(No Model.) 7 Sheets—Sheet 1.

F. WICKS.

TYPE CASTING MACHINE.

No. 430,051. Patented June 10, 1890.

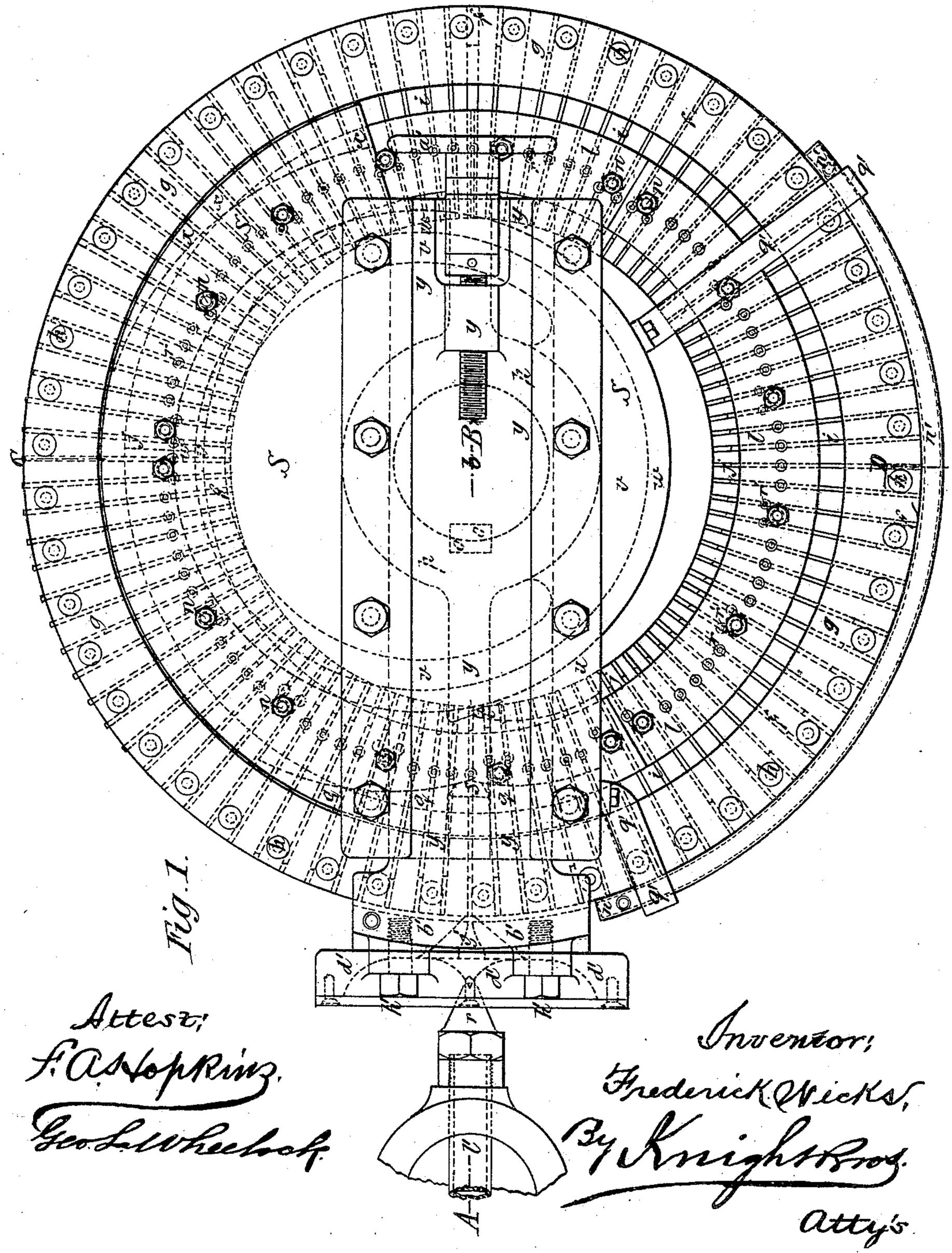

Fig. 1.

Attest;
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Geo. L. Wheelock.

Inventor;
Frederick Wicks,
By Knight Bros.
Atty's.

(No Model.)

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F. WICKS.

TYPE CASTING MACHINE.

No. 430,051. Patented June 10, 1890.

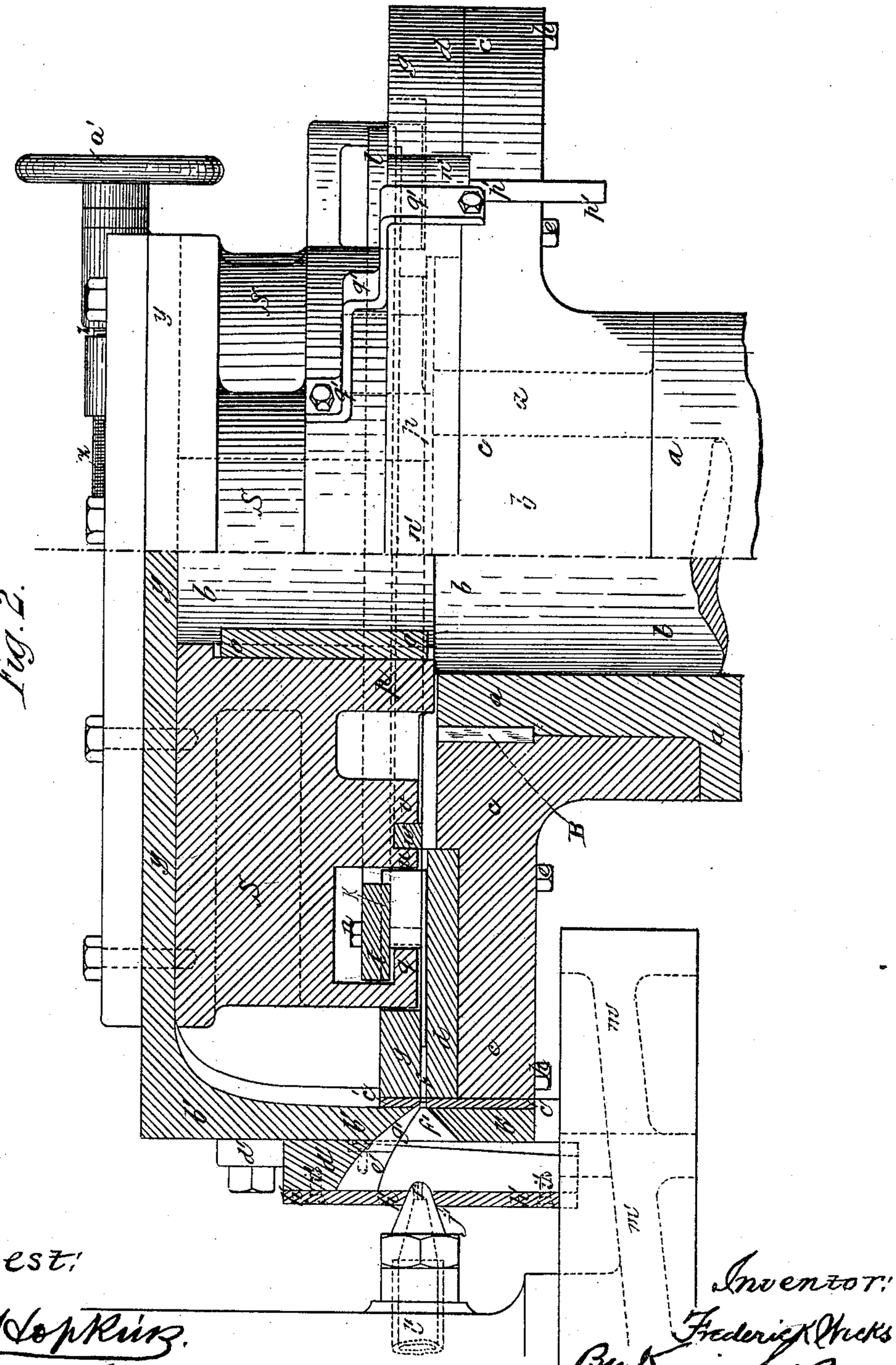

Fig. 2.

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TYPE CASTING MACHINE.

No. 430,051. Patented June 10, 1890.

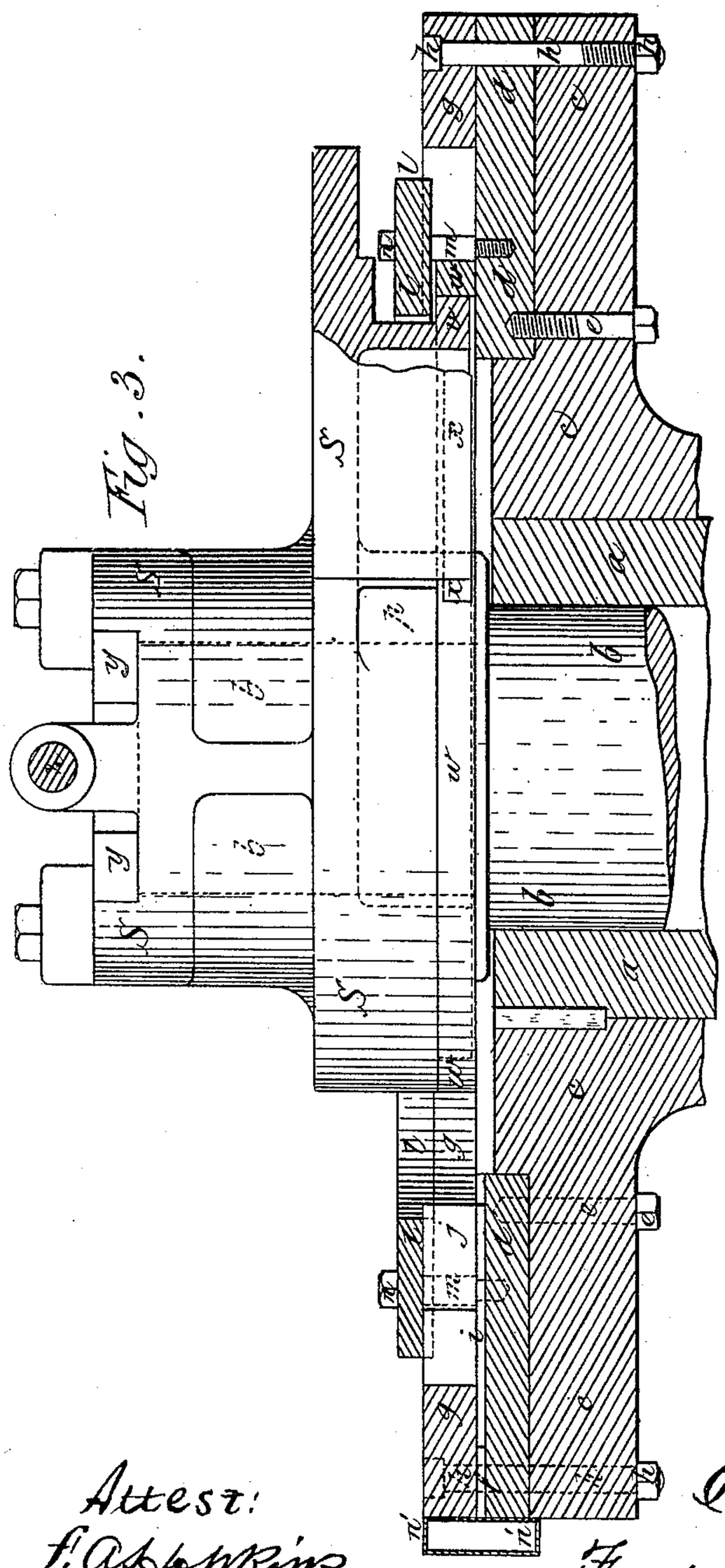

Fig. 3.

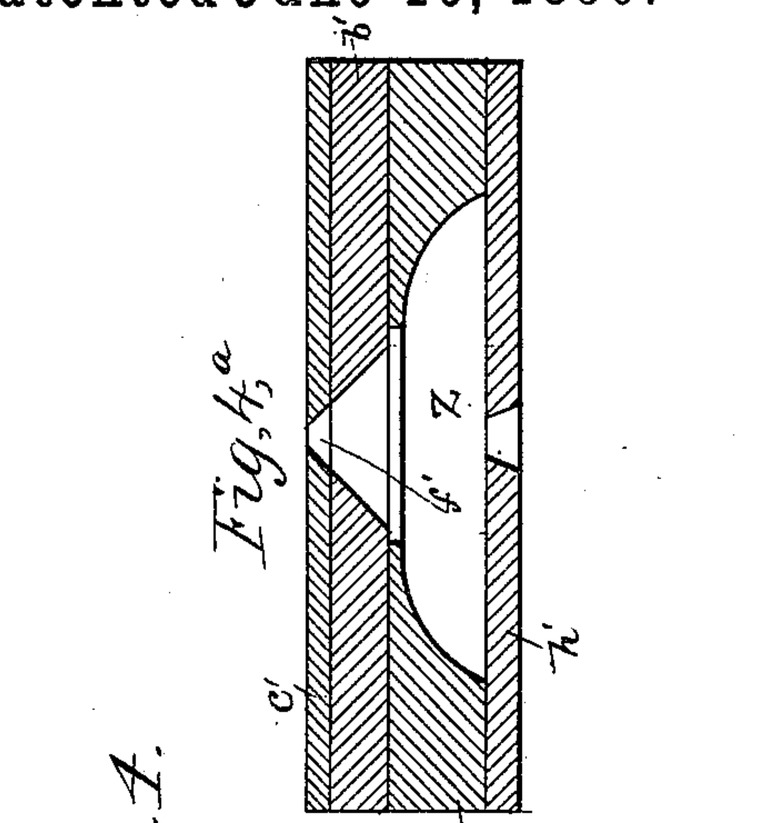

Fig. 4a.

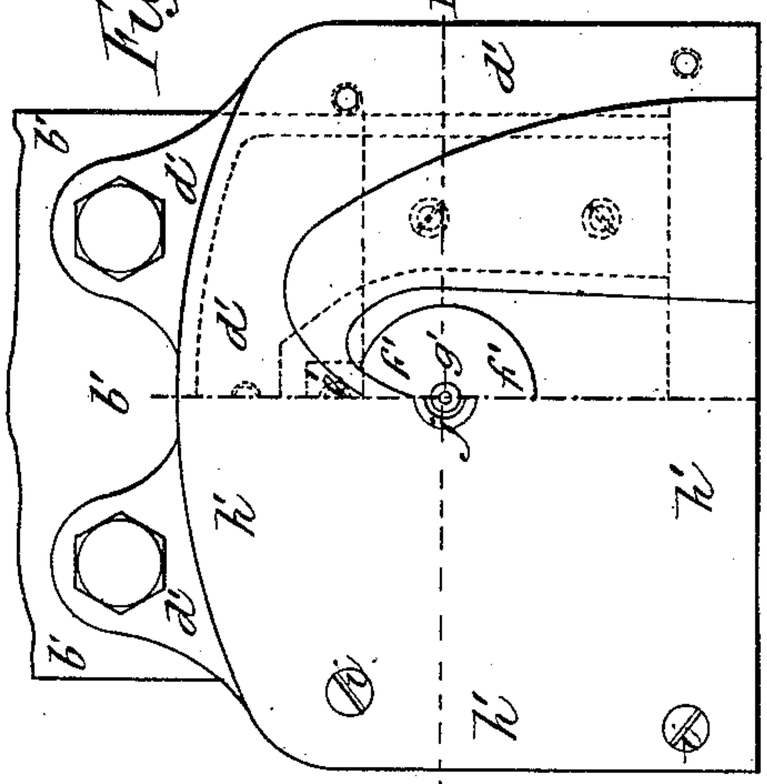

Fig. 4.

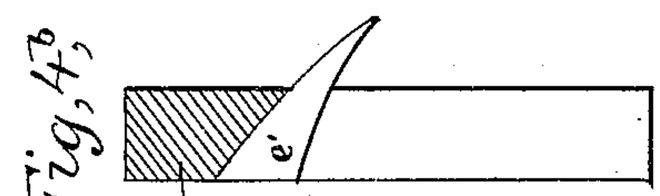

Fig. 4b.

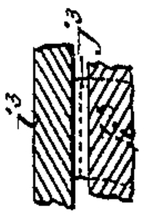

Fig. 15.

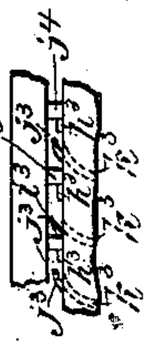

Fig. 14.

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F. WICKS.

TYPE CASTING MACHINE.

No. 430,051. Patented June 10, 1890.

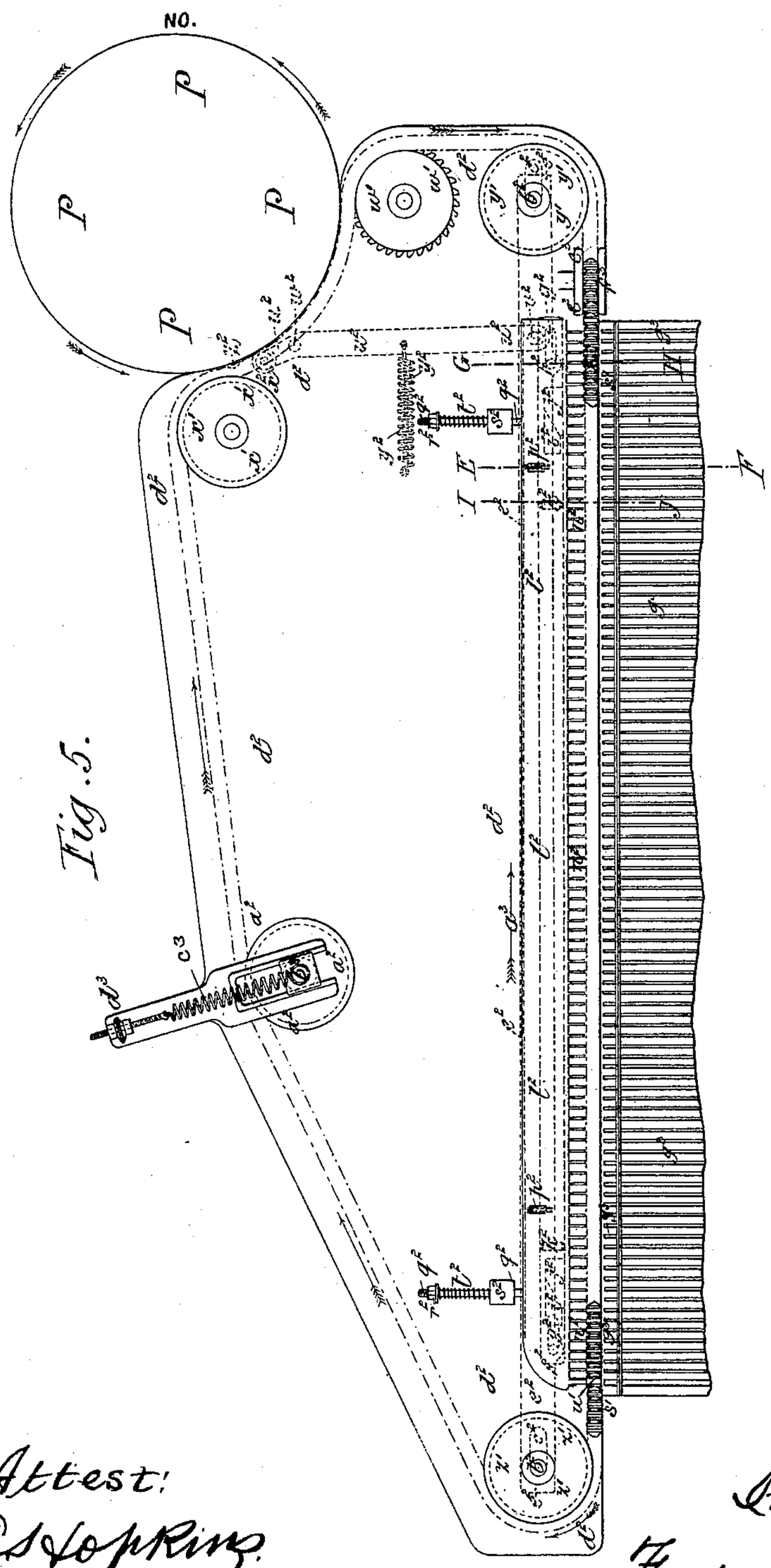

Fig. 5.

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F. WICKS.

TYPE CASTING MACHINE.

No. 430,051. Patented June 10, 1890.

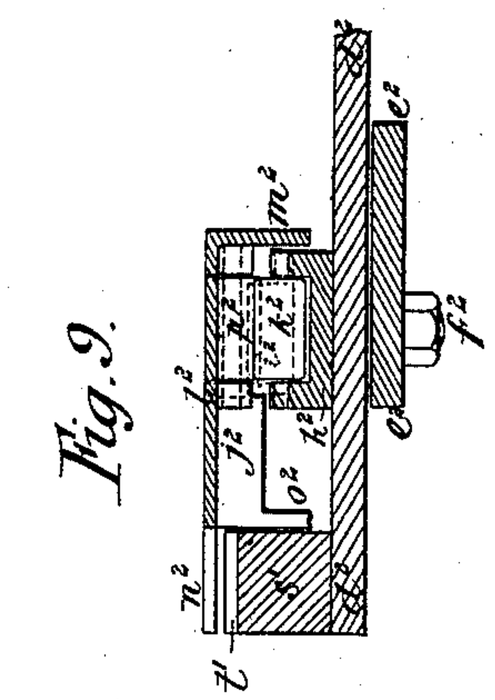

Fig. 9.

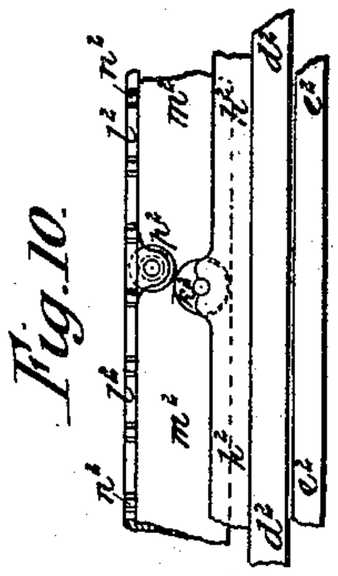

Fig. 10.

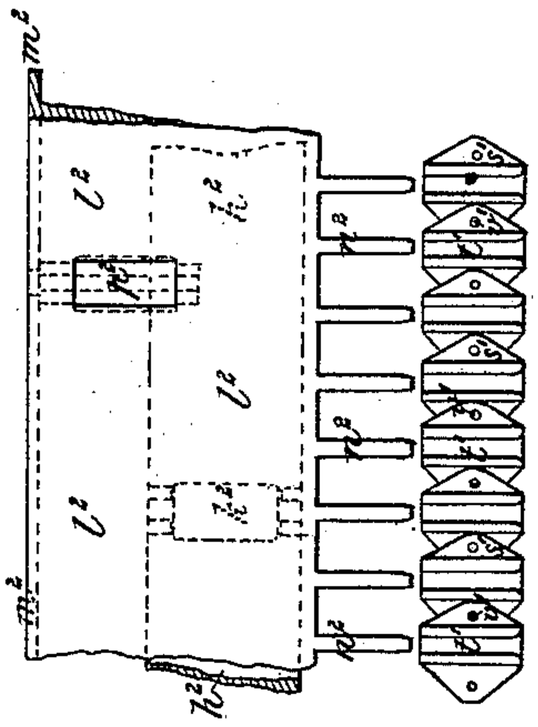

Fig. 6.

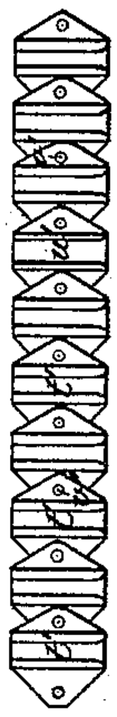

Fig. 11.

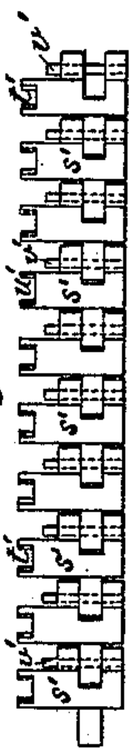

Fig. 12.

Fig. 13.

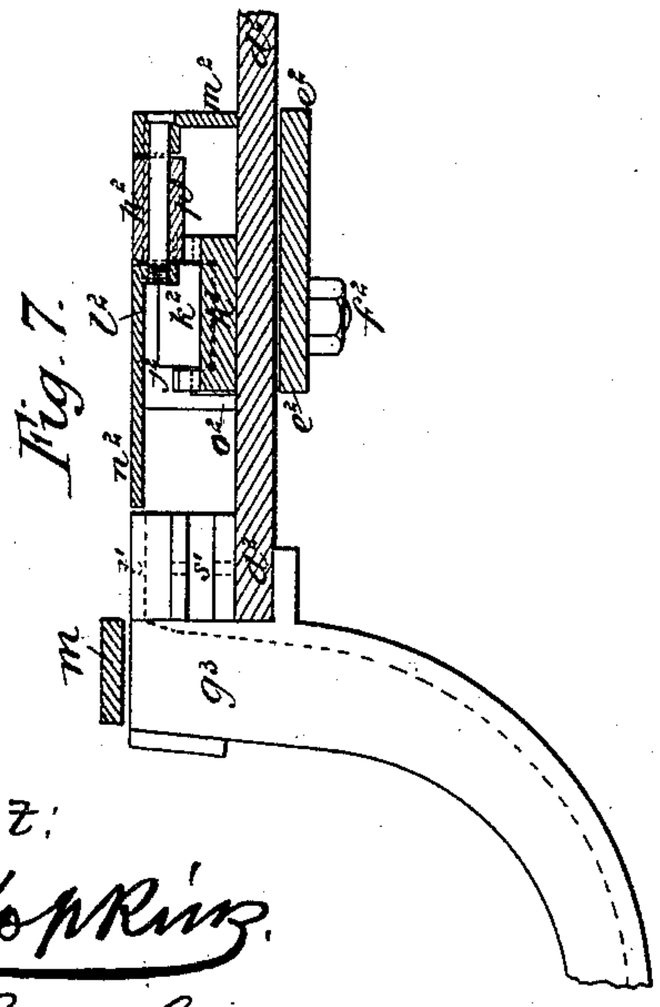

Fig. 7.

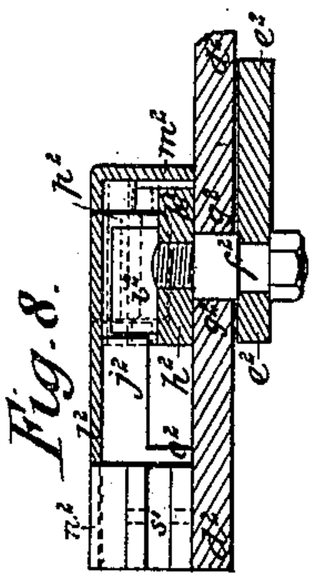

Fig. 8.

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Atty's.

(No Model.) 7 Sheets—Sheet 6.

F. WICKS.

TYPE CASTING MACHINE.

No. 430,051. Patented June 10, 1890.

FIG-16-

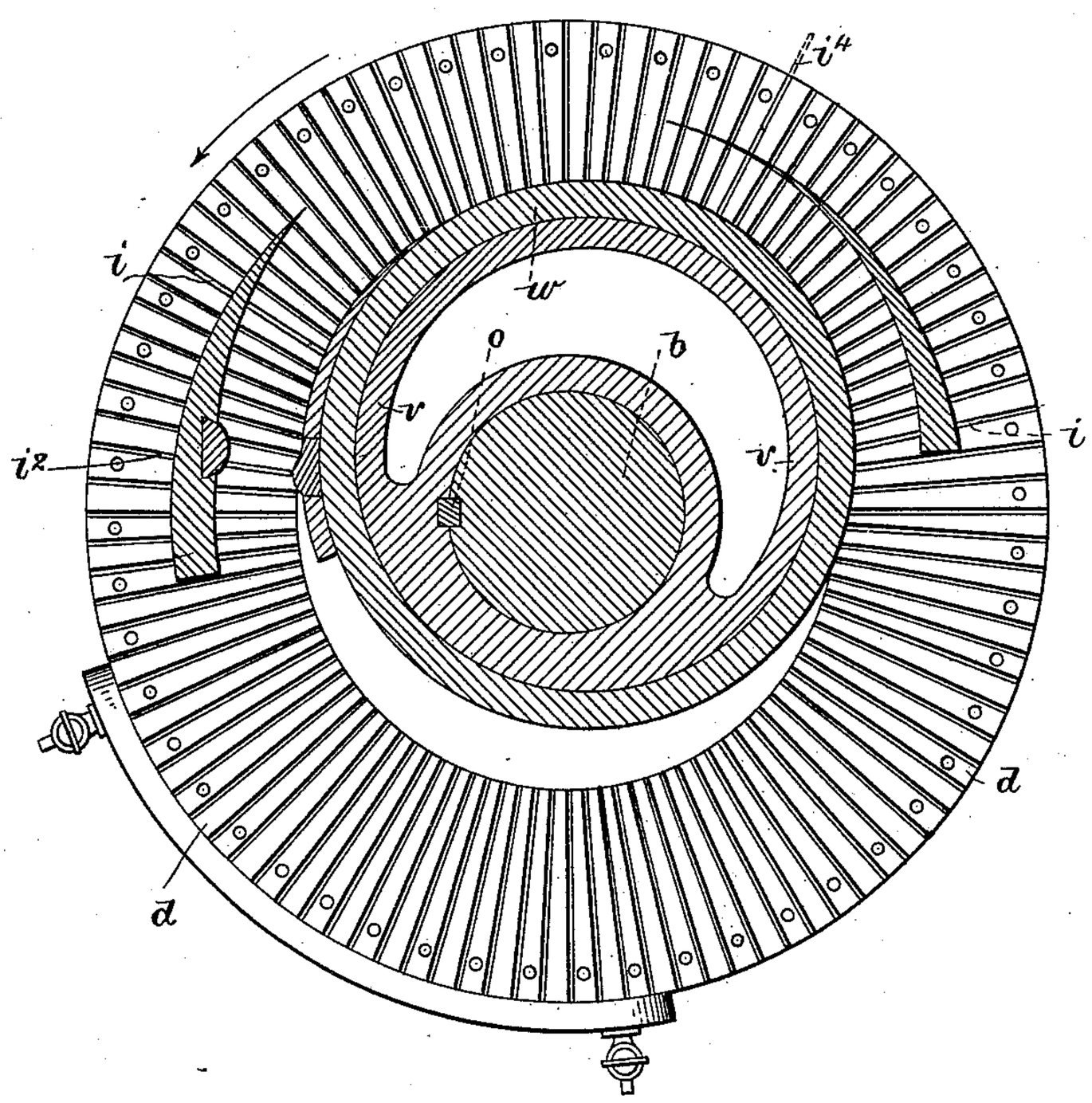
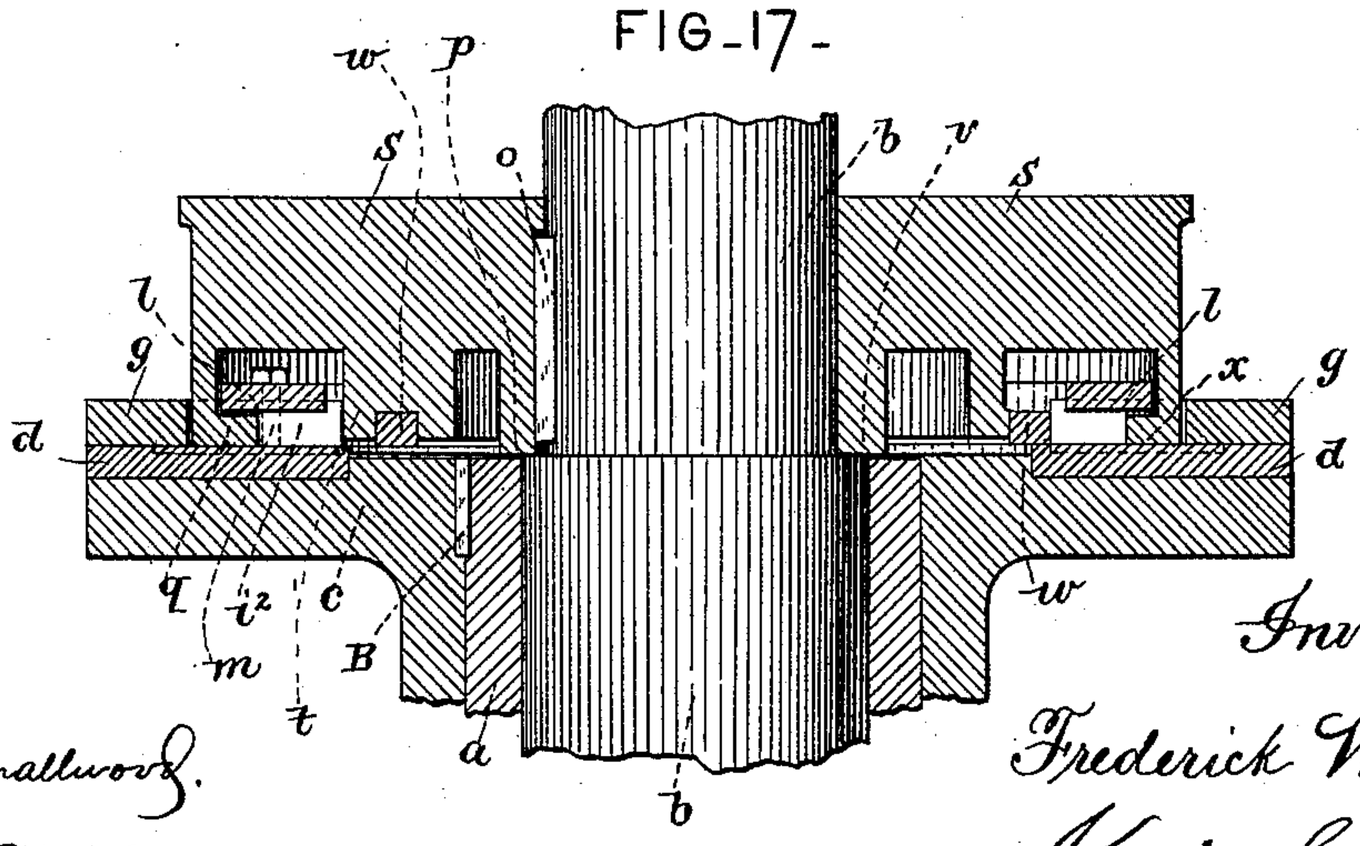


FIG-17-



Attest:

Geo. T. Smallwood.

Geo. L. Wheelock.

Inventor:

Frederick Wicks

By Knight Bros

attys:

(No Model.)

7 Sheets—Sheet 7.

F. WICKS.

TYPE CASTING MACHINE.

No. 430,051. Patented June 10, 1890.

Fig 23.

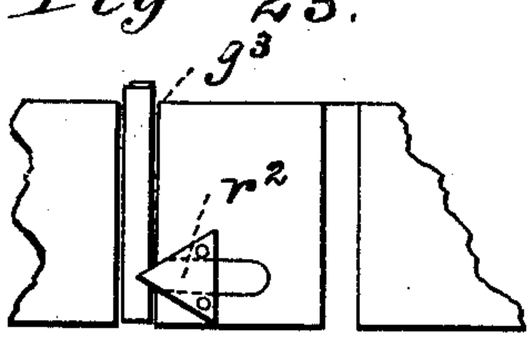


Fig 18.

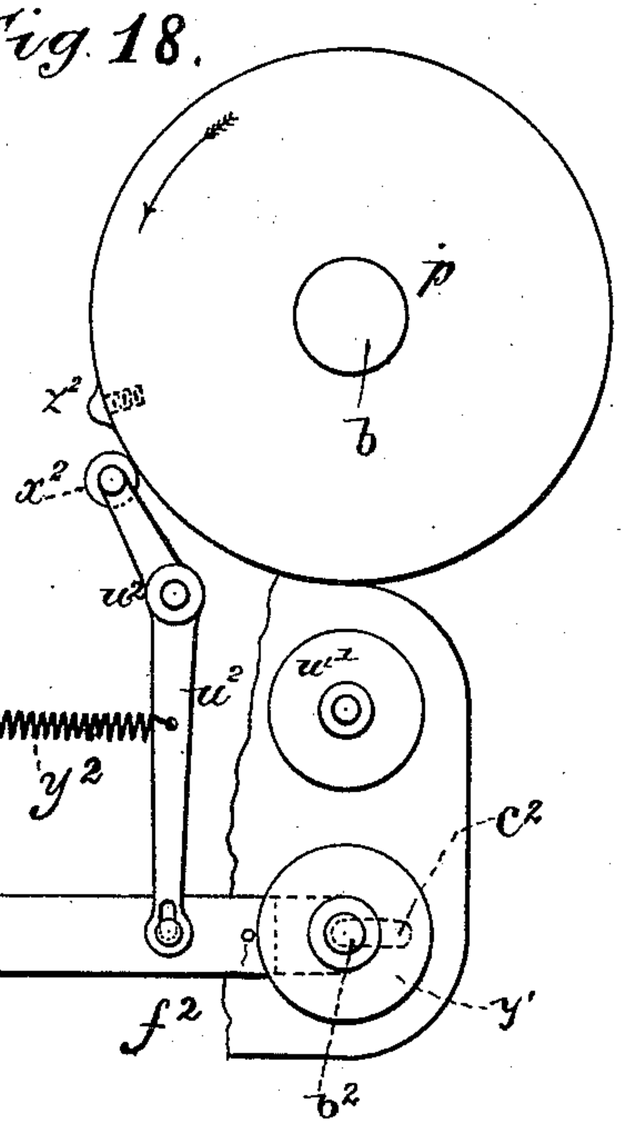


Fig 19.

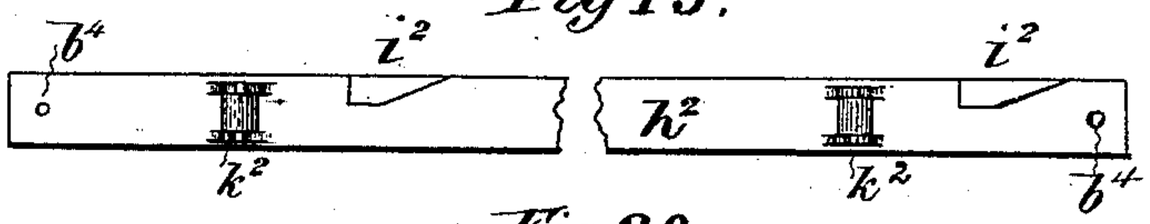


Fig 20.

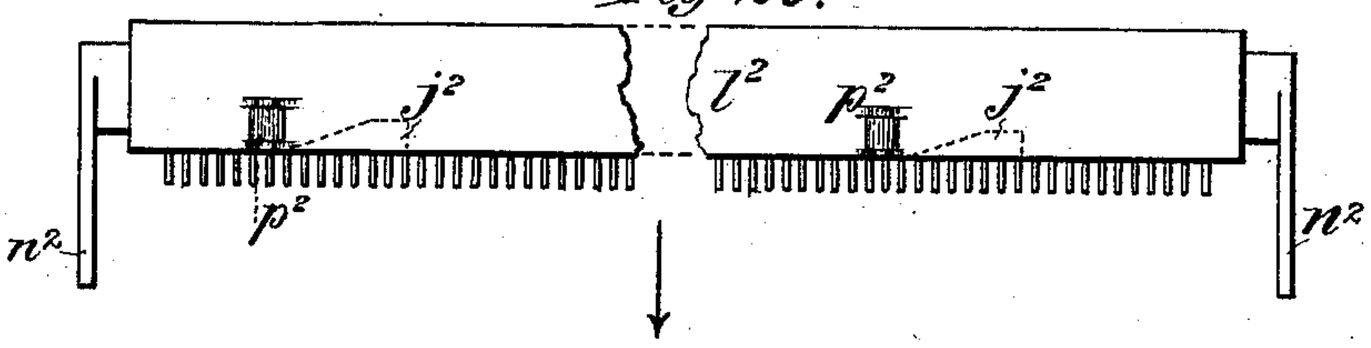
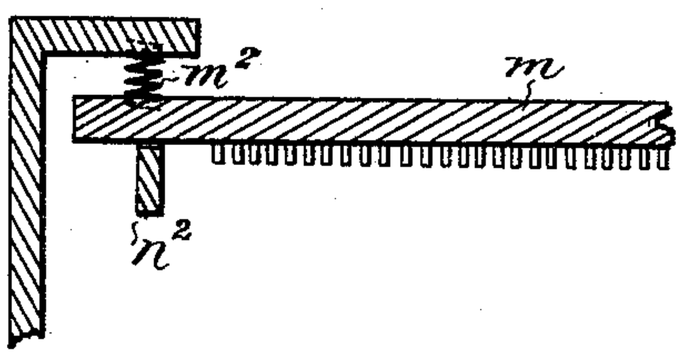


Fig. 21.



Fig, 21,a

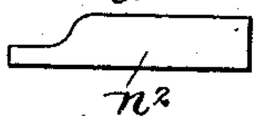
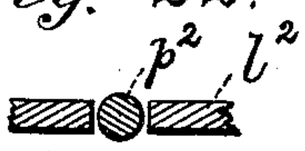


Fig. 22.



Attest:
Geo. T. Smallwood
Walter Allen

Inventor
Frederick Wicks
By Knight Bros. Attys

UNITED STATES PATENT OFFICE.

FREDERICK WICKS, OF GLASGOW, COUNTY OF LANARK, SCOTLAND.

TYPE-CASTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 430,051, dated June 10, 1890.

Application filed April 24, 1886. Serial No. 200,049. (No model.) Patented in England September 25, 1884, No. 12,784; in France July 25, 1885, No. 170,311; in Germany August 4, 1885, No. 34,333, and in Belgium October 3, 1885, No. 70,382.

To all whom it may concern:

Be it known that I, FREDERICK WICKS, newspaper proprietor, of Glasgow, in the county of Lanark, North Britain, have invented Improved Machinery for Manufacturing Type and Means for Collecting the Type therefrom, (for which I have obtained patents in Great Britain, No. 12,784, dated September 25, 1884; in France, No. 170,311, dated July 25, 1885; in Germany, No. 34,333, dated August 4, 1885, and in Belgium, No. 70,382, dated October 3, 1885,) of which the following is a specification.

This invention, which relates to improved machinery for manufacturing type, with means for collecting the type therefrom, is a development of that for which Letters Patent were granted to me, the said Frederick Wicks, No. 280,699, dated July 3, 1883.

This invention consists in the addition of a cam, which I describe as the "cliché cam," and which operates to press the matrix-pistons forward after the mold has received a proper quantity of metal, and so the face of the type is much improved. The word "cliché" is taken from the French, and is applied to cliché casting of stereotypes when the mold is pressed down on nearly congealed metal, so as to secure sharpness. A fixed cam is also connected with the discharge of the types, and is formed the reverse of that of the ejecting-cam. This said fixed cam is provided for the purpose of maintaining the matrix-pistons in their respective positions in the grooves in which they operate, so that they cannot rise out of the said grooves or become bent at the period of their travel at which posterior pressure is applied for the ejection of the types from their molds. There is also a ring of grooves placed above the matrix-pistons and designed to retain them in position with more security.

For the fixed cam formerly used for ejecting the types I substitute a ring working on an eccentric for the purpose of pressing behind the matrix-pistons and so ejecting the cast types. I also vary the arrangements for ejecting the metal into the molds and the transference of the surplus metal back into the pot. The molds are filled by the metal being projected through space before it reaches the molds. I also provide an arrangement for directing the surplus metal back into the pot partly under cover, but not wholly inclosed, and means for shielding the wheel of molds from the flow of surplus metal and for cutting off the heels of type in the liquid.

I carry away the types from the wheel by a chain, which is caused by mechanism to remain stationary opposite places reserved for the reception of the several types, while at the same time the part of the chain next to the wheel of molds continues to move and receive letters from the wheel of molds. The purpose of this mechanism is to permit the removal from the chain of the several letters into their separate receptacles.

In the drawings, Figure 1 is a plan of a wheel of type-molds and its directly-connected parts as constructed according to my present invention, the said Fig. 1 being drawn to a scale smaller than that of Figs. 2, 3, and 4, now to be described. Fig. 2 is a view of the same, partly in side elevation and partly in longitudinal section, the said section being taken on the line A B, Fig. 1. Fig. 3 is a view of the same, partly in front elevation and partly in transverse section, the said section being taken on the line C D, Fig. 1. Fig. 4 is an elevation of a detached portion of the same, showing one (the left-hand) half as complete and the other (the right-hand) half as with its inclosing-plate removed, and all as hereinafter more particularly described. Fig. 4^a is a horizontal section on the line K L, Fig. 4. Fig. 4^b is a detail showing the front portion of the shield detached. Fig. 5 is a plan of the apparatus constructed for collecting the type from the wheel of molds and for discharging the several letters of such type into their separate receptacles, as hereinafter particularly described. Figs. 6 and 7 are respectively a plan and a transverse section, both on an enlarged scale, of a detached portion of the same when in its normal condition, the section being taken on the line E F, Fig. 5. Fig. 8 is a transverse section of the same, taken on the line G H, when the apparatus therein represented has performed its function of discharging the finished type into its receptacles. Fig. 9 is a transverse section of the same, taken on the line I J,

when the apparatus therein represented has been released and is in the act of returning to its normal position. Fig. 10 is a front elevation of a portion of the apparatus as shown at Fig. 9 and hereinafter more particularly described. Figs. 11, 12, and 13 are respectively a plan of the upper side, a front elevation, and a plan of the under side of a detached portion of the table and the endless type-carrying chain constituting a part of my present invention. Figs. 14 and 15 are respectively a front elevation and a transverse section of a modification of a detached portion of the last-mentioned part of my invention. Fig. 16 is a plan of the mold-wheel on a smaller scale, showing in transverse section the position of the various cams above it, the pistons and the rings being removed. Fig. 17 is a transverse section of the same on the line Y Z of Fig. 16. Figs. 18, 19, 20, 21, 21ª, and 22 show portions of the mechanism for transmitting and distributing the type in detail. Fig. 23 is a detail view of the nick-cutter.

In the carrying out of my present invention I arrange the tubular shaft *a* to rotate by any suitably-transmitted motive power about the stationary or fixed shaft *b*.

To the tubular shaft *a*, which I shall hereinafter refer to as the "rotating shaft" *a*, I secure the boss of the circular plate or disk *c*, and to the upper surface of the said disk *c* the steel ring *d* is securely held down by the bolts *e*, Figs. 2 and 3. The upper surface of the ring *d*, in place of having the grooves *f* formed between several segments, as described in my aforesaid patent, is grooved out of the solid, as represented upon the annexed drawings, in lines radiating to the axis of the said ring *d*, the said grooves *f* being of a number corresponding to the number of types to be made by the apparatus. The steel cover ring *g* is, by means of the bolts and nuts *h*, drawn tightly down upon the upper surface of the grooved ring *d*, and thus, by the addition of its under side to the three sides of the grooves *f*, makes up the four longitudinal sides of the molds between which the types are cast. Each of the matrix-pistons *i* operates in one of the grooves *f*, and by its end molds its own particular letter upon the type. These pistons *i*, as hereinbefore described, are guided at their outer or forward ends in the grooves *f*, and beneath the ring *g* and at their inner or rearward ends the said pistons are provided with the vertical blades or projections *j*, (shown more particularly at Figs. 2 and 3,) the upper surfaces or edges of which are guided in the grooves *k*, formed in the under side of the ring *l*. This guide-ring *l* is supported and secured at the required distance from the grooved ring *d* by means of the screwed pillars and nuts marked *m* and *n*, respectively.

The mechanism hereinbefore described constitutes the rotating portion of the type-casting apparatus, and the mechanism hereinafter described constitutes the fixed or stationary portion thereof, by means of the individual cams and other parts of which brought into operation by the relative rotation of the machine the several motions in the process of casting type in such machine are effected.

To the upper reduced or smaller end of the stationary shaft *b*, I secure, preferably by the key *o*, the socket *p* of a casting S, upon which are carried the stationary cams for imparting the several motions to the matrix-pistons *i*. The lower part of this casting S is formed with the cam *q*, Figs. 2 and 16, which draws the matrix-pistons *i* back into the molds *f* into the position necessary for receiving the molten metal forced through the nozzle *r*, (hereinafter described,) and directly opposite which the said cam *q* is situated. The maximum travel which is imparted to the pistons *i* by the cam *q* is determined by the steel block *s*, (represented in dotted lines at Fig. 1 and in full lines in Fig. 16,) which when worn may be removed and another unworn block *s* inserted. This adjustment provides for the casting of type all of the desired length. The pressing forward of the matrix-pistons *i* after the molds *f* have been charged with their proper quantity of molten metal and before such metal has cooled or set, and thereby improving the face of the type, is effected by the cam *t*, (represented in dotted lines at Fig. 1 and full lines, Fig. 16,) which I prefer to describe as the "cliché-cam." This cliché-cam *t* is formed of steel, and is supported in position in the block *u*, which constitutes a portion of the stationary casting S, and from which the said cam *t* may be withdrawn when worn for the insertion of an unworn cliché-cam. The ejection of the cast or finished type from the molds *f* is effected by means of the eccentric *v*, which also constitutes a portion of the stationary casting S. Around the eccentric *v* there is located the ring *w*, which is preferably of wrought-iron and is capable of rotation about the said eccentric *v*. This construction is more fully shown in Fig. 16. The ring *w* and eccentric *v* are of such dimensions and are so located relatively to the revolving matrix-pistons *i* that these pistons are continually forced outward during a portion of their revolution, at which portion they are caused to pass into the recesses or pockets *t'* of the endless type-carrying chain *s'* of the type-collecting apparatus hereinafter described. The ring *w*, being mounted loosely upon the eccentric *v*, is carried round by the friction and pressure of the vertical blades or projections *j* of the matrix-pistons upon the outer periphery of the said ring *w*, and thereby the friction of the rubbing-surfaces is very greatly reduced, because the ring is a smooth free-moving instrument and it is more freely moved in its bed. The heel of the piston would rub on a solid immovable cam at the part at which the posterior pressure is brought to bear upon the matrix-pistons *i* when forcing outward the

finished type unless provision is made for such contingency, and the said pistons *i* would be forced out of their grooves or become bent. It is in order to prevent or secure against such accidents that I employ the cam *x*. This fixed cam *x* is formed as a part of the stationary casting S, as shown more particularly at Figs. 3 and 16 of the annexed drawings, and its under surface is close down upon the upper or exposed surface of the matrix-pistons *i*, so that they are thereby prevented from rising in their grooves *f*.

In Fig. 16 are shown in dotted lines four of the matrix-pistons i', i^2, i^3, and i^4 in their different positions. The piston i' is in the act of being drawn back by the stationary cam *q*, the wheel being moved in the direction indicated by the arrow. The piston i^2 is represented as having been withdrawn to its full extent by the apex of cam *s* and the mold ready to receive the type metal. The heel of the piston at this point is about to be acted upon by the cam *t*. The ejecting-ring *w*, which works loosely on the eccentric *v*, is not at this point operating on this particular piston, but is acting on piston i^3, which has begun to impinge against the same. The heel of piston i^3, having been carried around to the opposite side of the machine, comes, as stated, in contact with ring *w*, and is pressed outward and passed along the groove in the mold, and the type is thus forced from the mold. The cam X being in close contact with the arm of the matrix-piston at this point, it enables the piston to bear the pressure of the ring *w*. This operation continues during the movement of the mold-wheel, the pistons being drawn in by the cam *q* and forced out by cams *t* and eccentric *v*.

At its upper part the stationary casting S carries the slide-rest *y*, which may be traversed longitudinally thereon by means of the screw *z* and hand-wheel a', secured to its outer end.

The vertical plate b' of the adjustable slide-rest *y* is faced on its inner surface with a steel plate c', which, together with the plate b', I designate the "shield." The exposed face of the steel plate c' is truly surfaced to the contour of the outer peripheries of the plate or disk *c* and its connected rings *d* and *g*, which rotate in close contact therewith. To the outer face of the plate b' of the slide-rest the frame d' may be bolted, as shown upon the annexed drawings, but is preferably placed in contact therewith by being suspended on a pin from which it is easily removable. This frame, as shown more particularly at Figs. 2 and 4 of the annexed drawings, is closed in at its vertical and upper sides, but left open at its lower side. The upper side of the frame d' is formed with the V-shaped projection e', which extends downward into the interior of the space inclosed on three sides by the said frame d'. The longitudinal continuity of the projection e' is preserved or maintained through the tapered orifice f', formed in the shield b' and c', by the V-shaped projection g', which is formed of steel, and is secured to the back of the frame d', the said orifice f' being formed in the shield b' and c' at the same level as that of the molds *f*.

The front of the frame d' is closed in by the steel plate h', which is secured thereto by screws i' or otherwise, and is provided with the aperture j', Fig. 4, for the introduction therein of the nozzle *r*. This nozzle *r* constitutes the points of delivery of the molten metal from the pumps or other apparatus employed to impart to it the necessary velocity, the said nozzle being secured to the end of the movable delivery-pipe l', Figs. 1 and 2. The nozzle may therefore be withdrawn from the aperture j'. After the withdrawal of the nozzle *r* from the said aperture j' the shield may, when required, be removed out of contact with the periphery of the circular plate or disk *c* by turning the screw *z* and hand-wheel a' in the proper direction, so that access may be had to the parts adjacent thereto. The nozzle *r* and its directly-connected parts are supported upon the plate m', Fig. 2, which forms part of the melting-pot, (not represented upon the annexed drawings,) and the obliquity of the plate m' serves to return the surplus metal directly into the said melting-pot in a liquid state.

In order that the wheel of molds may be kept cool, I provide the water-casing n', having its inlet at p' and its outlet at o', Fig. 16. This casing n', which is supported by the brackets q', secured to the base of the stationary casting S, is preferably formed of copper, has a constant flow of cold water through it, and thereby abstracts much of the heat from the cast type passing along its surface.

The countersunk holes r', Fig. 1, through the guide-ring *l* are provided for the application of lubricating material to the rubbing-surfaces of the matrix-pistons.

With reference to the type-collecting apparatus represented on Sheet 4 of the annexed drawings, a portion of the said apparatus is arranged to travel in a direction concentric with the motion of the circular plate or disk *c*, Figs. 1, 2, and 3, and its directly connected and operating parts, the relative position of such plate or disk *c* being indicated at P in the said Fig. 5. The portion of the circumference of the "wheel of molds" thus presented to the type-collecting apparatus is that part where the type is forced out of the molds *f*, or, more definitely speaking, outside that part whereat the reciprocating cam *x* is situated.

The type-collecting apparatus consists of an endless chain by which the type ejected from the casting-machine is received and from or out of which it is ejected into the separate receptacles set apart for each letter. A portion of this type-carrying chain is represented on an enlarged scale at Figs. 11, 12, and 13 in plan of upper side, in elevation, and in plan of under side, respectively. Each of the

links s', the number of which in the said endless chain is a multiple of the number of the molds f, Fig. 1, is formed with a recess or pocket t', preferably with its two sides curved or widened out at one of its ends. These recesses or pockets t' are of a size to admit of the type being easily and readily slipped in and out longitudinally, and may be formed of any required width to accommodate large or small type, an example of such provision for a large or double-letter type being shown on a reduced scale at u', Fig. 5. The links s' of the chain are pivoted together by the pins v', which pass through the connecting projections of such links. The endless chain of links s', when in the position shown at Fig. 5, passes partly around the peripheries of the sprocket-wheel w' and of the pulleys marked x', y', z', and a^2, respectively. The sprocket-wheel w' is that by which the endless chain is operated, the teeth of the said wheel w' engaging with the angular recesses formed by and between every pair of the links s'. This sprocket-wheel w', which is operated by toothed or other equivalent gearing (not represented upon the annexed drawings) carried by the tubular rotating shaft a, Figs. 2 and 3, or by other means, is driven at a surface speed corresponding to that of the wheel of molds P, so that as each recess or pocket t' of the links s' leaves the pulley x' it is presented to the outer end of one of the grooves f, Fig. 1, and is accompanied thereby at an equal rate of travel until it reaches the sprocket-wheel w', from which the course of the said chain is diverted toward the pulley y'. This pulley y' and the pulley z' are each pivoted on a short vertical shaft b^2, each of which shafts b^2 passes down through a slot c^2 (represented in dotted lines) in the table d^2, and is secured at its lower end in the bar e^2. This bar e^2, which is represented more particularly on an enlarged scale at Figs. 7 to 10 and 18, carries the two or more pillars f^2, which pass upward through the slots g^2 (represented in dotted lines at Fig. 5) in the table d^2, and at their upper ends are screwed, as shown at Fig. 8, or otherwise connected to the bar h^2. The bar h^2 carries the two or more cams i^2, the oblique surfaces of which bear upon the corresponding surfaces of certain cams j^2, (described below,) and the bar h^2 is also provided with bearings, which support the two or more rollers k^2. The cams j^2, herein last referred to, are secured to the under side of the plate l^2, the back of the said plate l^2 being preferably bent down, as shown at m^2, to form a continuous foot or support, while the forward edge thereof is formed with the prongs n^2 in the form of a comb, by reason of which analogy I hereinafter refer to the said construction as the "ejecting-comb." The cams j^2 may be formed in one piece, with the vertical plates o^2, or the ejecting-comb, may be provided with other feet to support it at its forward part. By the movement of the bar h^2 in the direction of the arrow the wedge-shaped piece i^2 comes in contact with the wedge-shaped pieces j^2 on the under side of plate l^2 and causes it to advance in the direction of the arrow, Fig. 20, and thus forces the prongs of the comb into the type-spaces in the chain s', ejecting the type therefrom, which pass into the stationary receptacles g^3, Fig. 7. The ejecting-comb carries at its under side the rollers p^2, which correspond in number to the number of rollers k^2 employed, and the plate l^2 of the said comb is perforated to admit of the easy rotation of the rollers p^2. When the bar h^2 has advanced to the extent of the width of the wedges i^2 and j^2, the teeth of the comb will have completed their work and the rollers k^2 will have been brought under the rollers p^2. The plate l^2 will be lifted out from the control of the wedges and will be returned to its normal position by the action of spring t^2. To the back plate m^2 of the ejecting-comb two or more screwed rods q^2 are secured, and between the nuts r^2 on these and the fixed guide-blocks s^2, through which they pass, the springs t^2 exert their influence, so that the tendency is always to draw the ejecting-comb nearer to and against the guide-blocks s^2. For the longitudinal operation of the bar e^2 it is connected to the lever u^2 by the pin v^2, which passes into and engages with a slot formed in lever u^2, as represented in Figs. 5 and 18. This lever is pivoted at w^2 to the under side of the table d^2, and at its nearest or shortest end is provided with the anti-friction roller x^2, the periphery of which is, by the tension of the spring y^2, maintained in the position in which it is represented at Figs. 5 and 18 until forced backward by the cam z^2. This cam z^2, which is carried by the tubular rotating shaft a, Figs. 2 and 3, or otherwise, is of such proportions relatively with the proportions of the lever u^2 that the bar e^2 is moved in the direction indicated by the arrow a^3 at a rate of travel the same as the rate of travel in the opposite direction of the links s', composing the endless type-carrying chain. It therefore stands to reason that while the bar e^2 and its connected pulleys y' and z' are so moving in the opposite direction to that of the endless chain they neutralize the travel of that portion of the said chain which is stretched between the two said pulleys y' and z', the chain at this particular part being brought to rest relatively to table d^2 and receiver g^3.

The pulley a^2 is carried upon a short shaft b^3, which is fitted in guide-blocks and which is drawn upon by the spring c^3, the degree of tension of which may be adjusted by the nut d^3, or the endless type-carrying chain may be maintained taut by any other suitable tension device.

The number of links s' contained in the endless type-carrying chain should preferably be a multiple more than two of the number of grooves or type-molds f, Fig. 1, (that on the annexed drawings being represented as of

the proportion of three to one,) so that each recess or pocket t' is always presented to its own particular groove or mold f.

In the event of any of the type passing into the recesses or pockets t' of the collecting apparatus being of an irregular length the ends of such types are trimmed off by means of the rotary cutter-disk e^3, the face of which is finely cut, the operation of which may be effected by any convenient means. During this "dressing" the lettered or figured ends of the type are traveling across and bear upon the truly and smoothly faced plate f^3, projecting from the table d^2, which thus insures the type being all of uniform length. The prongs n^2 of the ejecting-comb are slightly rounded or tapered off toward their points, so as to facilitate their passage into the recesses or pockets t' for the ejection therefrom of the type. The type in this manner ejected passes into separate receptacles or grooves g^3, which conduct the said type down to a level table of grooves. The type when placed upon the last preceding letter ejected from the traveling chain is pressed downward by bar m, which descends upon them by pressure of spring m^2 and remains in that position until the next advance of the comb, when it is raised by the cam-formed arms n^2 of the comb, Figs. 21, 21[a], and 22, to allow of the next delivery of type through the curved grooves g^3.

In the combined operations of the separate functions of the type casting and collecting apparatus the molten or liquid metal which is forced by pumps or otherwise through the nozzle r charges with great velocity across the space partly inclosed by the frame d' in one continuous and unbroken stream, it being, however, so arranged that the maximum power of the pump-stroke may be synchronous with the presentation of each of the molds or grooves f, Fig. 1, to the aperture f' in the shield c'. The molten or liquid metal is in this way charged directly into all the molds in succession, while the said molten or liquid metal not carried away by the molds falls in part down the oblique surface of the orifice f', and in part rebounds right and left after contact with that position of the periphery of the ring d which presents itself at the orifice f'. The rebounding right and left of the surplus metal is effected by the V-shaped edges, and thus the partially-cooled metal so rebounding does not interfere with the stream of hot metal propelled across to the molds f, but falls down at either side of the said stream and is repassed by the plate m' into the melting-pot. The metal charged into the molds f is compressed endwise by the action of the cliché-cam t, and thereby the face of the type is much improved. The type in the molds f is then conducted in front of the water-casing n', which thereby facilitates the setting of the metal and the cooling of the type. The type is then gradually forced out from the molds f by the rotation of the matrix-pistons i, causing the inner or rear edges of their projections or vertical blades j to bear upon the outer surface of the eccentrically-mounted ejecting-ring w. During the time the said type is being so forced gradually out of the molds f it is gradually being pressed into the recesses or pockets t' of the endless type-carrying chain of the collecting apparatus, in which it is thereafter dealt with. Should there be any variation in the length of the type at this stage, such variation is removed by the rotary cutter e^3 dressing up the "feet" of such long type. The type then being in the recesses or pockets t' of the endless chain passes between the pulleys y' and z', and when the cam z^2 operates the lever u^2 at the proper time the said type and chain at this part are at rest relative to bed d^2. The longitudinal motion of the bar e^2 to effect this inaction, and consequently the longitudinal motion of the bar h^2, which is secured to the bar e^2, causes the ejecting-comb to be moved forward by virtue of the obliquity of the faces of the cams i^2 and j^2. In being so moved forward the prongs n^2 of the ejecting-comb push the type out of the recesses or pockets t' and into the receptacles g^3, by which the said type is conducted down to any required table. The prongs n^2, having arrived at their maximum forward travel, are then released from their recesses or pockets t' by the continuance of the travel of the bar h^2, carrying the rollers k^2 under the rollers p^2, and thereby causing the ejecting-comb to ride upward. The prongs being thereby released, the endless chain is enabled to move onward, and the other parts of the mechanism are returned to their normal position by the action of the springs t^2 and y^2.

Should it be desired, in place of arranging the type in the receptacles g^3 and ultimately upon the grooved tables side by side, as hereinbefore described, to arrange the said type at right angles to such direction—that is to say, with the bottom of one letter resting upon the top of the next letter—I provide grooves or receptacles suitable to the width of the letter to be received, and the upper ends of which are curved in a direction parallel to the adjacent portion of the endless type-carrying chain, while the lower ends of such receptacles are curved in a direction at right angles to the said chain. A detached portion of such mechanism I have represented on Sheet 3 of the annexed drawings in front elevation at Fig. 14 and in transverse section at Fig. 15. Under this form of construction the type ejected from the pockets or recesses t' of the endless chain s' rests upon the surface h^3, the bar i^3, with its connected projections j^4, being at the time in the respective position in which it is represented at Fig. 14 of the annexed drawings. The bar i^3 then moves longitudinally and parallel to the endless chain, and by its projections j^4 sweeps the type sidewise down into the receptacles k^3, by which it is conducted onto suitably-grooved

tables. The projections j^3 prevent the type being carried past the openings or receptacles k^3.

Should it be desired to form a nick in the type, this can be effected by fixing a knife or cutter r^2, somewhat of the nature of a planing-tool, at the exit of the grooves or receptacles g^3 or k^3, and so located that by the drawing past of any of the types the said knife or cutter removes the fragment necessary to form the nick, as shown in Fig. 23.

I claim—

1. In a type-making machine, the combination of a rotary mold-wheel provided with matrices, pistons in the matrices, a pump-nozzle through which the molten metal is ejected into the matrices, and a fixed clichécam which acts on the pistons at the proper time to compress the type-metal when in a semi-molten state immediately after injection, substantially as set forth.

2. In a type-making machine, the combination of a mold-wheel provided with matrices, a shield constructed of plates b' and c' having a single orifice f', and the frame d', provided with a closing plate, a pump-nozzle through which there is a continuous and uninterrupted flow of metal projected through an orifice in the closing plate and through the orifice f', and mechanism for causing the matrices of the mold to continuously and uninterruptedly approach the orifice f', substantially as and for the purpose set forth.

3. In a type-making machine, the combination of the mold-wheel provided with matrices, type-pistons i, plate b', constructed with an orifice and fixed so that the latter will register with said matrices, means for supplying molten metal to said mold-wheel, and cam s, for acting on the pistons to enable the type-metal to be compressed when in a semi-molten state immediately after injection, substantially as and for the purpose set forth.

4. In a type-making machine, the combination of a mold-wheel provided with type-pistons reciprocating in its matrices, an eccentric v, and a ring w, mounted loosely upon and free to rotate about the eccentric, said ring being adapted to impinge upon the type-pistons and eject the types, as and for the purpose set forth.

5. In a type-making machine, the combination of a mold-wheel provided with type-pistons, means for ejecting the type therefrom, and a cam x, fixed above the pistons beyond the means for ejecting the type for maintaining the pistons in position within the molds when the type are being ejected, substantially as and for the purpose set forth.

6. The combination, in a type-making machine, of a type collecting and distributing device consisting of an endless chain having transversely-grooved links, means for forcing the type laterally out of the links, and receptacles for receiving the type after they have been forced from said chain, substantially as set forth.

7. The combination, in a type-making machine, of a type collecting and distributing device provided with an endless chain composed of grooved links, a shaft, a cam z^2, carried by said shaft, pivoted lever u^2, operated by said cam, bar e^2, connected with said lever, and pulleys y' and z' at each end of said bar, and their attachments for neutralizing the travel of a portion of such chain, substantially as and for the purpose set forth.

8. The combination, in a type-making machine, of a type collecting and distributing device provided with an endless chain composed of grooved links, means for neutralizing the travel of a portion of such chain, and means for ejecting the type from the grooves of the links, consisting of an ejecting-comb having prongs n^2, cams i^2 and j^2, for operating the comb, and rollers k^2 and p^2, for releasing the comb, all substantially as and for the purpose set forth.

In testimony whereof I have signed my name to this specification in presence of two subscribing witnesses.

FREDERICK WICKS.

Witnesses:

JOHN LIDDLE,

JOHN G. CLARK,

Both of 115 *St. Vincent Street, Glasgow.*