19, which is connected therewith, said air passing through said pipe 19 into said cylinder 12 and forcing the oil therein through the pipe 13 into the chamber 14 under the piston 11, thereby elevating said piston, and with it the platform 9, thus producing an initial pressure upon the sand within that portion of the molding-flask represented generally by the letter A in the drawings which may be in position in the machine. Opening the valve 18 by means of the lever 15 closes a valve in the coupling 20 by means of the link 21, connected with said rod 16, said valve 20 being located in a by-pass 20^a, connected with

the pipe 13 at each side of a check-valve 22 in said pipe 13, so that said check-valve is effective to prevent back pressure from the chamber 14 beneath said piston 11. The construction and proportion of the parts illustrated is such that the piston 11 will be elevated approximately seven inches by the initial pressure described, this being sufficient to bring the sand into contact with the follower 8 and produce an initial pressure thereof, after which the secondary cylinder becomes operative.

Connected with the platform 9 is a bracket 25, provided with an angular extension 26, which slides longitudinally upon the rod 27, as best shown in Fig. 1. Upon said rod 27 are stops 28 and 28ª, which may be adjusted by means of set-screws to any desired position upon said rod 27.

Connected with the lower end of the rod 27 in the coupling 29 is a valve adapted to be operated by said rod, said valve being in the pipe 19ª, which is a by-pass from the main air-supply pipe 19, and between said valve and the connection of said pipe 19ª with the main pipe 19 is an automatic pressure-regulating valve 30 of any convenient type, the construction of which forms no part of this invention, the object of said pressure-regulating valve being to provide a blow-off in case of an excessive pressure of air within the pipe 19ª.

The stop 28 is so positioned upon the rod 27 that when the platform 9 has been elevated the required distance by the initial pressure before described the angular extension 26 will contact with said stop 28, carrying the same upwardly, and with it the rod 27, thereby opening the valve in the coupling 29, permitting air to pass through the pipe 19 19ª into the major or secondary chamber 31, which is of much larger area than the primary chamber 14, before described. The liquid in chamber 14 being incompressible, it will be evident that when a supply of air is forced into the chamber 31 beneath the piston 32 said piston 32 will be elevated, carrying with it the primary cylinder 10, piston 11, and platform 9, and because of the greater area of the piston 32 a proportionately greater pressure will be exerted upon the sand within the flask, thereby giving it the final pressure necessary to complete the matrix therein. Of course it will be obvious that flexible connections may be provided where necessary between the parts of the pipe 13, and it will be obvious that some flexible connection is necessary to avoid breaking the rod 27 during the final elevation of the larger piston 32. This flexible connection may be provided by means of "swing-joints" 33, or any other convenient means may be used. After the final pressure has been applied all that is necessary is that the lever 15 be shifted in the direction opposite that indicated by the arrow, whereupon the valve 18 will be rotated to shut off the supply of air and through the said three-way valve will exhaust from opening 34 to atmosphere from pipes 19 and 19ª between the chambers 14 and 31, thus permitting the oil from chamber 14 to return through pipe 13 into the chamber 12, whereupon the platform 9 will descend by gravity to a position, as shown in Fig. 1, below the rotatable member 4, after which a new flask portion may be brought into position and the pressure applied as before.

The piston 11 is provided at its base with a leather or other suitable compressible expansion-ring 36, which is held in place by the angular annular ring 37, as shown in Fig. 3, so as to provide a substantially oil-tight packing at the lower end of said piston 11. The major piston 32 is provided with a leather packing 38 and a packing-ring of steel 39, coöperating therewith, which are held in position by means of the flanged annular ring 40, bolted or otherwise secured to said piston 32, as best shown in Figs. 3 and 4, so as to provide as nearly as possible an air-tight packing for said piston.

In the claims the rotatable member 4 is for convenience referred to as a "flask-support," meaning thereby a support for any suitable vehicle containing a compressible substance, as sand, adapted to be used in forming matrices.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a power molding-machine, a flask-support, a vertically-moving platform, a relatively fixed resisting means coöperating therewith, in combination with a plurality of lifting means comprising cylinders and pistons, one of said cylinders being adapted to contain a relatively incompressible fluid, and means for supplying a compressible fluid for exerting pressure against the incompressible fluid and against the piston in another cylinder, substantially as described.

2. In a power molding-machine, a rotatable flask-support, a relatively fixed resisting means in a different plane therefrom, a movable platform adapted to be projected beyond the plane of said flask-support, a plurality of platform-moving pistons one of which is capable of moving independently of another in the direction of said resisting means, means for supplying compressed air, a fluid-receptacle communicating with said means, a primary chamber communicating with said fluid-receptacle, and a larger chamber communicating with said means for supplying compressed air, substantially as described.

3. In a power molding-machine, a movable platform, in combination with hydropneumatic means for moving said platform, said means comprising a plurality of movable pistons coöperating therewith, a source of compressed-air supply, a source of fluid-supply, a receptacle of relatively small diameter into

which said fluid-supply is projected by said air-supply, and a receptacle of relatively large diameter adapted to coöperate therewith, communicating with said source of air-supply; substantially as described.

4. In a power molding-machine, a resisting means, a platform, a plurality of platform-moving pistons one of which is capable of moving independently of another in the direction of the resisting means, a source of compressed-air supply, a source of fluid-supply communicating therewith, a receptacle of relatively small diameter communicating with said source of fluid-supply, a receptacle of relatively larger diameter in direct communication with said source of air-supply, a pressure-regulating valve therebetween, and automatically-operating means adapted to establish such communication; substantially as described.

5. In a power molding-machine, a movable platform, a plurality of movable pistons cooperating therewith, a cylinder of relatively small diameter in which one of said pistons is movable throughout a relatively long stroke, a source of fluid-supply in communication therewith, a source of compressed-air supply in communication with said fluid-supply, and a cylinder of relatively larger diameter in direct communication with said source of air-supply; substantially as described.

6. In a power molding-machine, a flask-support, a movable platform, a relatively fixed resisting means, a plurality of lifting-pistons in a plurality of cylinders, one of which pistons has a relatively long stroke, and is of small diameter, the other of which has a relatively shorter stroke and is of larger diameter, a source of fluid-supply in communication with said smaller piston-cylinder, a source of compressed-air supply in communication with said source of fluid-supply and said cylinder of larger diameter, and means whereby said smaller and larger cylinders are successively supplied with their respective motive powers; substantially as described.

7. In a power molding-machine, a flask-support, a movable platform, a plurality of pistons, one of which is of smaller diameter and one of which is of relatively larger diameter, coöperating therewith, means for supplying a relatively incompressible fluid against one of the pistons, means for supplying a compressible fluid to exert pressure against the incompressible fluid, and means whereby said compressible fluid will be caused to successively exert pressure against the piston of smaller diameter and against which the incompressible fluid is disposed, and next against the piston of larger diameter, substantially as described.

8. In a power molding-machine, a flask-support, a movable platform, a plurality of fluid-cylinders, a plurality of pistons therein, said pistons being provided with pressure-faces of different areas, a source of liquid in communication with one of said cylinders, a source of compressed-air supply in communication with said source of liquid and with the larger of said cylinders, a check-valve between said liquid-supply and said smaller cylinder, a by-pass around said check-valve, a pressure-regulating valve between said larger cylinder and said source of compressed air, and means whereby said compressed air is permitted to exert pressure against the liquid and admitted to said larger cylinder, substantially as described.

In testimony whereof I hereunto affix my signature, in the presence of two witnesses, this 14th day of July, 1903.

JOSEPH G. JOHNSTON.

Witnesses:
C. M. BELNAP,
D. B. LAKE.