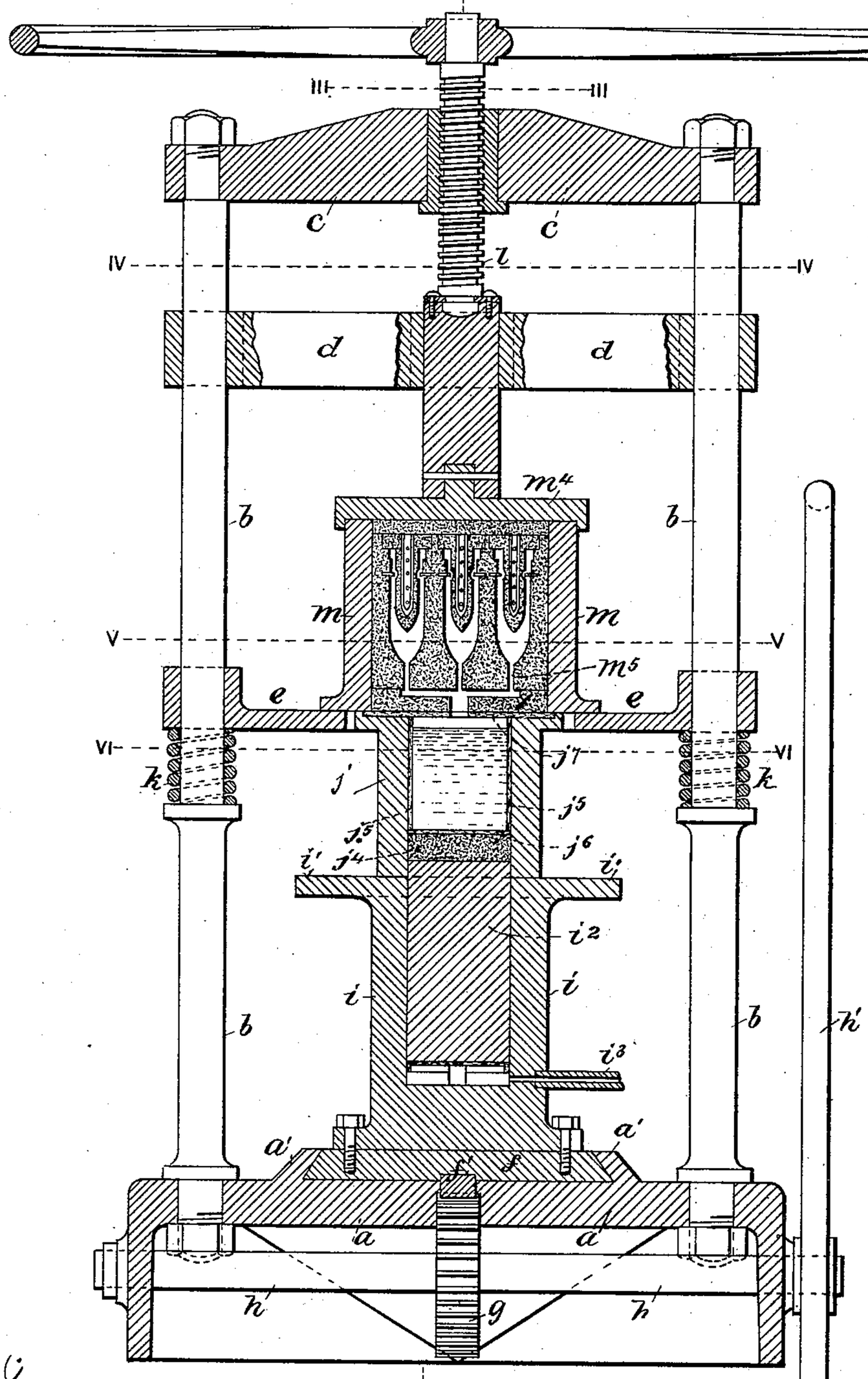
(No Model.) 3 Sheets—Sheet 1.

J. J. C. SMITH & C. GRASSER.

APPARATUS FOR CASTING METALS UNDER PRESSURE.

No. 407,696. Patented July 23, 1889.

FIG. 1.



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Charles Grasser.
By Knight Bros. attys

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FIG. II.

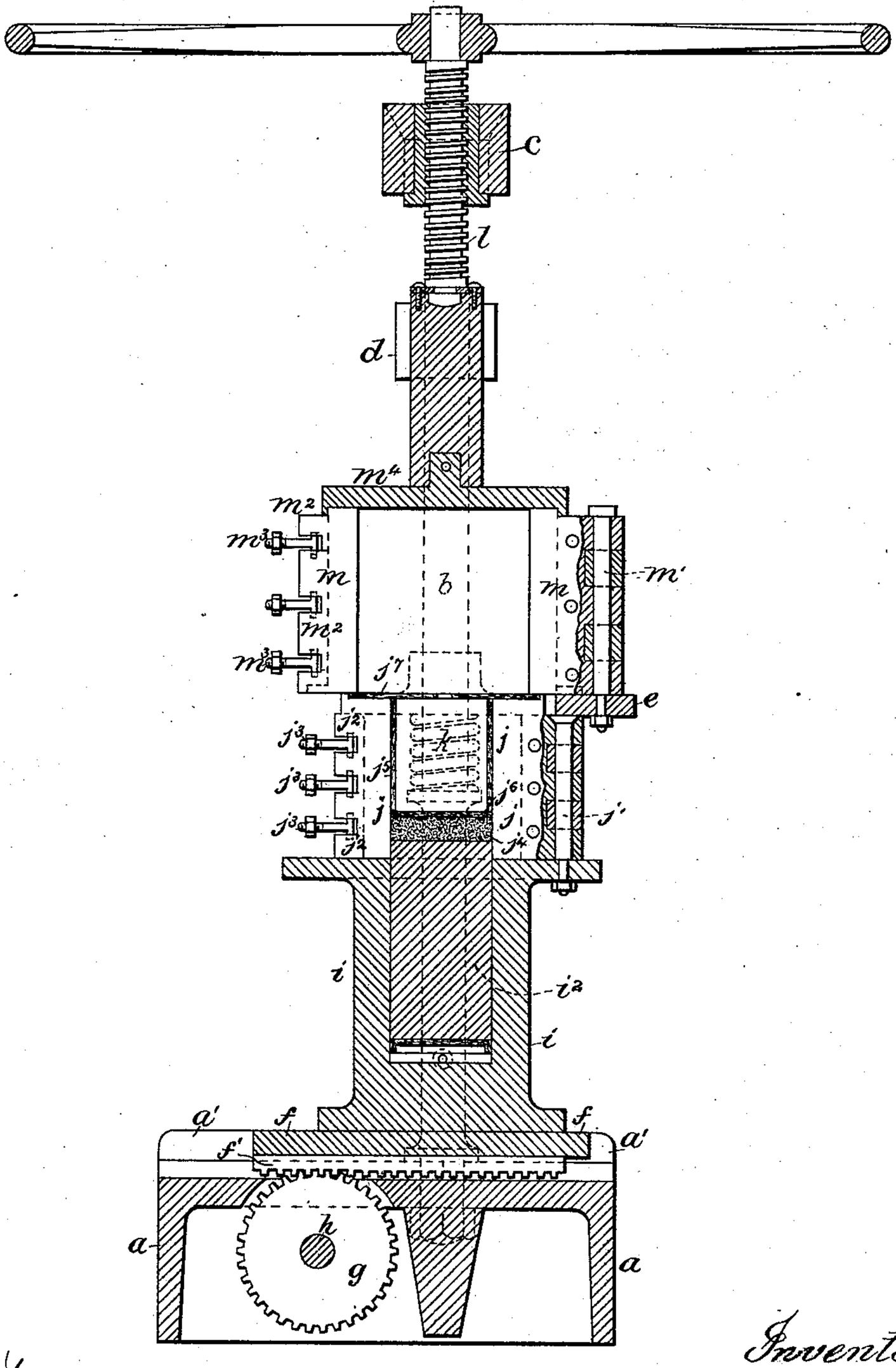

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FIG -III-

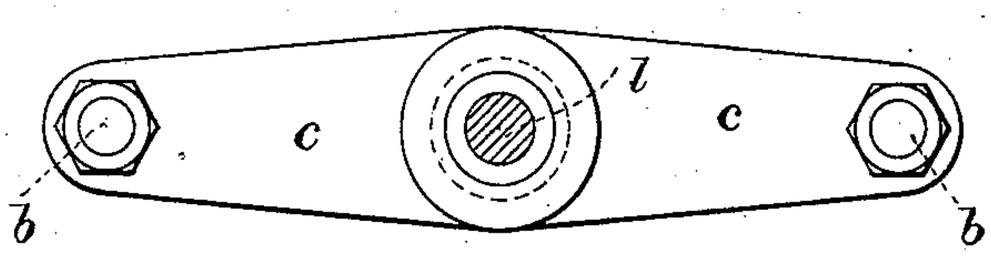


FIG -IV-

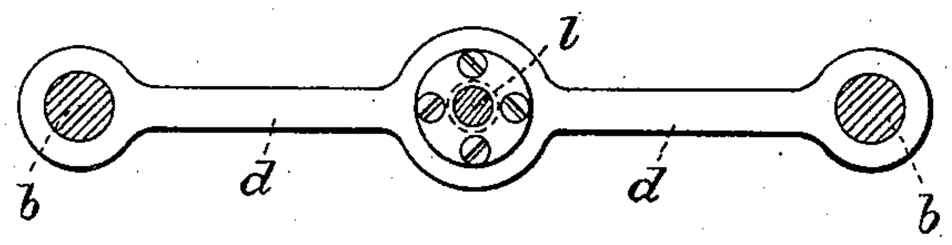


FIG V

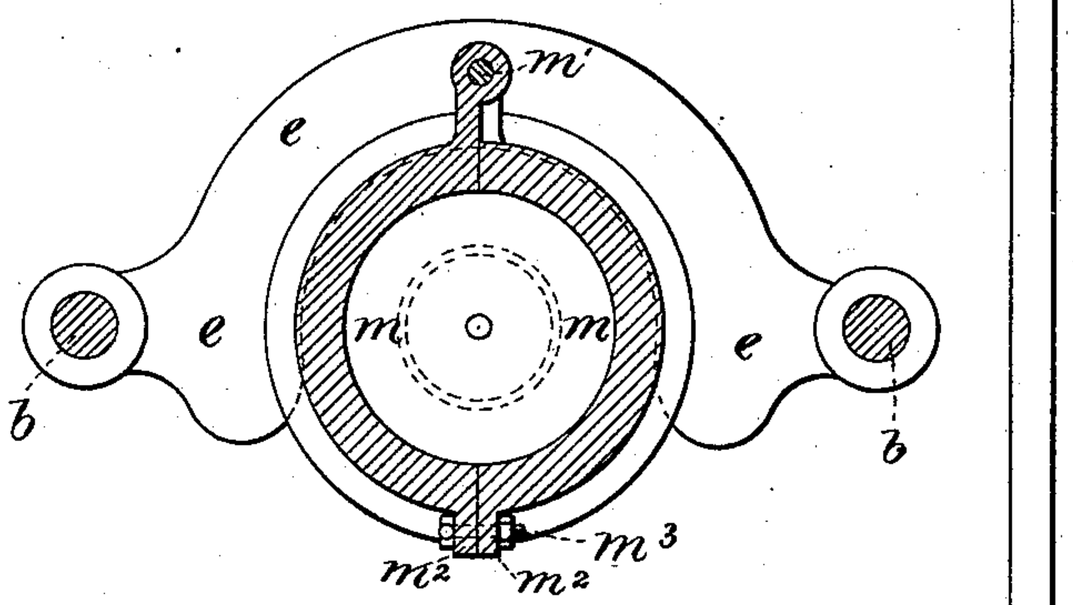
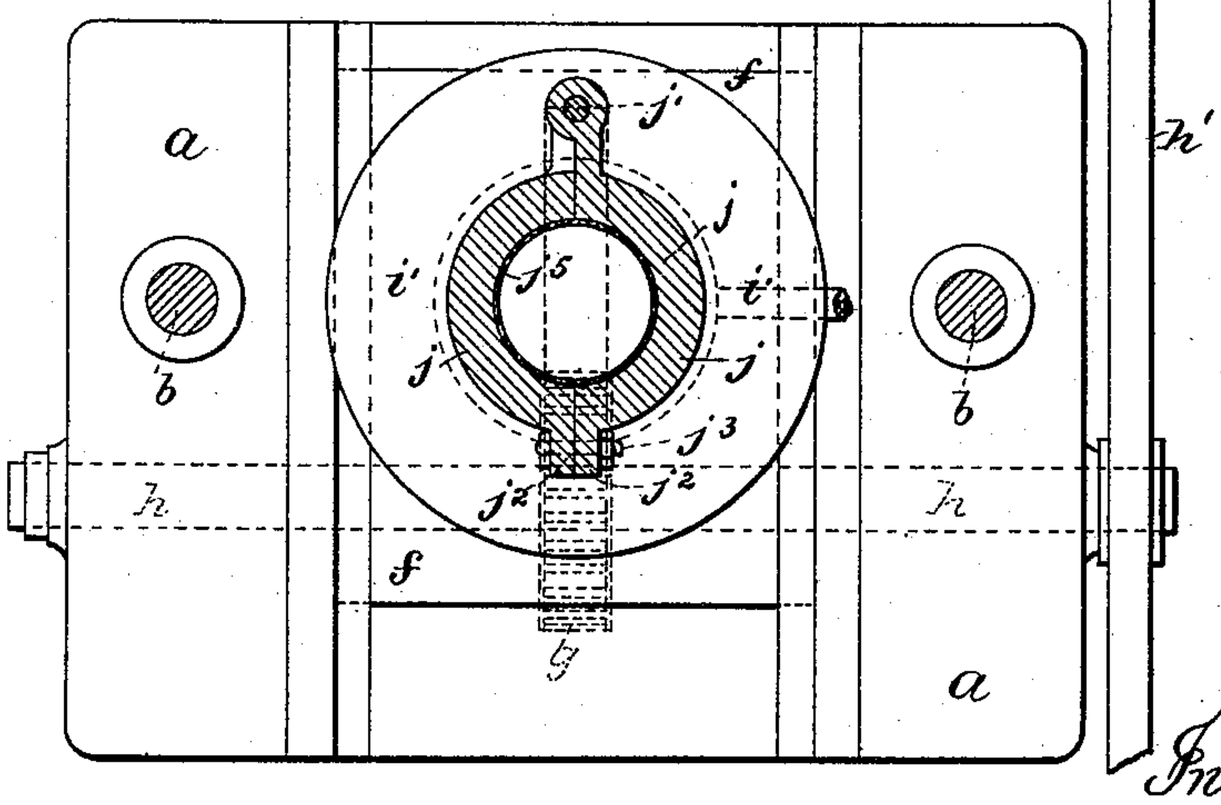


FIG -VI-



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UNITED STATES PATENT OFFICE.

JOHN JOS. CHARLES SMITH AND CHARLES GRASSER, OF PASSAIC, NEW JERSEY, ASSIGNORS TO THE SMITH BROTHERS MANUFACTURING COMPANY, OF SAME PLACE.

APPARATUS FOR CASTING METALS UNDER PRESSURE.

SPECIFICATION forming part of Letters Patent No. 407,696, dated July 23, 1889.

Application filed February 16, 1888. Serial No. 264,189. (No model.) Patented in England June 30, 1887, No. 9,322.

To all whom it may concern:

Be it known that we, JOHN JOSEPH CHARLES SMITH and CHARLES GRASSER, citizens of the United States, residing at Passaic, in the county of Passaic and State of New Jersey, have invented certain new and useful Improvements in Apparatus for Casting Metals under Pressure, (for which Letters Patent have been obtained in England, No. 9,322, dated June 30, 1887,) of which the following is a full, clear, and exact description.

The subject of our invention is an apparatus for casting metals under pressure, constructed with a metal receptacle open at top and mounted in a vertical position on a sliding platform, by which means it is readily moved into position for receiving a charge of molten metal and then into the position beneath the molds for forcing the metal into them, the said metal receptacle being mounted upon a hydraulic ram, connected by a flexible tube with an accumulator or other source of hydraulic pressure. The ram-piston is surmounted by a non-conducting clay disk, and this by a packing of asbestus, which is thus interposed between the piston and the clay disk and the molten metal in the receptacle. The walls of the cylindrical receptacle for the molten metal are also lined on the inside with asbestus. This constitutes a fire-proof material, while by its fibrous character and tenacity it is free from liability to become disintegrated and mix with the molten metal. The molds are arranged in a suitable flask upon a platform above the metal receptacle and hydraulic ram, the said flask being depressed by a screw against the action of supporting-springs, which, when the screw is retracted, lift the flask above the metal receptacle to permit the latter to be removed into position for filling and restored into its operative position. The metal receptacle and the flask are each made in two parts, hinged together by a vertical joint and fastened at their free edges by suitable screw-bolts inserted in open slots in projecting flanges, so that the parts may be quickly and securely clamped together and again released at the proper times.

In the accompanying drawings, Figure I is a vertical section of my improved apparatus, drawn through the axial or central lines. Fig. II is a vertical section of the same, also drawn through the axial or central line, but in a plane at right angles to that shown in Fig. I. Figs. III, IV, V, and VI are cross-sections of the same, drawn on lines 3 3, 4 4, 5 5, and 6 6, respectively, of Figs. I and II.

In all the figures like parts are indicated by similar letters of reference.

a, Figs. I and II, represents a strong base or platform, to which two vertical columns *b b* are fixed, which latter carry the cross-head *c*, cross guide-bar *d*, and table *e*, to which vertical motion is given.

The base or platform *a* is provided with a table *f*, which is fitted to slide to and fro in a horizontal direction in dovetail or other guides *a'*. Motion is imparted to this sliding table by means of a rack *f'*, gear-wheel *g*, and lever or hand-wheel *h'*, attached to the outer end of the shaft *h*, to the center of which the gear-wheel *g* is fixed. To the sliding table *f* the cylinder *i* of a hydraulic ram is attached. This cylinder *i* is provided on its upper end with a broad flange *i'*, forming a platform. On this platform *i'* is supported and fixed a cylinder *j*. This cylinder is formed in two parts, which are hinged together at *j'* on one side thereof. On the other side each of these halves has a flange j^2, by means of which the two halves may be held together firmly by the aid of three hinged bolts j^3, which work in open-ended slots formed in the flanges j^2. By means of this arrangement the two halves of the cylinder *j* may readily be separated from each other by turning them upon their hinged joint *j'*, as occasion may require. This cylinder *j* serves as the receptacle for the fluid metal, to which mechanical pressure can be applied by means of the piston i^2 of the hydraulic ram *i*, which acts on an intervening clay disk j^4. The cylinder *j* is provided with a non-conducting lining j^5, which prevents the chilling of the fluid metal when poured into the cylinder *j*. The chilling of the fluid metal is prevented long enough by the lining j^5 to enable the said fluid metal to be forced into

the molds. The lining j^5 is formed of asbestus sheets, which are rolled into cylindrical shape, of a size to fit the interior of the iron cylinder j. This asbestus cylindrical lining j^5, as also the asbestus disk j^6 and burnt-clay disk j^4, is inserted in position before the two halves of the cylinder j are closed and fastened together. Both the clay disk j^4 and asbestus disk j^6 fit snugly in the cylinder j and tightly against the lower end of the asbestus cylindrical lining j^5, thereby forming a perfect packing against the escape of the fluid metal when pressure is applied thereto.

It will be seen that by reason of the flexibility of the asbestus lining when the piston is operated the lining is compressed thereby and curls or gathers up at the bottom, the sides of the lining being kept from creasing or breaking partly by the pressure of the molten metal.

The piston i^2 of the hydraulic ram extends even at its lowest position a little into the cylinder j and forms the support for the clay disk j^4.

The table e is movable vertically by means of the springs k, surrounding the columns b, and can be forced down to the position shown in the drawings by means of the screw l. On the table e, and fastened thereto by the hinge-bolt m', is a cylindrical mold casing or flask m. This casing or flask m is made in two halves capable of being separated from each other by turning them on the hinge-bolt m' and of being fastened rapidly and securely together by means of the hinged bolts m^3, acting in combination with open-ended slots formed in the flanges m^2. This casing or flask m is for the purpose of holding the molds firmly, so as to prevent the bursting of the same when they are filled with fluid metal under pressure. The table e is movable vertically for the purpose of raising and lowering the mold casing or flask m when required.

The springs k act to press the table e upward and hold it at any point, while by means of the screw l, acting through the cover m^4 and casing or flask m, it may be depressed, and by means of the asbestus-sheet packing j^7 between the molten metal in the cylinder j and the mold-receptacle m form a tight connection between the two.

It is essential that the mold-casing, when charged with empty molds ready for casting, be so arranged as to permit of a quick and tight connection with the cylinder j containing the fluid metal, and that the platform or sliding table f must be capable of being quickly relieved, so that it may be readily moved in and out to enable the cylinder j to be supplied with fluid metal and to permit of a rapid and tight connection between the cylinder j containing the fluid metal and the casing or flask m containing the molds to be filled.

We will now describe the mode of operation of our improved apparatus. By raising the screw l the table e and mold-receptacle m will also rise by the action of the springs k. This movement will permit the sliding table f, together with the hydraulic ram i and metal receptacle j, to be moved out from their central or normal position by means of the lever or hand-wheel h', gear-wheel g, and rack f', which motion brings the metal receptacle j into suitable position to be filled with molten metal. When this is done, the sliding table f is replaced in its central or normal position in the apparatus, together with the ram i and metal receptacle f. Then the screw l is rotated, so as to depress the mold casing or flask m and table e onto the open end of the metal receptacle j, so as to make a tight connection between the two by the aid of the asbestus packing disk j^7. The hydraulic ram i has a valve and flexible connection-tube i^3, which is in connection with a hydraulic accumulator under a pressure of about one hundred pounds to the square inch. As soon as the ram i and metal receptacle j are in proper position and firmly connected with the molds, as described, the valve is opened to admit the water from the accumulator into the ram, which causes the ram-piston i^2 to move and exert pressure on the clay disk j^4, which in its turn acts on the fluid metal in the cylinder j, thereby forcing it into the molds through the proper gates m^5 at the same rate and pressure as the water enters the cylinder i of the ram. The pressure is kept up until the metal has solidified. When the metal in the mold has fully set, the screw l is rotated, so as to raise the cover m^4 from the mold-casing m. The latter and the metal receptacle j are then opened and the whole charge is easily removed.

It should be here stated that more fluid metal must be put into the cylinder j than is required to fill the molds, so that the ram-piston i^2 may continue to act on the fluid metal after the molds are filled and produce the desired pressure.

Our improved apparatus possesses the following advantages:

First. The cylinder or receptacle for the fluid metal, being made in two parts hinged together, is adapted to be opened or parted longitudinally to permit the ready removal of the residual charge for cooling.

Second. The non-conducting lining, being made of fibrous, fire-proof, and flexible material, holds together and is not liable to become disintegrated and mixed with the metal charge during the motion of the piston, as in the case of linings of clay and plumbago or like materials.

Third. The vertical position of the metal receptacle and the readiness with which it is moved into and out of position for use afford the greatest facility for supplying it with a charge of molten metal and forcing this into the mold, while the asbestus packing disk and lining serve as a complete and perfect guard against leakage.

Having thus described our invention, the

following is what we claim as new therein and desire to secure by Letters Patent:

1. In a machine for casting metals under pressure, the combination of the hydraulic ram i, a metal receptacle j, both arranged on a sliding platform, and an elevated mold, substantially as and for the purpose set forth.

2. The combination of the elevated mold-receptable m, table e, cylinder j, piston i^2, asbestus lining j^5, asbestus disk j^6, covering the head of the ram-piston i^2, and the asbestus partition j^7, provided with a contracted gate and interposed between the mold in the receptacle m and the metal in the receptacle j, all substantially as and for the purposes herein set forth.

3. The combination of the mold-receptacle m, formed in two parts, hinged together and resting on a vertically-movable table e, and a metal receptacle j and a hydraulic ram i, both mounted on a horizontally-sliding platform, substantially as and for the purpose set forth.

4. The combination of the movable table e and mold-receptacle m, both movable vertically by means of spring and screw, and a movable cover for receptacle m, adapted to be raised therefrom by said screw, substantially as and for the purposes set forth.

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CHARLES GRASSER.

Witnesses:
THOS. M. MOORE,
W. W. SCOTT.