

No. 662,858.

Patented Nov. 27, 1900.

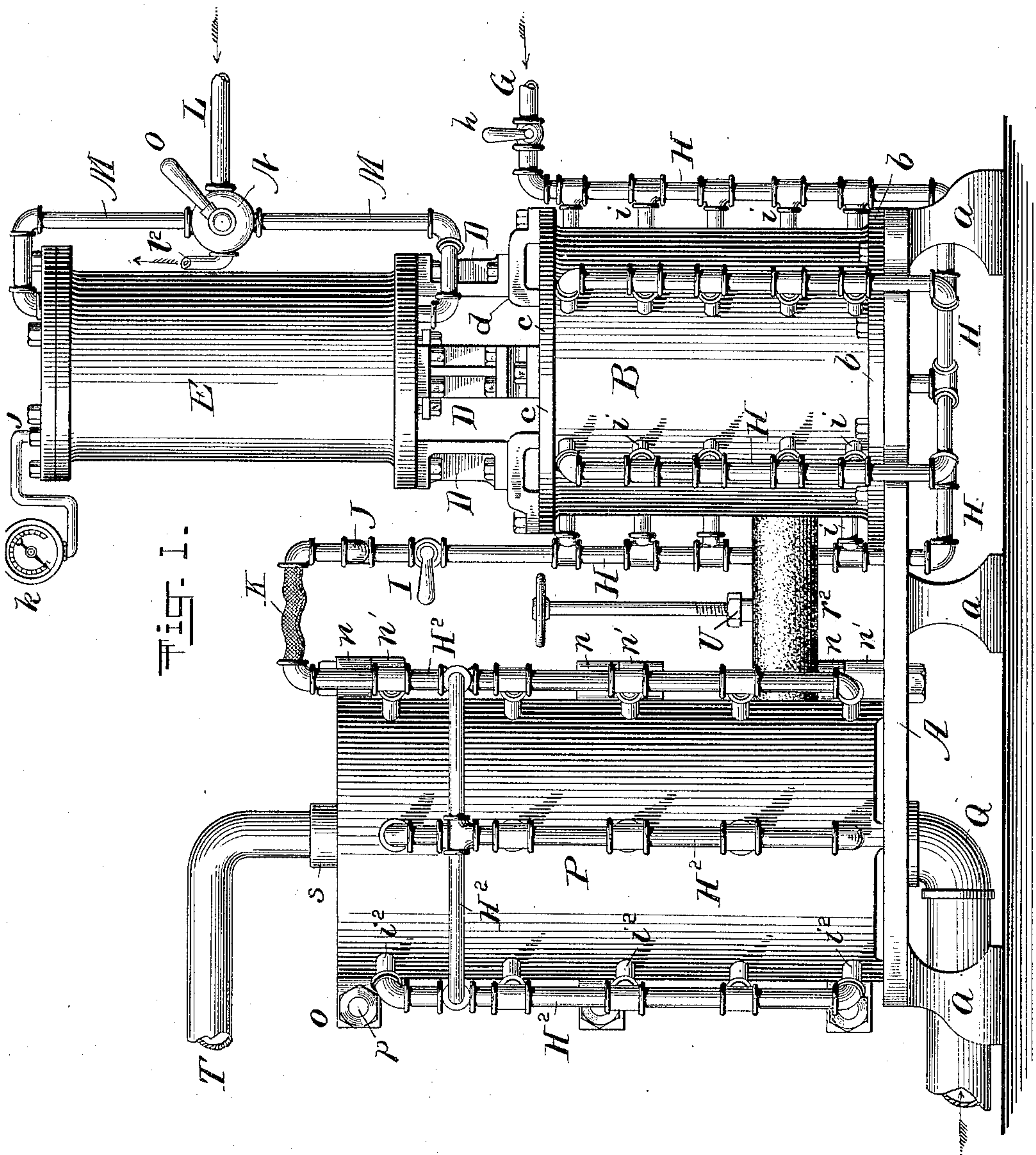
E. HETT.

MACHINE FOR CASTING PRINTING CYLINDERS.

(Application filed Apr. 6, 1899.)

(No Model.)

6 Sheets—Sheet 1.



WITNESSES:

F. N. Roehrich
Geoffrey

INVENTOR

Edward Hett

BY

Kerrym & Kerrym
ATTORNEYS

No. 662,858.

Patented Nov. 27, 1900.

E. HETT.

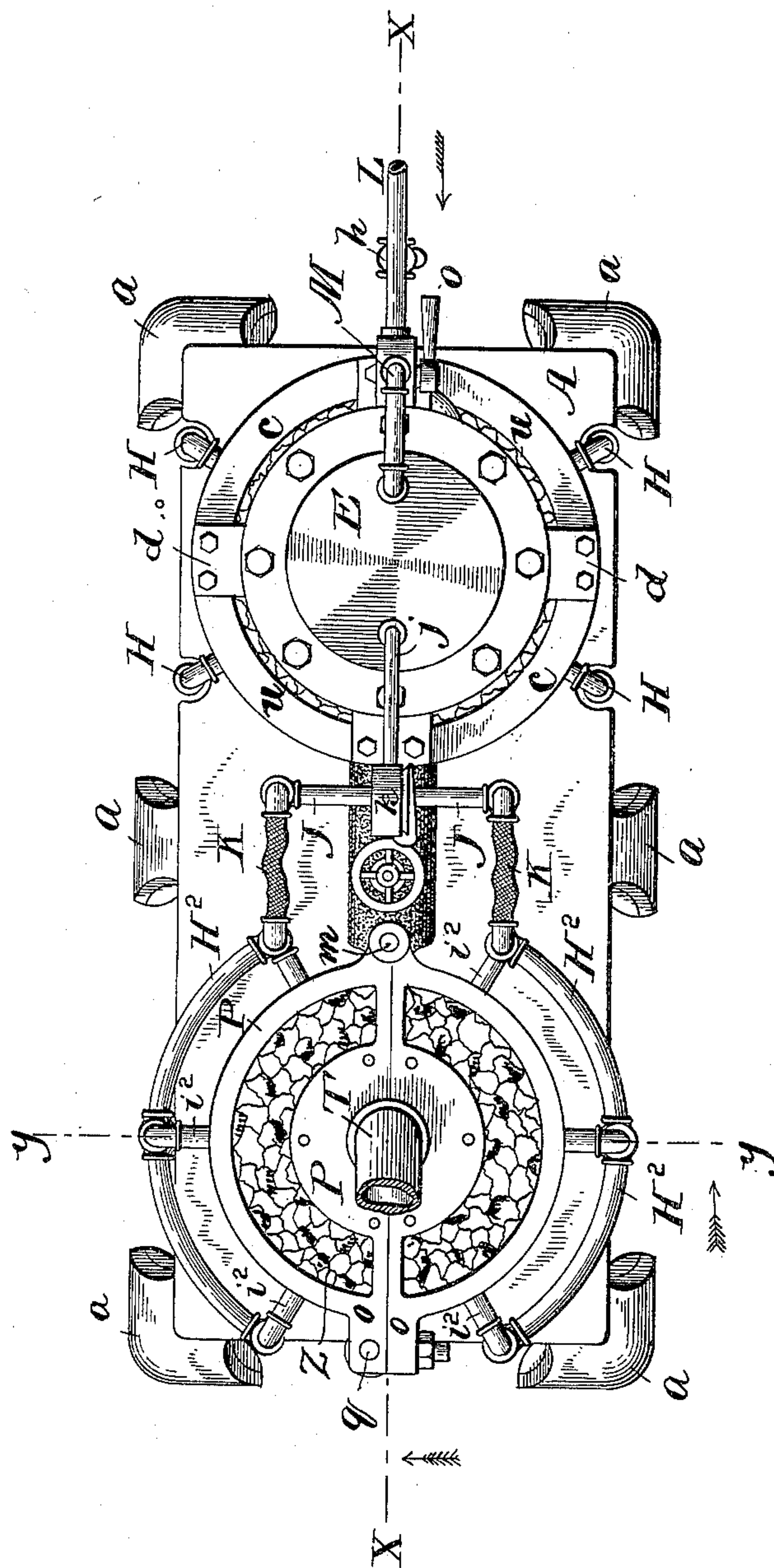
MACHINE FOR CASTING PRINTING CYLINDERS.

(Application filed Apr. 6, 1899.)

(No Model.)

6 Sheets—Sheet 2.

Fig. 2.



WITNESSES:

F. N. Rockrich
Leeds & Co.

INVENTOR

Edward Hett

BY

Kemp & Kemp
ATTORNEYS

No. 662,858.

Patented Nov. 27, 1900.

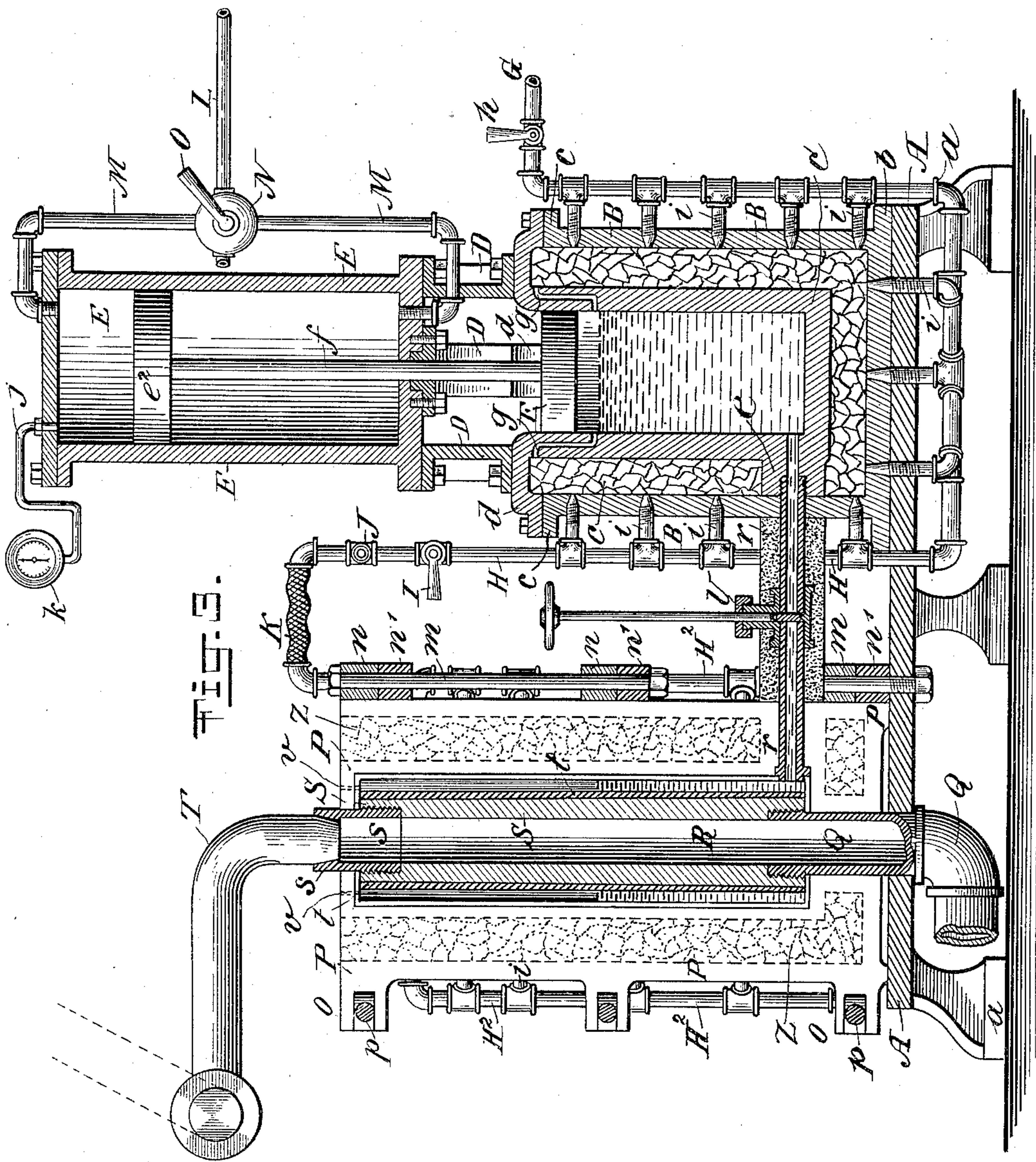
E. HETT.

MACHINE FOR CASTING PRINTING CYLINDERS.

(Application filed Apr. 6, 1899.)

(No Model.)

6 Sheets—Sheet 3.



WITNESSES:

F. N. Roebuck
Scott & Willing

INVENTOR

Edward Heitt

BY

Kennedy & Kennedy
ATTORNEYS

No. 662,858.

Patented Nov. 27, 1900.

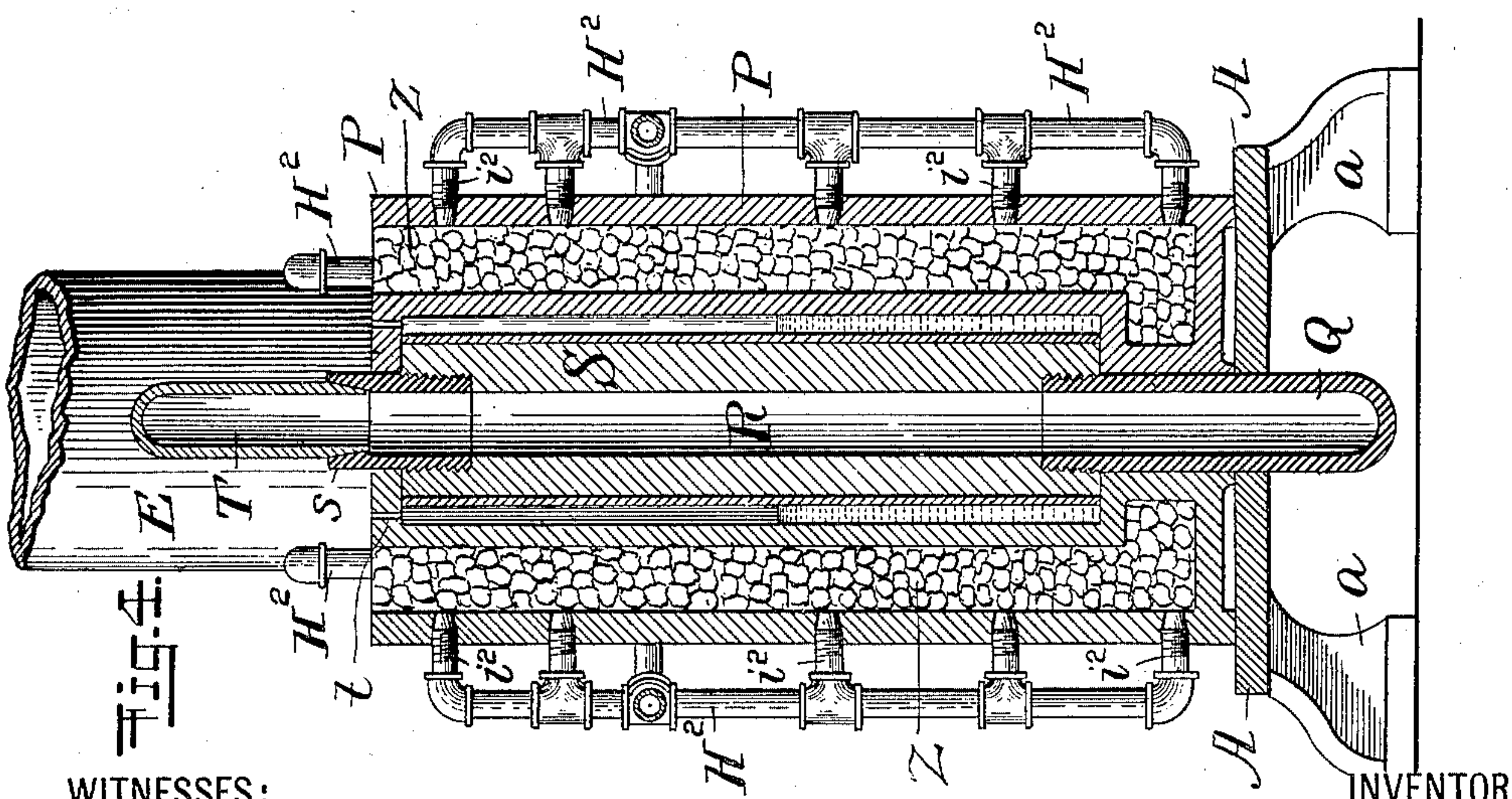
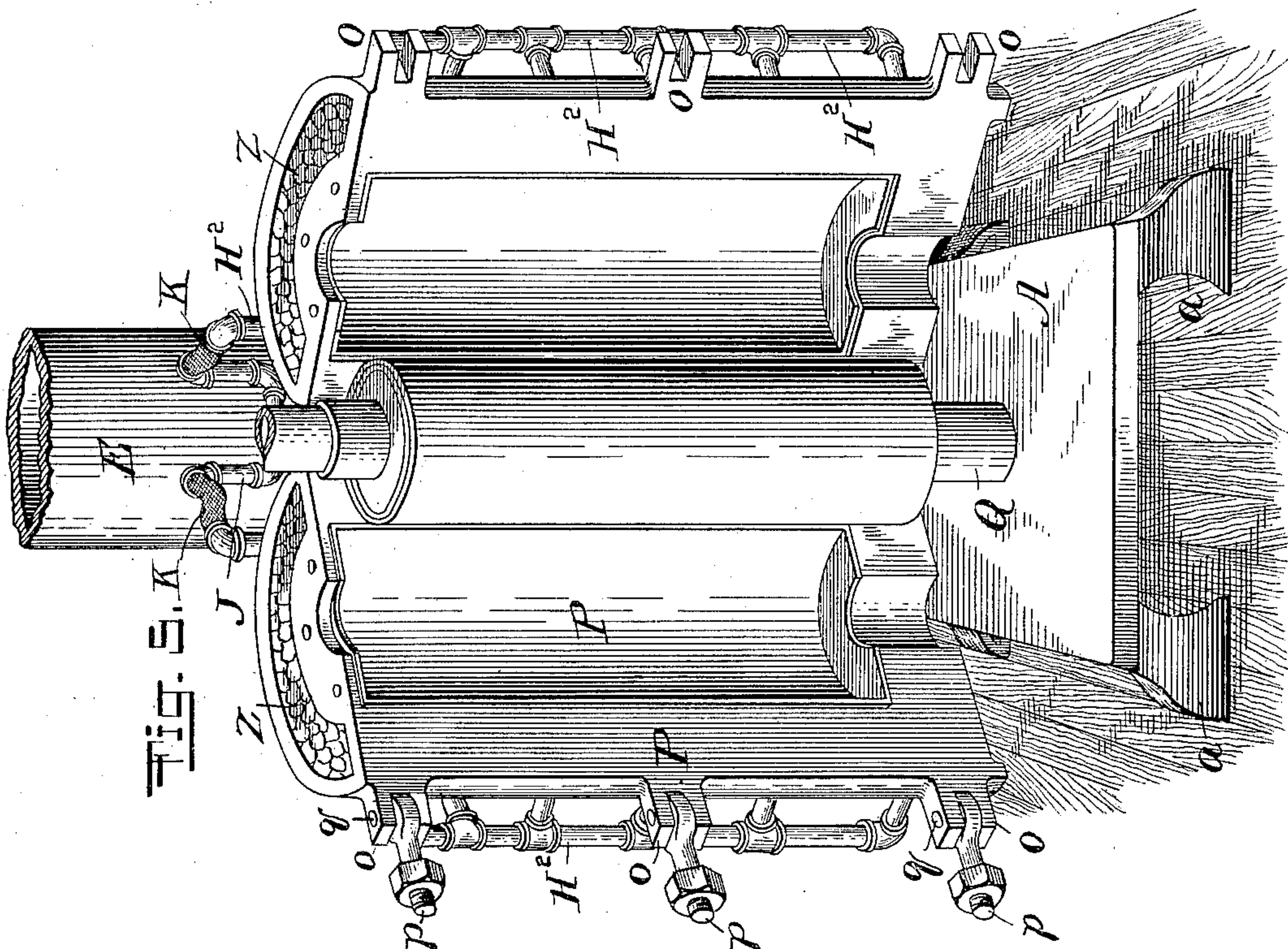
E. HETT.

MACHINE FOR CASTING PRINTING CYLINDERS.

(Application filed Apr. 8, 1899.)

(No Model.)

6 Sheets—Sheet 4.



WITNESSES:

F. N. Roehrich
Leeds & Co.

INVENTOR

Edward Hett

BY

Kennedy & Kennedy
ATTORNEYS

No. 662,858.

Patented Nov. 27, 1900.

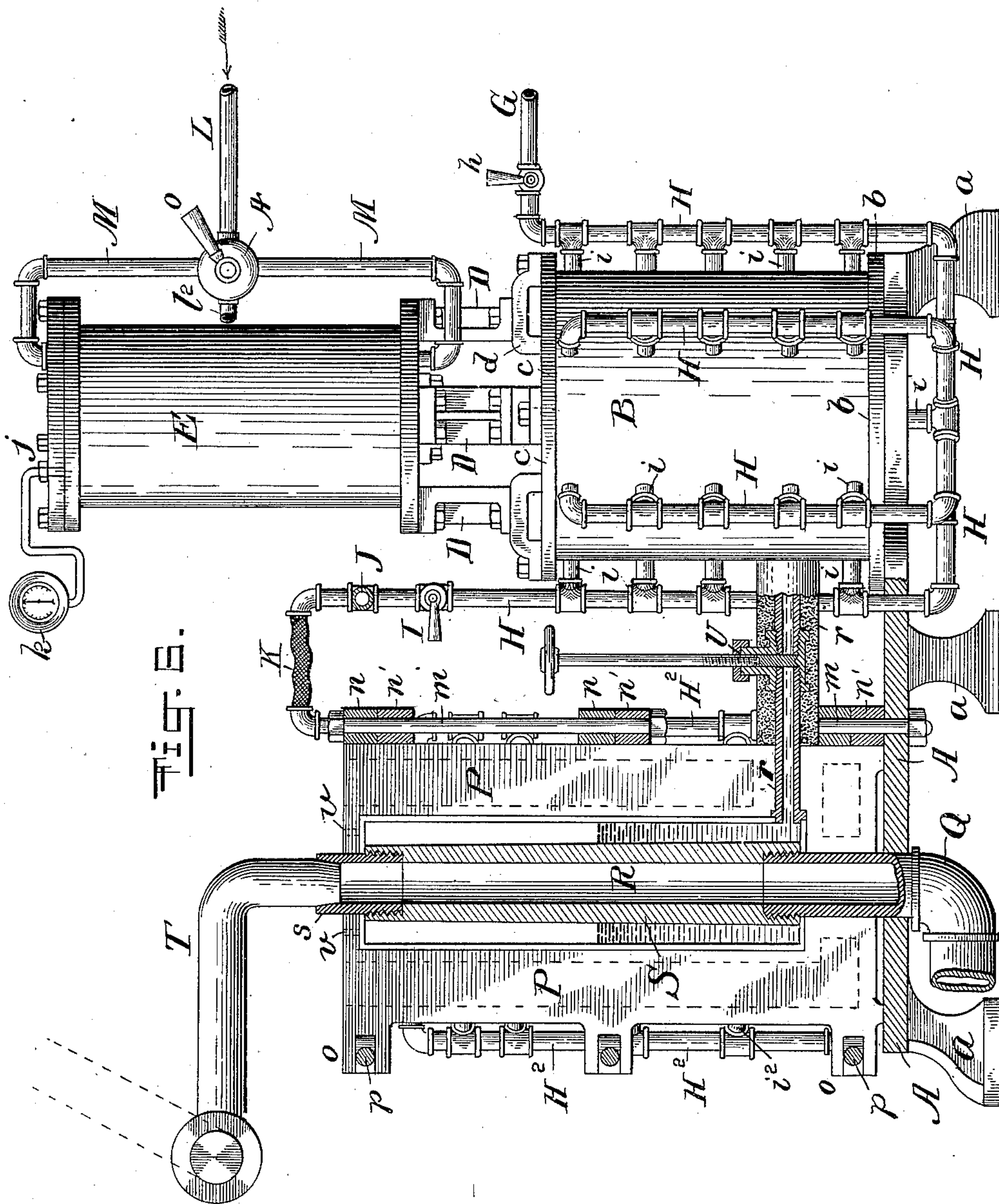
E. HETT.

MACHINE FOR CASTING PRINTING CYLINDERS.

(Application filed Apr. 6, 1899.)

(No Model.)

6 Sheets—Sheet 5.



WITNESSES:

F. N. Roehrich
Scott & McMillan

INVENTOR

Edward Hett

BY

Kerny & Kerny
ATTORNEYS

No. 662,858.

Patented Nov. 27, 1900.

E. HETT.

MACHINE FOR CASTING PRINTING CYLINDERS.

(Application filed Apr. 6, 1899.)

(No Model.)

6 Sheets—Sheet 6.

Fig. 6.

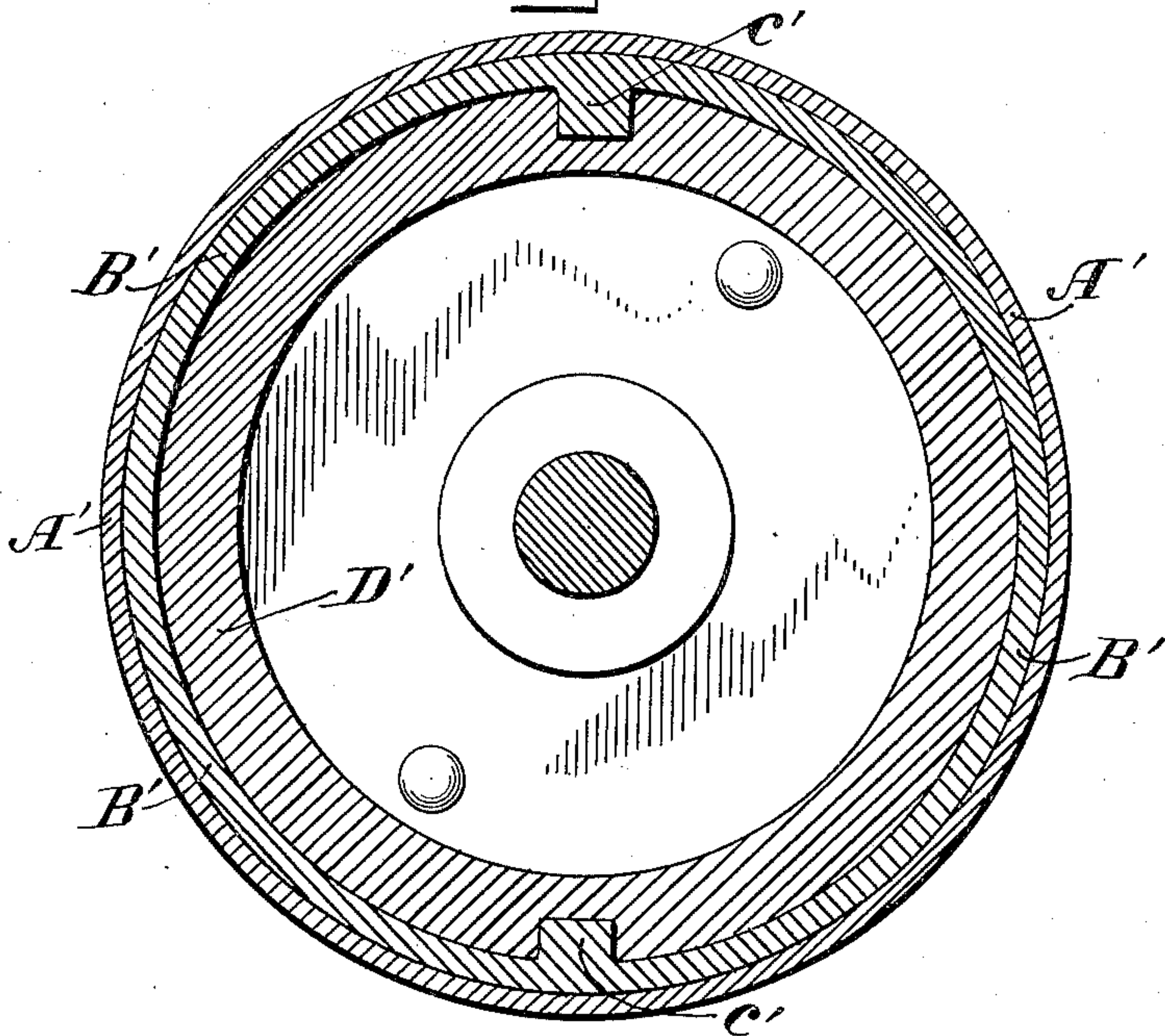
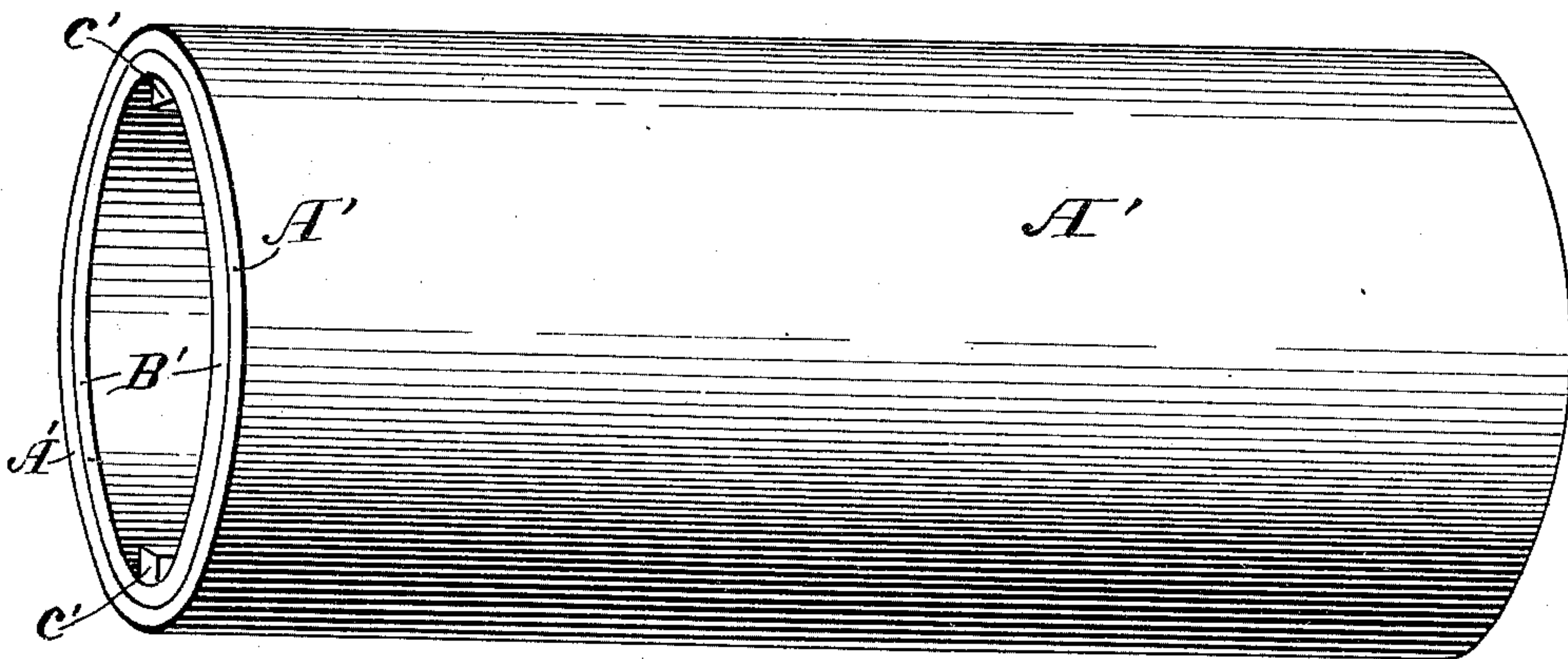


Fig. 7.



WITNESSES:

F. N. Roehrich
Geo. W. Milby

INVENTOR

Edward Hett

BY

Kenny & Kenny
ATTORNEYS

UNITED STATES PATENT OFFICE.

EDWARD HETT, OF NEW YORK, N. Y.

MACHINE FOR CASTING PRINTING-CYLINDERS.

SPECIFICATION forming part of Letters Patent No. 662,858, dated November 27, 1900.

Original application filed January 5, 1899, Serial No. 701,196. Divided and this application filed April 6, 1899. Serial No. 711,992. (No model.)

To all whom it may concern:

Be it known that I, EDWARD HETT, a citizen of the United States, residing at New York, (New Dorp,) in the county of Richmond and State of New York, have invented certain new and useful Improvements in Machines for Casting Printing-Cylinders, of which the following is a specification.

My invention relates to a casting-machine or apparatus adapted more especially to the casting of printing-cylinders, such as are employed in carrying into effect an invention of mine in the art of printing, which constitutes the subject-matter of another application by me, Serial No. 701,196, filed January 5, 1899, of which this case is a divisional one, (Division B.)

My present invention has for its object to provide for use a machine or apparatus by the use of which I am enabled to produce with perfection and economy such printing-tubes; and it consists in the several novel devices and combinations of devices which will be found hereinafter described, and which will be most particularly pointed out in the several claims of this specification.

To enable those skilled in the art to which my invention most nearly appertains to make and use machines or apparatuses embodying either wholly or in part my said invention in either the precise form (as to all or a part of my improvements) herein set forth or under some modification thereof, I will now proceed to more fully describe said invention, referring by letters to the accompanying drawings, which form part of this specification, and which illustrate all the parts of my invention carried into effect in the precise mechanical forms in which I have so far successfully practiced them.

In the drawings, Figure 1 is a side elevation of a machine or apparatus in the best form known to me, suitable for carrying into effect all the parts or features of my invention. Fig. 2 is a top view of the same. Fig. 3 is a vertical section of the same, taken on a plane indicated by the broken line *xx* of Fig. 2. Fig. 4 is a cross-sectional view in a plane indicated by the line *yy* of Fig. 2 looking in the direction indicated by the half-arrow in said figure. Fig. 5 is a perspective view

mainly of the molding-chamber, showing the same with its hinged parts opened out. Fig. 6 is a view, partly in elevation and partly in vertical central section, of the machine or apparatus seen in the other views, with a slight modification illustrating mainly the absence of a copper lining from the cast tubular printing device and as a result the production of such printing device without any lining. In these several figures the same parts will be found always designated by the same letter of reference. Fig. 7 is a perspective view of the preferable form of a printing-tube such as may be perfectly and cheaply made by my improved casting-machine; and Fig. 8 is a cross-sectional view of the same, on an enlarged scale, illustrating also the application of such cast-metal printing-tube to the interior form-support of a printing-press.

Mounted upon a sufficiently strong rigid base-plate A, that is preferably supported by integrally-cast feet or footpieces *a*, is a melting-pot cylinder or chamber B, the annular foot-flange of which is securely bolted to the said base-plate A, and within the said cylindrical chamber is concentrically arranged the cylindrical melting-pot or metal-receptacle C, which is so arranged concentrically within the chamber B as to leave an annular space between its exterior and the interior of said chamber and also a space between the exterior of its bottom and the bottom of said chamber B, which space is filled in with some suitable refractory material, by preference fire-clay, as clearly shown in the drawings, (see particularly Fig. 3,) and the said melting-pot or receptacle C is firmly supported or held in place concentrically within the fire-chamber B by means, as shown, of four (more or less) radially-projecting integral arms *d*, the outer ends of which rest upon and are securely bolted to the annular top flange *c* of the chamber B. The said melting-pot C is provided at one point with a radially-projecting tubular part *e*, which contacts at one point with the inner surface or wall of the chamber B, (see particularly Fig. 3,) which is perforated at this point for the accommodation of a tubular conduit *r*, which communicates with the part *e* of the melting-pot and serves to conduct the melted metal

therefrom in a manner and for a purpose to be presently described.

Above the fire-chamber B with its combined melting-pot C is arranged a cylinder E, which is supported, as shown, upon a series of metallic stands D, the foot-flanges of which are securely bolted to the parts *d* of the metallic melting-pot and the upper flanged ends of which are in like manner secured to the foot-flange of the said cylinder E. This cylinder is provided with a piston-rod *f*, at one end of which, working within the cylinder, is a piston *e*², while the opposite and lower end of said piston-rod *f* is provided with a piston or plunger F, which fits and works vertically within the cylindrical melting-pot C, all as clearly shown. The said cylinder is of course provided with the necessary and proper stuffing-box devices in its lower head, through which the said piston-rod works, and it is also provided with a gage *k*, suitably connected by a tube *j* with the upper head of the cylinder for the purpose of indicating the degree of pressure exerted by any medium which may be used to drive the piston *e*² of said cylinder.

L is a supply-pipe communicating through the medium of a suitable valvular device N, provided with a handle O, with a vertical pipe M, the upper and lower branches of which communicate, respectively, at the upper and lower heads of the cylinder E with the interior of the latter, and through the medium of these last-named devices said cylinder may be supplied with a proper medium for driving its piston *e*² in either direction as may be required and for a purpose to be presently explained. In the case shown this cylinder E, with its connections and appliances, operates as a hydraulic engine to move upwardly and downwardly at the pleasure of the attendant of the machine and with any requisite power the plunger F of the melting-pot C; but in carrying into effect my invention some other medium than hydraulic pressure may, of course, be employed for the purpose of moving this plunger.

I have shown by broken lines the supply of molten zinc in the pot or chamber C, which supply, as illustrated, should not reach a higher level than the lower ends of the escape ports or passages *g* (see Fig. 3) of said melting-pot, which ports communicate at their upper ends with the annular fire chamber or space between the melting-pot and the inclosing-cylinder B, which annular space is more or less open at the upper end, as seen at *u*, Fig. 2, to permit the escape of the gaseous productions of combustion from the said annular fire-chamber. G is a pipe for the supply to the said annular fire-chamber of combined gas and atmospheric air, the supply being regulated by an ordinary valvular device or cock at *h* and passing from the said supply-pipe to a network of vertically and horizontally arranged piping H, from which project through the side walls and also through the bottom of the cylindrical chamber B a series

of burners *i*, from which flames are injected into the mass of fire-clay which fills the space around and beneath the melting-pot C, as shown, and which is kept by the said burners *i* in the proper incandescent state to sufficiently heat the charge of zinc within the said melting-pot. On the same metallic base-plate A, upon which is mounted, as above described, the chamber B, with its melting-pot and overhead compression-cylinder, is arranged a molding-chamber P, which is made in two parts, hinged together at the point nearest to the said chamber B by means of female articulate members *n* and *n'*, projecting from the respective portions of said two-part molding-chamber and properly combined, as shown, with the vertical male members or pintle-like devices *m*, the lower one of which is securely fastened to the base-plate A, from the top surface of which it projects upwardly, as shown, and the two portions of this molding-chamber P are provided at points diametrically opposite the hinges thereof with a set of radially-projecting lugs *o*, with one set of which are pivotally connected, as shown, locking or clamping bolts *p*, by means of which the hinged parts of said molding-chamber are securely fastened together, as seen at Figs. 1, 2, 3, and 6, and by the loosening and swinging out of which clamping-bolts, as shown at Fig. 5, the hinged parts of said molding-chamber may be swung apart, as illustrated at the last-mentioned figure, for the purpose of extricating from the chamber the casting which may have been made therein. Each of the parts of this molding-chamber is made, as shown, with hollow vertical walls and a cellular bottom portion, the said hollow spaces being filled in with fire-clay Z, as illustrated in the drawings, for a purpose to be presently described, and the interior of said molding-chamber P is connected at its lowermost portion, through the medium of the conduit *r*, hereinbefore referred to, with the interior of the melting-pot C, as plainly shown, (see Fig. 3,) and the said connection or communicating-tube *r* is provided, near its middle, with a cut-off or valvular device U (operated, preferably, by a screw-stem and hand-wheel, as seen at Figs. 3 and 6) for the purpose of permitting or preventing the flow of molten metal from the melting-pot to the interior of said molding-chamber, as occasion may require. Around the said molding-chamber P is arranged a network of piping H², very similar to that used in connection with the fire-chamber B, but connected only with the movable parts of said molding-chamber and flexibly connected, as seen at K, with the said system of piping H through a branch pipe J, a short distance below which branch pipe is located a suitable valvular device or cock I, by means of which the supply of combined air and gas afforded from the piping H may be at pleasure turned onto or off from the piping H² of the molding-chamber, and from the said piping

H² projects radially only into said molding-chamber a series of burners ², which discharge their flame-jets into the annular spaces or cellular portions of the molding-chamber, which, as clearly illustrated in the drawings, are filled with fire-clay to be heated by the flame-jets to any desired degree for the purpose of keeping the interior of the mold hot for a purpose to be presently explained.

S is a cast-iron core which is mounted centrally in the mold. It is accurately shaped exteriorly to exactly reproduce in the mold the exterior shape and size and dimensions of the interior supporting parts of the press designed later to support the tubular printing devices in the press. As shown in the drawings, the core S is tapered from end to end as the form-supports of the press are tapered, the upper end of the core being the smaller in diameter.

Q is a cold-water-supply pipe which is permanently arranged in the base-plate A of the machine, with its upper end projecting slightly up within and tapped into the cast-iron core S of the mold, (see especially Figs. 3 and 4,) which core S has an axial bore or passage-way R running through it, the upper portion of which bore is provided with a bushing s, screwed into the core and formed with a tapering upper orifice, within which fits the corresponding tapered lower end of an exit-pipe T, which, as shown, is preferably formed with an elbow, the outer arm of which is pivotally connected with a waste-pipe, so that the said bent exit-pipe T may be either set in communication with the bushing s, as shown in full lines, or may be swung up out of connection with said bushing, as illustrated by the dotted lines at Figs. 3 and 6. By means of this arrangement of devices a supply of cold water may at pleasure be afforded to the cast-iron core S of the molding-chamber, the said supply of water being let on, preferably, at the lower end of the supply-pipe Q, as indicated by the half-arrow at Fig. 1, under sufficient pressure to keep up a circulating supply, thence through the bore R of the core S, and thence upwardly and away from the machine through the connected exit-pipe T and a suitable waste or discharge pipe.

In the molding-chamber illustrated in Figs. 1 to 5 of the drawings, t is a copper tube, which is to constitute the inner strengthening-shell of a composite tubular printing-cylinder, such as designed to be made by my improved casting-machine. It is accurately prepared internally to fit the interior supporting parts or form-supports of a press. Consequently it fits accurately and snugly onto the core S of the molding apparatus and is supported internally by said core and from end to end at all points. The exterior of the copper tube is preferably made perfectly cylindrical and circumferentially continuous, (so that said copper tube is of slightly-greater thickness at its upper end or mouth than at the lower end,) and the arrangement and

proportions of the parts are such, as shown, that between the exterior of said copper tube thus fitting exactly onto the tapering core S and the inner cylindrical and continuous wall of the two-part molding-chamber P there occurs an annular space equal in thickness to the designed or proposed thickness of the zinc tube to be cast in said molding-chamber, into which tubular space the molten metal is forced, as will be presently explained. At Figs. 3 and 4 this annular space is represented by the broken lines as being occupied by the molten zinc up to the same level as the molten mass in the pot C. The inner walls of the molding-chamber P are carefully and uniformly finished to a uniform and planographic surface—i. e., a surface consisting of microscopically-outlined elevations and depressions, such as are produced by a sand-blast—and to the exact character and textures of surface desired on the outer or printing surfaces of the casting.

In the general operation of the apparatus illustrated in the drawings and thus far herein described with reference to its construction and the arrangement of its several parts, the melting-chamber C having been supplied with the proper charge of zinc or zinc alloy or other suitable metal and said charge heated up to the proper degree by the appliances already explained, the gaseous and other products of combustion of the fire-chamber escaping from the open portions of the annular space containing the fire-clay, and the molding-chamber having had its parts securely fastened together after the proper application to the cast-iron core of the copper tube or cylinder before mentioned, and the supply of cold water having been put in circulation through the core of the molding-chamber when the molten mass in the melting-pot shall have reached the proper liquid state for the casting operation, and the molding-chamber been properly heated by the appliances hereinbefore mentioned, the valvular device or gate at U in the connecting-pipe r having been opened, the molten metal flows or is forced from the melting-pot through said conduit r into the annular space between the inner uniformly and carefully finished wall of the molding-chamber P and the external surface of the copper tube in the mold and is forced to ascend through said annular space and fill the same by reason of the plunger F of the hydraulic or other cylinder being forced down within the melting-pot to a sufficient extent not only to force the molten metal upwardly within the molding-space of the chamber P, but to also force and hold the molten metal within said chamber under a sufficiently high degree of pressure to insure the casting of a perfect zinc tubular device without any irregular superficial or other porosity and of such surface texture as is desirable and necessary for the purpose for which I make these hollow tubes.

As will be seen by reference to Fig. 3, any

air or combined air and gases which may be contained in the small cylindrical space between the top of the molten metal in the melting-pot and the base of the plunger F will be caused by the initial descent of said plunger to pass upwardly and out of the melting-pot through the escape ports or passages *g*, and after the periphery of the plunger shall have passed the lower ends of said ports and come into contact with the top surface of the mass of molten metal further communication between said ports and that part of the melting-chamber which contains the molten material will be cut off and the mass of metal forced downwardly within the chamber C and upwardly within the casting-chamber P under any desired degree of pressure. In practice I hold the metal in the molding-chamber thus under hydraulic or other considerable pressure (by means of the plunger F) until the metal within the mold shall have partially or completely solidified, whereupon by manipulating the cut-off gate U, thus closing communication between the mold and the melting-pot, the pressure on the metal in the former may be removed. At the same time by keeping the molding-chamber hot by the appliances hereinbefore described the molded zinc tube is not permitted to solidify or cool too rapidly, especially at the vicinities of its exterior or peripheral surface. Inasmuch as the core S is kept comparatively cool by the cold-water-circulating device, the copper cylinder, which is to ultimately constitute the lining of the composite printing-tube, is not so much heated as the mass of molten metal and is sooner cooled, and therefore in the final cooling and necessary contraction of the molten metal into a zinc tube the latter will practically be shrunk onto the copper tubular lining, at which time the copper tube is firmly supported at every point against collapse or distortion. Thus is effectuated a strong and perfect union and integration between these two separate tubular devices, which is of course of great advantage. It will be understood, of course, that in the manipulation of the different devices of the machine shown and described the supply of heat both to the fire-chamber for melting the zinc and to the molding-chamber in the process of casting the zinc cylinder is to be controlled and regulated according to the judgment and experience of the operator of the machine or contrivance. During the molding process or operation to permit the escape from the interior of the mold of air or gas or impurities that may be forced out by the rising metal I have provided at *v* a vent, and it will be seen that in the use of a machine such as I have shown and described in the manner set forth the result is the production of a zinc tube or hollow cylinder which, though of comparatively slight thickness, (usually a little more than an eighth of an inch,) will be perfect in form or outline and with a surface of a uniform degree of density,

so that it has to be neither turned, bored out, nor exteriorly prepared to possess a fit condition for use for the purpose for which I design such zinc tubes—namely, to constitute the cylindrical printing-surface for relief or planographic or intaglio printing—for which purpose the uniform surface of the cast tube has only to receive the impression or design and then to be properly etched, according to the usual method or process of etching, or routed out or properly developed otherwise into the character of printing-surface desired. After the casting shall have sufficiently cooled or solidified within the molding-chamber the latter has its hinged parts swung open (after having released the clamping bolts or devices) into the condition illustrated at Fig. 5, whereupon after cutting off the supply of cold-water circulation and swinging up and out of the way the exit-pipe T the sprue or connection between the lower end of the finished casting and the stock of zinc in the contiguous end of the supply-tube *r* may be sawed or cut off, and thereafter the finished casting, with its firmly-attached copper lining, may be readily removed with the slightly-tapering core S of the molding apparatus and the latter then slipped out from the composite tube.

With my improved machine or apparatus I can produce numerous tubes with continuous cylindrical printing-surfaces which will all perfectly fit on the form-supports of a press, and since the machine is comparatively simple in construction and can be easily operated as a part of the plant of a printing establishment, so that the printing tubes or cylinders do not have to be cast at a separate place, economic results are accomplished, and the casting of the zinc tubes can be done at comparatively low cost, and after having been once used the tubes if wholly of zinc can be melted up and cast over again without loss of stock or material, or if partly of zinc the zinc or a sufficient part of it can be turned off in a lathe and the tube that is left slipped over the core S, as described. The copper part of the composite tube can thus be used and reused an indefinite number of times, and thus become a permanent part of a series of successive printing-tubes, and the outer zinc portion or printing-surface becomes in contrast a removable and renewable envelop integral with the inner strengthening-shell throughout the printing and presenting a new and fresh and unused printing-surface for each new design to be printed.

When the copper-tube lining is used, it is carefully made internally to begin with and at great expense, so as absolutely to fit on the form-supports of the press and so on the core S of the molding apparatus, and preferably it tapers evenly from end to end to fit a correspondingly-tapered form-support, and it may be used and reused an indefinite number of times without losing its shape or size, and thus the composite tube has a permanent

shape internally, the cast-zinc, or substantially all of it, (it is immaterial whether a small part be left on the exterior of the copper tube or not,) being removable as by being
 5 turned off in a lathe after the use of the tube as a printing-surface for a given design is completed. Where the tube is wholly of zinc, it is wholly melted up after each printing job is completed, and reliance is placed for the
 10 accurate internal as well as external shaping of the tube upon the apparatus for casting shown, the mold shaping the tube externally and determining its surface character and texture.

15 Figs. 7 and 8 show simply an improved tubular printing-cylinder made in my improved casting-machine and forming the subject of another application by me.

In practice the composite tubular device
 20 made in the machine shown is removable from and replaceable on the form-supports of the press and is adjustable in both directions on such form-supports or with such supports in the press, as set out fully by me in applications
 25 heretofore filed by me.

Having now so fully shown and described my invention that those skilled in the art can make and use a casting-machine embodying the same either wholly or as to some of the
 30 separable parts thereof and either in the precise form or forms shown or under some modification thereof, what I claim as new, and desire to secure by Letters Patent, is—

1. In an apparatus for casting planographic
 35 surfaces, the combination with a mold having the face which forms the planographic sur-

face constructed with sharply-outlined microscopic elevations and depressions, of means for heating said face, and means for cooling the opposite face of the mold, whereby a perfect and uniform planographic surface is produced, substantially as described. 40

2. In an apparatus for casting planographic surfaces, the combination with a mold having the face which forms the planographic surface constructed with sharply-outlined microscopic elevations and depressions and means for filling the mold with molten metal and subjecting the metal in the mold to great pressure, whereby a perfect and uniform planographic surface is produced, substantially as described. 45 50

3. In an apparatus for casting planographic surfaces, the combination with a mold having a cylindrical outer molding-surface consisting of sharply-outlined microscopic elevations and depressions and a slightly tapered or conical inner surface, of means for heating the outer molding-surface, means for cooling the inner surface, and means for filling the mold with molten metal and subjecting the mold to great pressure, whereby a perfect and uniform planographic surface is produced, substantially as described. 55 60

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses. 65

EDWARD HETT.

Witnesses:

EDWIN SEGER,
 Geo. W. MILLS, Jr.