(No Model.) 5 Sheets—Sheet 1.

R. G. GUPTILL.

MACHINE FOR CASTING GLASS PIPES.

No. 438,806. Patented Oct. 21, 1890.

Fig. 1.

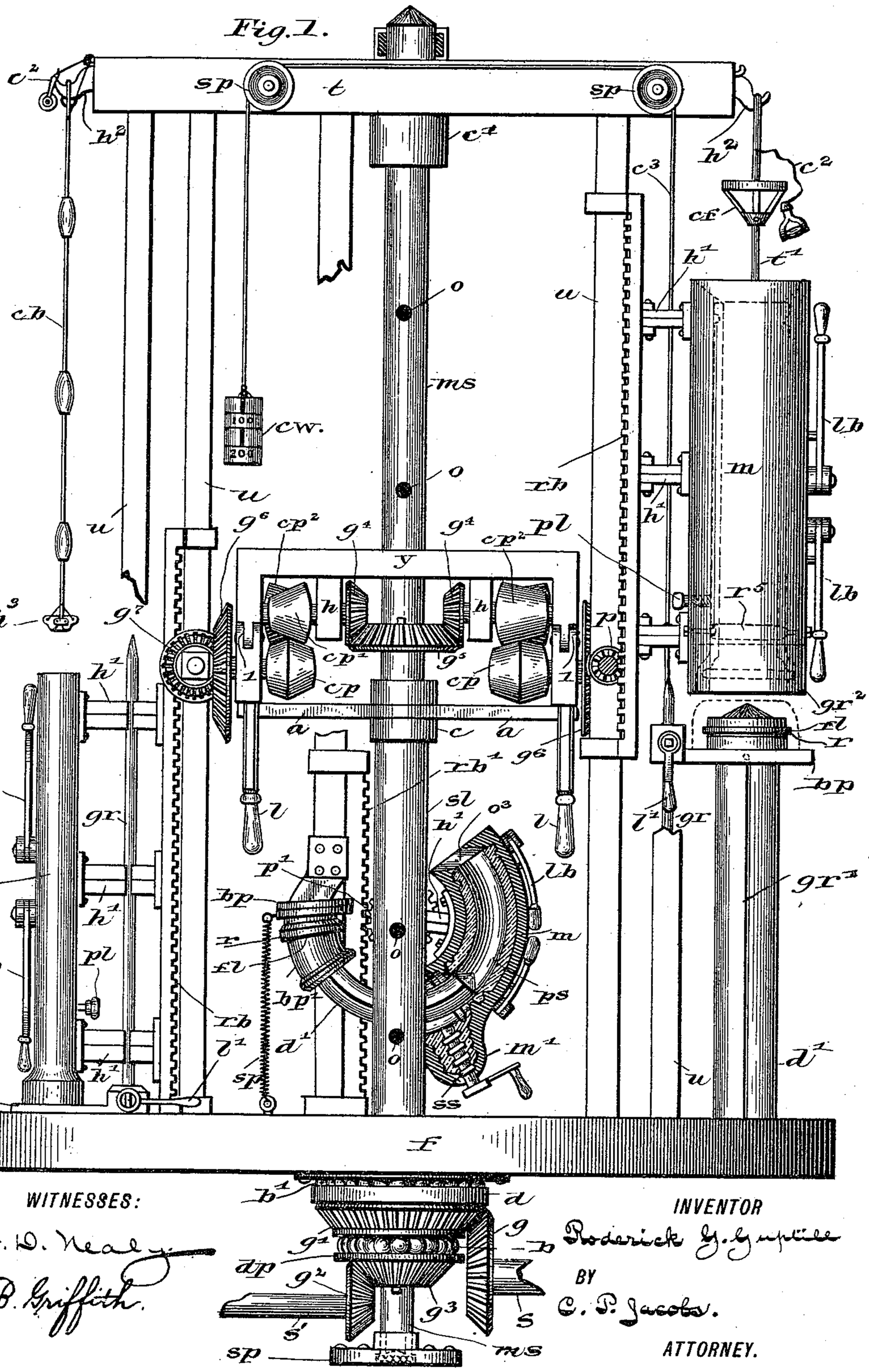

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Fig. 2.

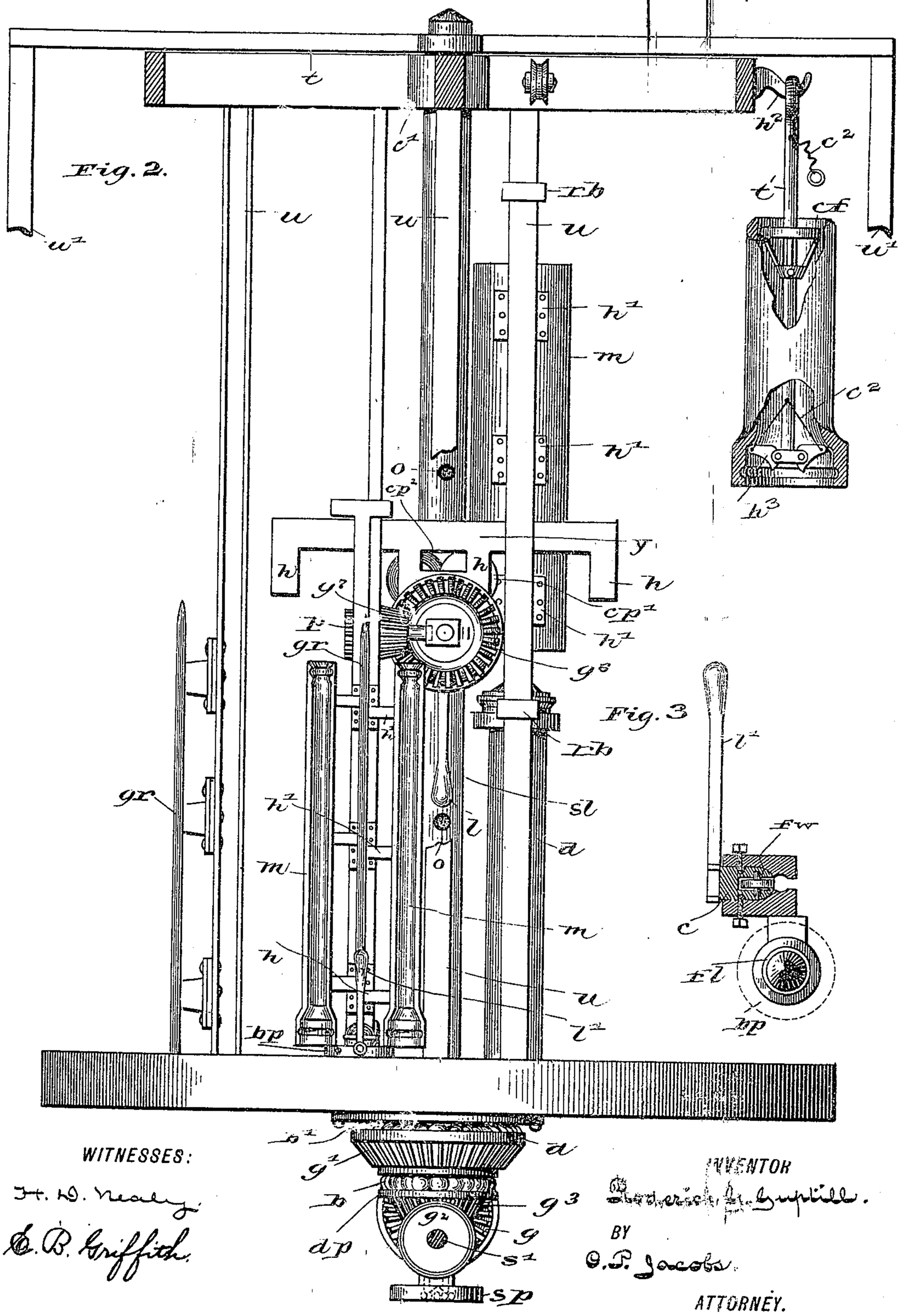

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Fig. 4.

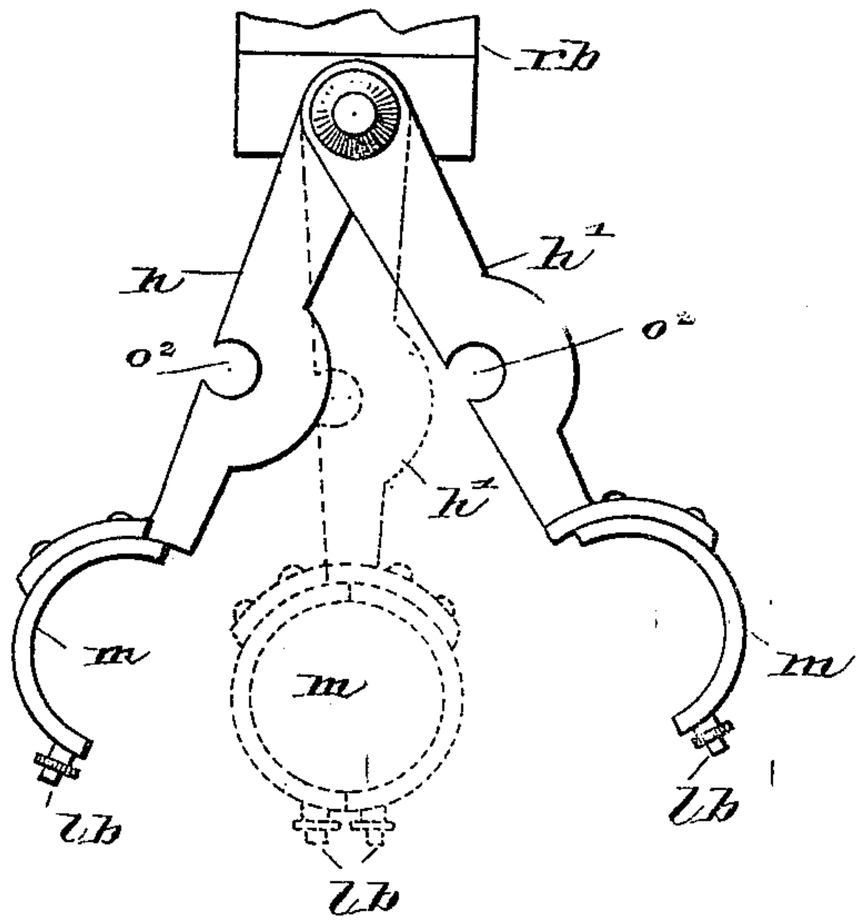

Fig. 8.

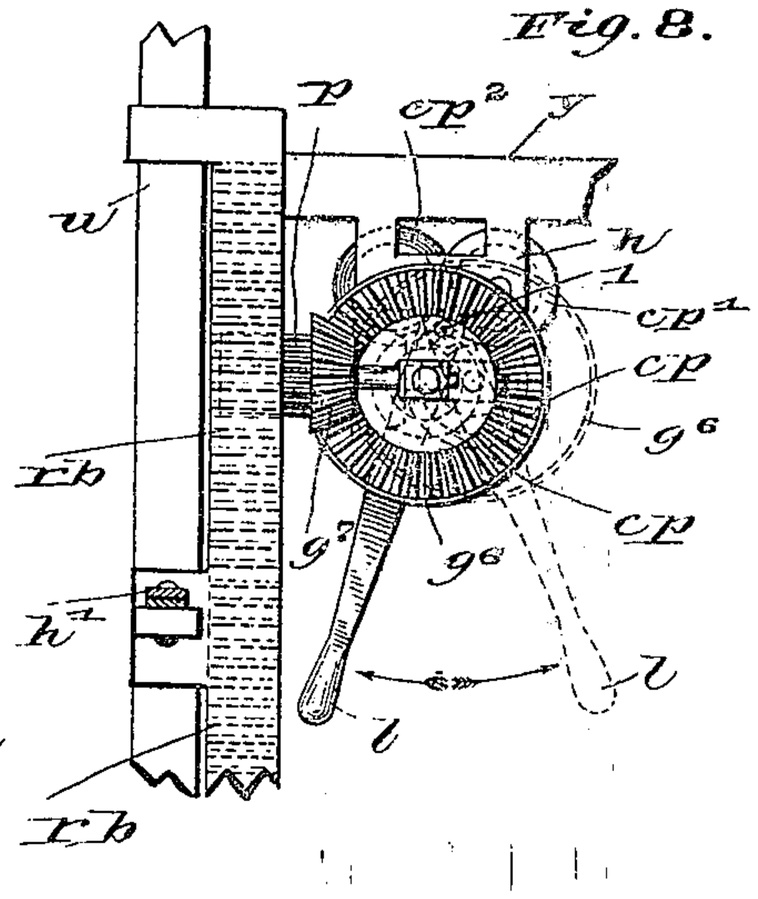

Fig. 9.

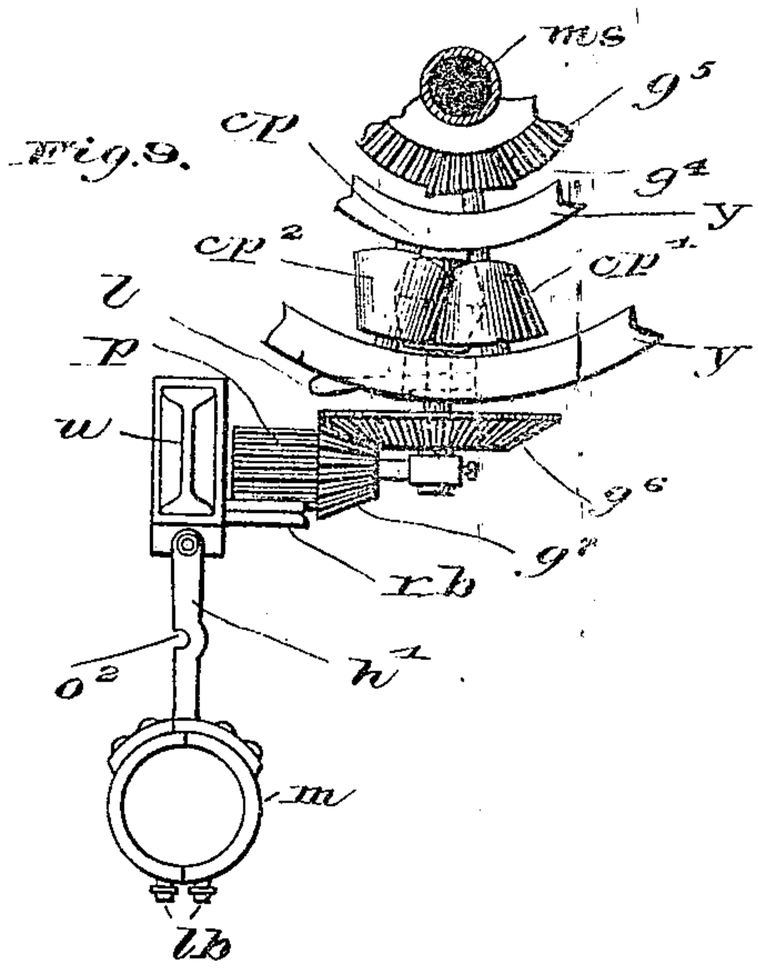

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Fig. 5.

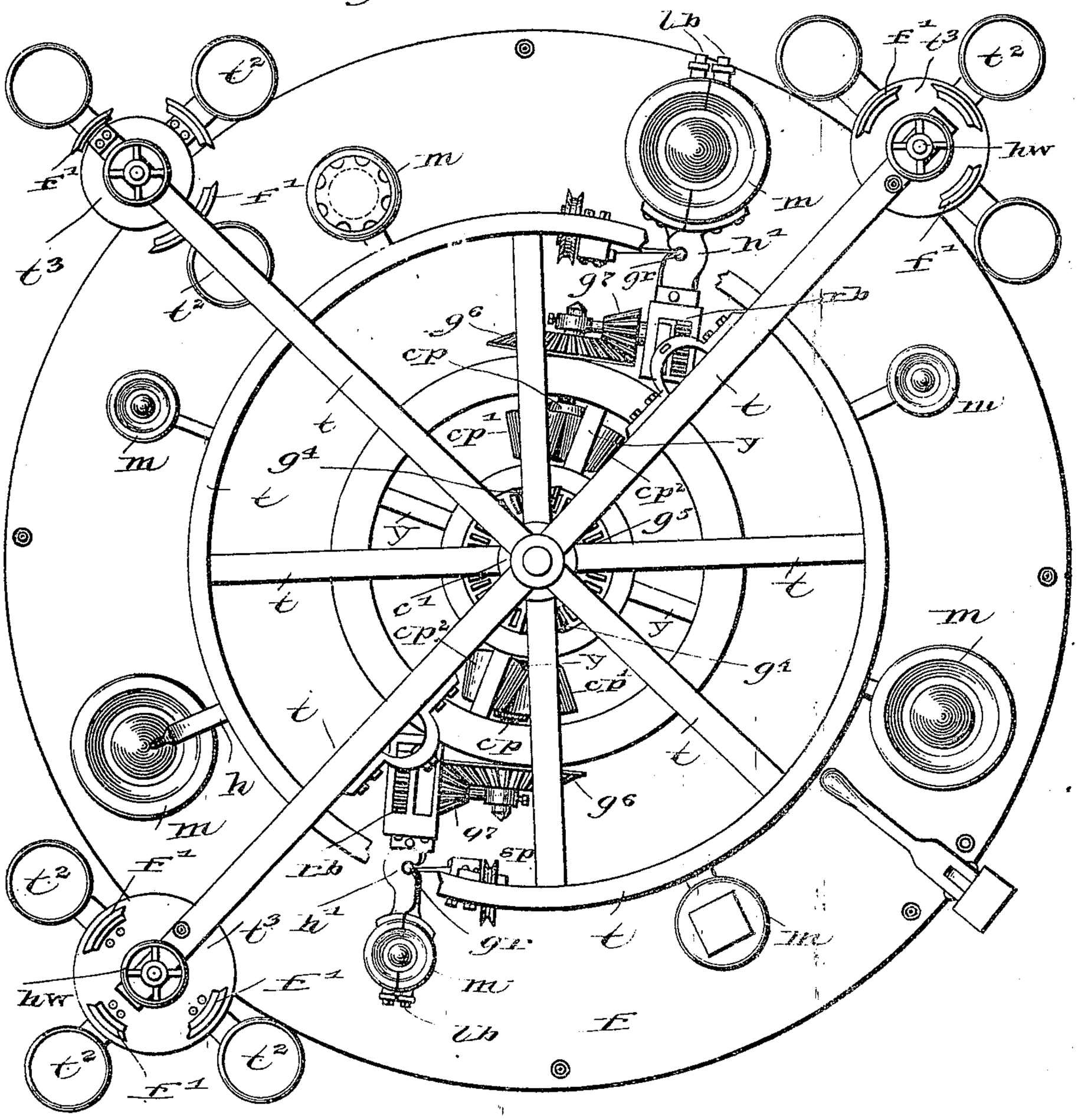

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Fig. 6.

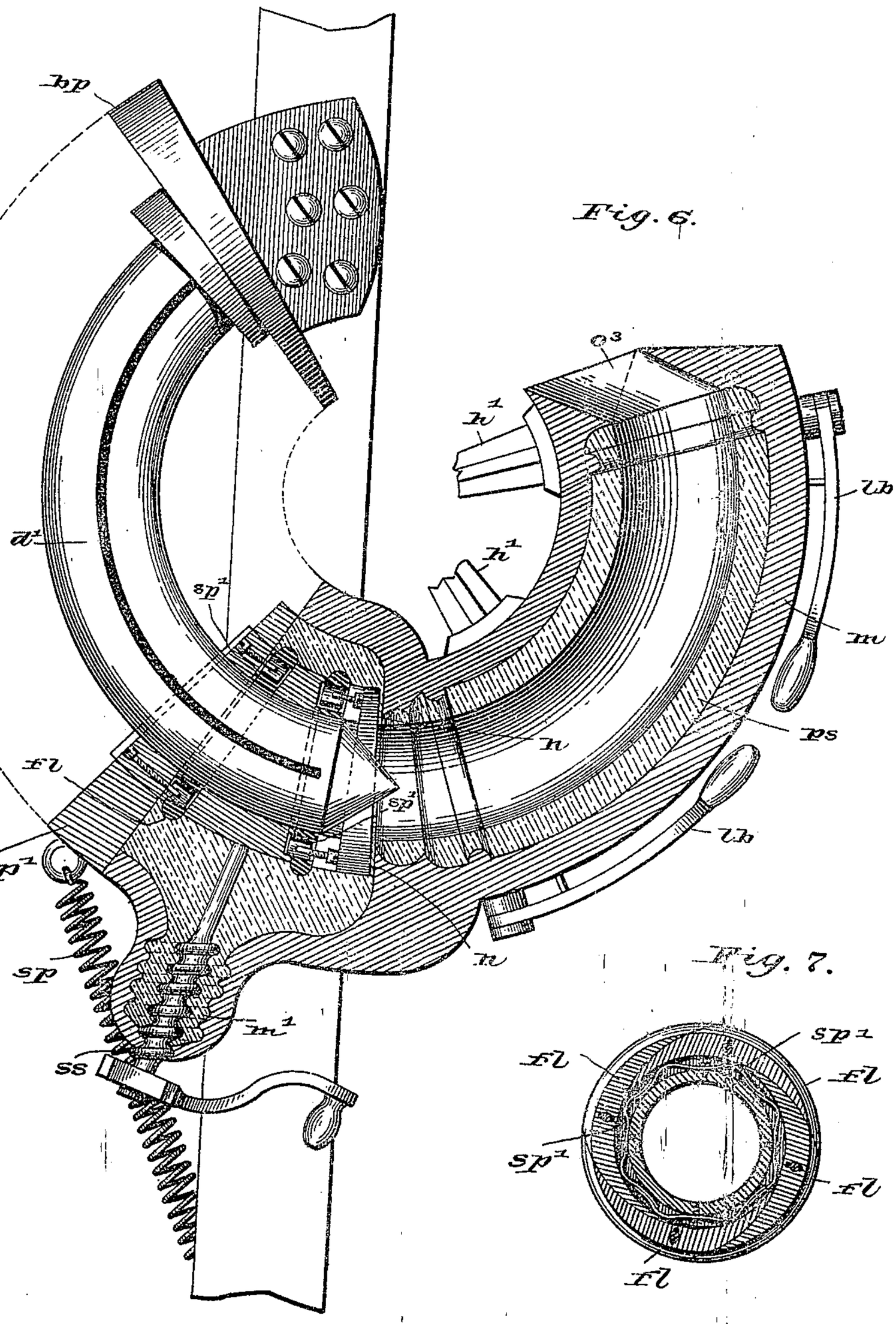

Fig. 7.

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UNITED STATES PATENT OFFICE.

RODERICK G. GUPTILL, OF ELGIN, ILLINOIS.

MACHINE FOR CASTING GLASS PIPES.

SPECIFICATION forming part of Letters Patent No. 438,806, dated October 21, 1890.

Application filed December 28, 1889. Serial No. 335,287. (No model.)

To all whom it may concern:

Be it known that I, RODERICK G. GUPTILL, of Elgin, county of Kane, and State of Illinois, have invented certain new and useful Improvements in Pipe-Casting Mechanism; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, in which like letters refer to like parts.

My invention relates to the construction of mechanism for casting pipe-sections from molten glass or metal, and will be understood from the following description.

In the drawings, Figure 1 is a side view, partly in section, of my device. Fig. 2 is a similar view at right angles to that shown in Fig. 1. Fig. 3 is an enlarged sectional view of the device that locks the bed-plate to the guide-rod. Fig. 4 is an enlarged detail view of one of the hinges of the mold. Fig. 5 is a top view of the mechanism partly broken away. Fig. 6 is an enlarged detail view, partly in section, of the device for casting curved pipe-sections and the collar and lateral connections therefor. Fig. 7 is a sectional view of the collapsible flange and collar. Fig. 8 is a detail side view of the operating-lever and its connections, the movement of the lever being shown in full and dotted lines and the direction by the arrows. Fig. 9 is a top view of the operating mechanism and the mold, the main shaft being in section.

The mechanism is carried upon a circular floor *f*, which is connected by uprights *u* to the top *t*. A sleeve *sl* passes through this circular floor *f*, and below this floor a beveled gear g' is mounted thereon, the upper part of which is formed into a disk *d*, cup-shaped upon the top to receive friction-balls b', which bear against one side of a bearing-plate fastened beneath the circular floor *f*. This gear-wheel g' meshes with a smaller gear *g*, mounted on the shaft *s*, which drives the sleeve, and below the gear-wheel g' are friction-balls *b*, which rest in a disk-plate *dp*, formed integral with a lower gear g^3, which is mounted on the main shaft *ms*, whose foot has a bearing in the socket-plate *sp*, having friction-balls in a groove beneath, as shown in Fig. 1. This gear-wheel g^3 engages with a smaller gear g^2, connected to the countershaft s', to which power is applied to revolve the main shaft. The sleeve *sl* passes loosely through a collar of the yoke *y* for the purpose of strengthening and steadying it in position.

g^5 is a beveled gear attached to the top of the sleeve *sl*, the main shaft *ms* extending above this and passing through the yoke and having an upper collar c', which supports and is connected with the top *t*, as shown in Fig. 1, and by this means the whole frame-work is revolved. The gear-wheel g^5 gears with the smaller gears g^4 on each side, which are mounted on short shafts having bearings at their ends in the arms of the yoke *y* and in hangers *h*, cone-pulleys cp' being mounted on the other end of these shafts. Opposite these, but reversed as to position, are similar cone-pulleys cp^2, mounted on parallel stub-shafts having bearings in the hangers and the arms of the yoke. Below these is a double cone-pulley *cp*, mounted on a short and movable shaft having its bearings in the lever-arm *l*, and upon the outer end of this shaft is mounted the large beveled gear g^6, which meshes with a smaller gear g^7, mounted on a shaft at right angles to that of the larger gear g^6, this shaft being journaled in an upright *u* of the frame-work. On the outer end of this same shaft that carries the gear-wheel g^7 is mounted a small pinion *p*, whose teeth mesh with those of a rack-bar *rb*, connected to and sliding upon the uprights *u* of the frame. To this rack-bar is connected the clasp-hinges h', the detail of which is shown in Fig. 4, and these hinges are connected to the halves of the mold *m* and also to the rack-bar, as shown in Fig. 1. The two halves of this mold open with these hinges and are locked in front when closed by lock-bars *lb*. It will be noticed that openings o^2 are formed on each arm of this clasp-hinge, and when closed they come together, so that the two openings register with each other, making a single operative opening, through which the guide-rod *gr* passes as the mold descends, as shown in Fig. 1. This guide-rod is connected on one side to the upright *u*, as shown in Fig. 2, and

passes through the locking device l', the details of which are shown in Fig. 3, which consists of a central core c, in which is journaled a small friction-wheel fw, whose periphery is in its normal position adjacent to the inner side of the opening through which the guide-rod passes, and bears against such rod. Set-screws on each side lock the core in position, and by turning the lever l' the core may be revolved, bringing the face of the wheel at right angles to the line of the guide-rod holding the bed-plate bp in place upon the guide-rod. This bed-plate carries a collapsible flanged collar fl, which has a collapsible rib r, corresponding with the grooves gr^2 of the pipe-section, and this bed-plate closes the bottom of the mold m when the latter is let down upon it, preventing the escape of the molten material. As the mold descends it carries with it the flanged collar fl and the bed-plate along and around the die d', which has a central guide-groove gr', in which a small projection or lug connected to the bed-plate moves. The ascent and descent of the mold are controlled by the lever l, which is pivoted to the hanger at 1 and carries the shaft of the double-cone pulley cp, and by pulling the lever out to the right, as shown in Fig. 8, it brings this double-cone pulley in contact with the periphery of the upper cone-pulley cp', operating the pinion and rack-bar, causing the mold to descend, and by reversing this operation the opposite end of the double cone-pulley is brought in contact with the cone-pulley cp^2, which receives its power from frictional contact with cp'. In other words, the two pulleys being reversed in position with respect to each other are adapted to produce reverse movements of the mold. Similar pulleys are arranged on each side of the main shaft, having independent levers, gears, and rack-bars, and one may be operated without the other, and as many of these may be connected to the mechanism as may be desired, one being the duplicate of the other.

As the mold descends, its lower end rests upon the bed-plate bp, closing it. The molten material is then poured in until it reaches the level of an opening formed in the back of the mold, which is closed by a plug pl when the liquid has reached the proper height. The operator then pulls the lever l, the mold m descends, and the guide-rod gr passes through the opening in the hinges, forming an independent rear lock to the halves of the mold, so that if the lock-bars lb should become inoperative the halves of the mold could not separate, and as the mold descends it carries with it the flanged collar fl and the bed-plate bp, the metal passing over and about the die d' until the mold reaches the floor f, when it will be in the position shown at the left hand in Fig. 1. The pipe-section being thus formed of the molten material in the mold, the workman proceeds to the next operation. Reversing the lever l, the mold rises, carrying with it the bed-plate bp and the flanged collar fl, the latter being held by its projecting rib r in a corresponding groove gr^2 formed in the cast pipe-section. In order that it may be readily freed from engagement with the groove of the pipe-section, the rib r is made collapsible, preferably by the use of interior springs sp', as shown in Fig. 7. The springs are inclosed in the rib which is formed of lapping sections. The dotted line, Fig. 1, over this flanged collar fl shows how a different-shaped collar may be capped over it in order to form a different-shaped opening in the pipe-section by the use of the same mold. In order that a groove similar to gr^2 may be formed in the pipe-section where this additional collar is used, a small ring r^5 is screwed on inside the mold, as shown in Fig. 1.

t' is a tube having collapsible hooks h^3 connected at its bottom, the arms of these being connected to a cord c^2, which passes up through the tube and is provided with a handle. The operator hangs this tube t' upon the hook h^2 directly in line with and over the mold, and as the latter rises it passes up and around this tube with its hooks, these hanging substantially in the center, and as these hooks pass into the widened flange portion of the mold they automatically open, their ends passing beneath the shoulder of the flange and bearing against it, so that they will support the pipe-section when it is released from the mold, as shown in Fig. 2.

cf is a circular carrier-frame, which is fastened to the same tube t' near its top, and this has a diameter substantially that of the interior of the pipe-section, so that it will bear slightly against it, guiding and steadying it in a vertical position as it rises. When the mold is unlocked and the pipe-section freed therefrom, the latter is supported by these hooks and the tube hung upon the frame above, as hereinbefore described.

Where many molds are operated at one and the same time the pipe-section cannot well be carried by the tube t' and its hooks h^2, as indicated, and in such case provision is made to support them upon circular plates or tables t^2, which are connected to the outer uprights u', parts of which are shown at the right and left in Fig. 5, and these tables are disposed about a central table t^3, upon which the workman stands.

hw are hand-wheels for revolving the tables t^2, so as to bring any one of them beneath a mold to receive the pipe-section when freed therefrom.

f' are fenders set up to protect the workman from the heat arising from the mold and the cooling pipe-section.

In the top view shown in Fig. 5 molds of different sizes and shapes are shown intended to receive dies of corresponding shapes.

A counter-weight cw is suspended from a cord passing over the sheave-pulleys sp, fastened to the top of the frame and extending downward and connected with the bed-plate bp, this counter-weight being adjusted so as

to balance the weight of the plate with the mold and its material when resting thereon. If the counter-weight should not be heavy enough owing to the great size of the mold or pipe section, the locking device *l'* is then brought into requisition; but for ordinary purposes the counter-weight is sufficient to balance the mold with its contents, and this takes the strain off the machine and gives a uniform and regular ascent and descent to the mold with its load.

So far I have described the operation of the mechanism in casting straight pipe-sections. For curved sections—such as may be required for turning corners and for connecting with hydrants—I employ the additional device shown in the central lower part of Fig. 1 and also in enlarged detail in Fig. 6. The mold *m* is curved, as shown, and also the die *d'*, the collar and movable flange-section *fl* being connected to the lower half of a bed-plate *bp*, which is formed in two parts, to the lower one of which *bp'* is connected a coiled spring *sp*, whose tension normally operates to hold the collar and that half of the bed-plate against the end of the mold, closing the same. A lateral mold *m'* is connected to the curved mold *m*, which has an opening closed by a steel core-screw *ss*, connected with a crank for turning it in the molten mass, and as this fills it flows about the screw, which forms a thread on the inside, the mold forming a similar thread on the outside. I thus provide a means for connecting one pipe-section to another pipe or hydrant, for the ordinary means of connection used in other devices would be totally unavailable in pipes made of glass.

The end of the curved mold has a flared opening o^3 on one side, the lip of the mold projecting over the opposite side, as shown in Fig. 6, to prevent the molten material from flowing out when the mold is turned to form a curved section.

In Fig. 1 the bed-plate and the movable collar-section are shown when drawn away from the mold. This is done in order that the view should not be confused by the sleeve *sl;* but the proper and normal position of the parts is shown in Fig. 6, the pipe-section *ps* being in place in the mold. Connected with this curved mold *m* is a divided hinge *h'*, constructed substantially like the hinge shown in Fig. 4. To this hinge is connected a pinion *p'*, which engages with an additional rack-bar *rb'*, supported by and sliding upon one of the uprights of the frame and geared to operate by reversible cone-pulleys in the same manner as the other rack-bars. The movable half *bp'* of the bed-plate and its connected flanged collar *fl* being closed against the end of the curved mold, the metal is poured in, the operator turns the lever, and as the rack-bar rises it causes the mold to descend or rotate, passing over the curved die *d'* and the movable collar *fl'*, and when it reaches the upper and fixed half *bp* of the bed-plate the latter gives it an impact which drives the collar and its flanges into the lower half *bp'* of the bed-plate, preventing any more metal from flowing therein, leaving a slight neck *n* connecting the pipe-section and the collar, so that it can be readily separated by a tap of the hammer and the cast pipe removed.

The main shaft *ms* and the sleeve *sl* are hollow, and have holes or openings *o* connected with the interior, as shown in Figs. 1 and 2, the object of these being to allow a current of air to be driven up through the shaft and out through these openings in order to reduce the temperature and aid in cooling the casting, at the same time increasing the comfort of the workmen in supplying them with fresh air.

What I claim as my invention, and desire to secure by Letters Patent, is the following:

1. In a pipe-casting mechanism, a frame-work, a cylindrical mold composed of two halves and provided with a device for locking the parts suspended from such frame-work, and a stationary die supported upon such frame-work below such mold and in line therewith, having a movable head or collar which is adapted to be carried down the die by the descent of the mold, in combination with suitable mechanism connected to the frame-work for raising and lowering the mold substantially as shown and described.

2. In a pipe-casting mechanism, a frame-work, a sectional movable mold suspended therefrom for receiving the molten material, a stationary die-support upon such frame-work below and in line with the opening in the mold, a movable head or collar connected with such die and adapted to be carried down by the descent of the mold, mechanism for raising and lowering the mold carried by such frame-work, the mold connected to such mechanism, and a counter-weight also connected to such mold for balancing the weight thereof with its included material, all combined substantially as shown and described.

3. In a pipe-casting mechanism, a revoluble frame-work, means for revolving the same, a movable mold connected thereto and adapted to be raised and lowered by suitable mechanism, a die carried upon such frame-work below and in line with the mold, and a collar or flange loosely connected to such die and adapted to be carried down the same by the descent of the mold, in combination with mechanism for revolving the frame-work and actuating the ascent and descent of the mold and for locking the same at any desired point, substantially as shown and described.

4. In a pipe-casting mechanism, the fixed die *d'*, supported upon the floor *f* of the frame-work below and in line with the sectional mold *m*, suspended from the top of such frame-work above such die, and a movable flange or collar connected to a bed-plate for closing the bottom of the mold and adapted to be carried down the die by the descent of the mold with the weight of the molten material contained therein, substantially as shown and described.

5. In a pipe-casting mechanism, the sectional mold *m*, hinged to the movable part of the frame-work, and locking-bars *lb*, connected to the outside thereof for locking the sections together, in combination with the tube *t'*, provided with grappling-hooks h^3 at the bottom, and with a circular carrier-frame *cf* about midway its length, substantially as shown and described.

6. In a pipe-casting mechanism, the tube *t'*, the steadying-frame *cf*, connected thereto about midway, and the collapsible hooks h^2, connected at the bottom of such tube, in combination with a cord c^2, connected to such hooks and passing up through such tube and out through an opening in one side, whereby the grip of the hooks may be released, substantially as shown and described.

7. In a pipe-casting mechanism, a device for locking the mold at any point of the pipe, comprising the lever *l'*, the cylindrical core *c*, and the friction-wheel *fw*, journaled in such core, the whole connected to an upright of the frame, substantially as shown and described.

8. In a pipe-casting mechanism, a revoluble frame-work mounted upon suitable bearings, a series of sectional molds suspended therefrom in line with a series of corresponding-shaped dies supported upon such frame-work below and in line with the opening of such molds, the halves of such molds provided with locking-hinges in the rear and locking-bars in front, and mechanism for raising and lowering such molds, the whole connected to a hollow revolving driving-shaft provided with air-openings through which a blast may be forced by suitable mechanism for reducing the temperature, substantially as shown and described.

9. In a pipe-casting mechanism, the fixed die *d*, and the movable collar or head *fl*, provided with a rib *r*, which is formed of lapped sections, so that it may be collapsed when desired for withdrawing from the mold, substantially as shown and described.

10. In a pipe-casting mechanism, the flange *fl*, having a rib *r*, such rib composed of overlapping sections, and overlapping springs *sp*, connected to the inside of such overlapping sections, the whole forming a collapsible flange or rib, substantially as described.

11. In a pipe-casting mechanism, a circular sectional mold *m*, connected by divided locking-hinges *h'* to the movable part of the frame-work, with mechanism for rotating such circular mold and carrying the same over the circular die *d'*, connected to the frame-work in line with such circular mold, such circular die *d'* provided with a flanged collar *fl*, movable on such die, such flanged collar connected with the movable bed-plate *bp*, and the spring *sp* connected thereto, whose normal tension operates to close the plate *bp* against the end of the curved mold, all combined substantially as shown and described.

12. In a pipe-casting mechanism, the curved mold *m*, connected by lock-hinges to rotating mechanism, and having a locking device in front for securing the halves of the mold together, such mold provided with a lateral branch m^2, and having a core-screw *ss*, revoluble by a crank in such lateral mold-connection, all combined substantially as shown and described.

13. In a pipe-casting mechanism, a frame-work, rotating mechanism connected therewith, a cylindrical curved sectional mold connected on one side to such rotating mechanism by two-part hinges, locking-bars connected to such mold for securing the parts together, a die fixed to one half of a bed-plate, the other half bolted to such frame-work in line with an opening in the curved mold, and a movable collar or flange mounted upon such die having a corresponding plate with collapsible ribs connected thereto for forming the mold of the pipe-section, such movable bed-plate normally controlled by a coiled spring, all combined substantially as shown and described.

14. In a pipe-casting mechanism, a frame-work, a rotating mold-carrying mechanism connected therewith, a cylindrical sectional circular mold connected on one side to such rotating mechanism, means for locking the sections of the mold together, a fixed die connected to the frame-work in line with an opening in the mold, a movable collar having a collapsible flange carried upon such movable die, and a plate for closing the opening in the mold connected thereto, the upper end of such curved mold having an opening at an angle to its curve to prevent the molten material from falling out when the mold is rotated, substantially as shown and described.

15. The process of making glass castings of irregular shapes, which consists in pouring the molten material into a sectional mold and carrying the latter down upon a movable flange or head supported upon a movable bed-plate which closes the bottom of the mold, and continuing the descent of the mold with the bed-plate along and about a fixed die for forming the main body of the casting, and elevating the same and freeing the casting from the mold, substantially as shown and described.

In witness whereof I have hereunto set my hand this 2d day of December, 1889.

RODERICK G. GUPTILL.

Witnesses:
C. P. JACOBS,
E. B. GRIFFITH.