

(No Model.)

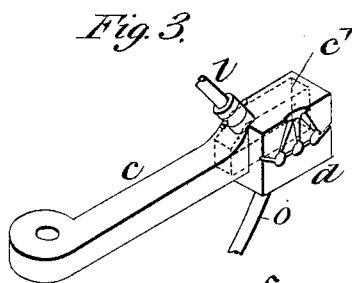
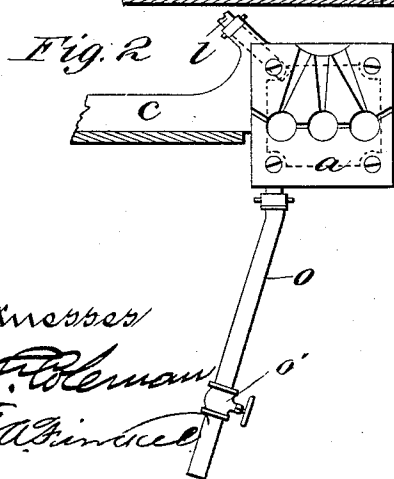
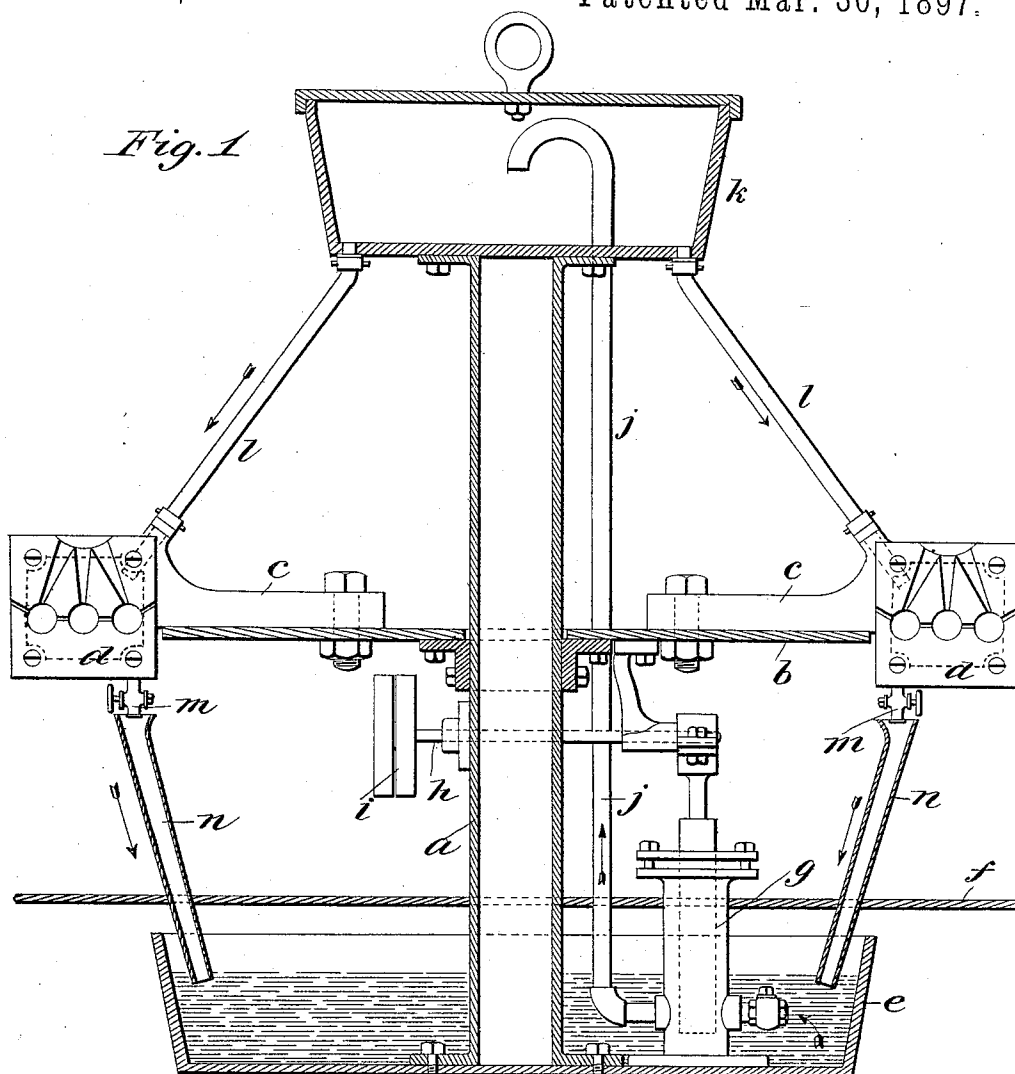
3 Sheets—Sheet 1.

H. A. DALRYMPLE & P. C. McGRATH.

BALL CASTING MACHINE.

No. 579,698.

Patented Mar. 30, 1897.



Witnesses
J. F. Blum
E. A. Finckel

Inventors
Hartwell A. Dalrymple,
Patrick C. McGrath.
by W. H. Finckel
att'y.

(No Model.)

3 Sheets—Sheet 2.

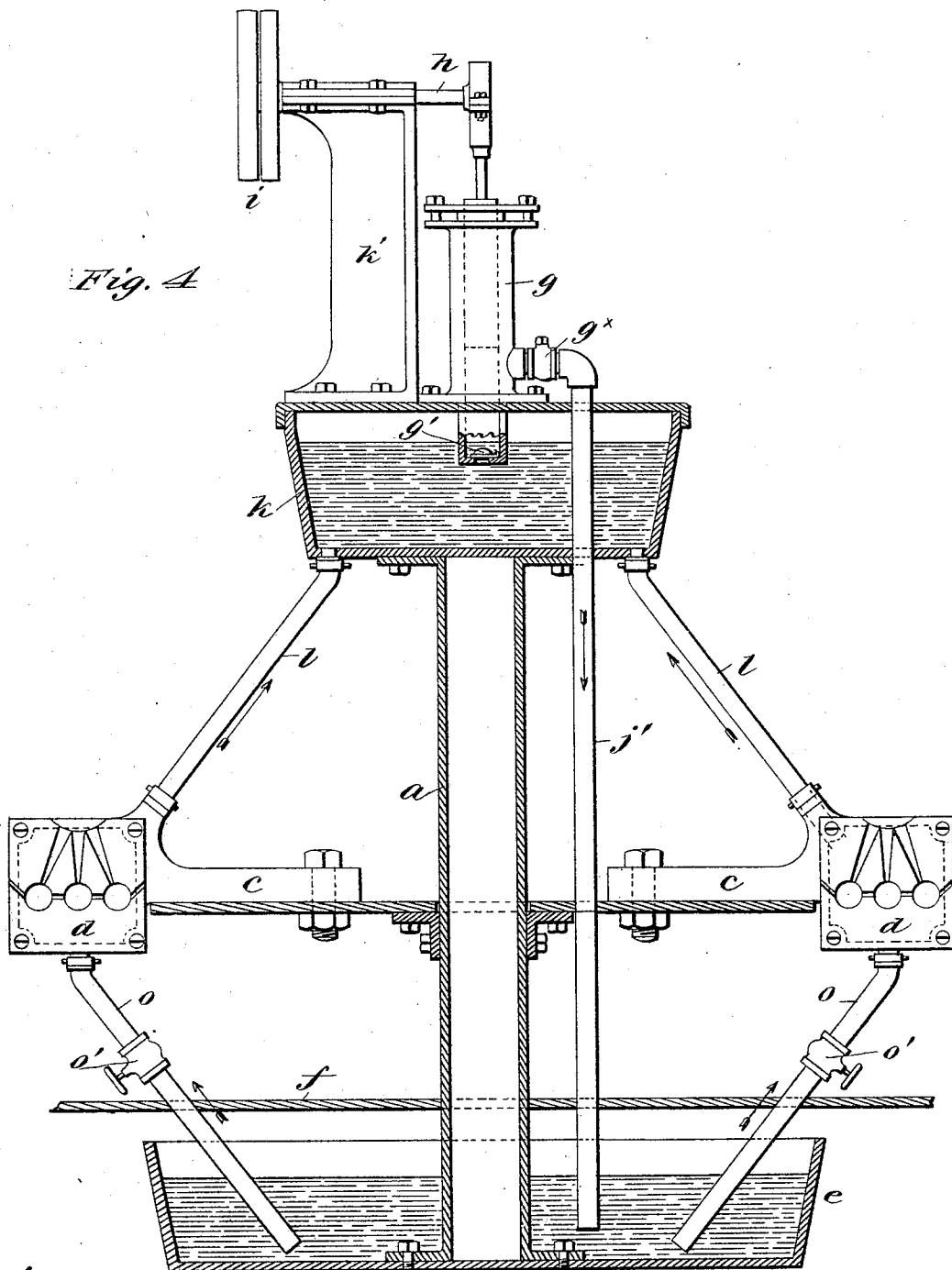
H. A. DALRYMPLE & P. C. McGRATH.

BALL CASTING MACHINE.

No. 579,698.

Patented Mar. 30, 1897.

Fig. 4



Witnesses
J. F. Coleman
Nellie Callahan

Inventors
Harwood A. Dalrymple.
Patrick C. McGrath.
by W. F. Finckel atty.

(No Model.)

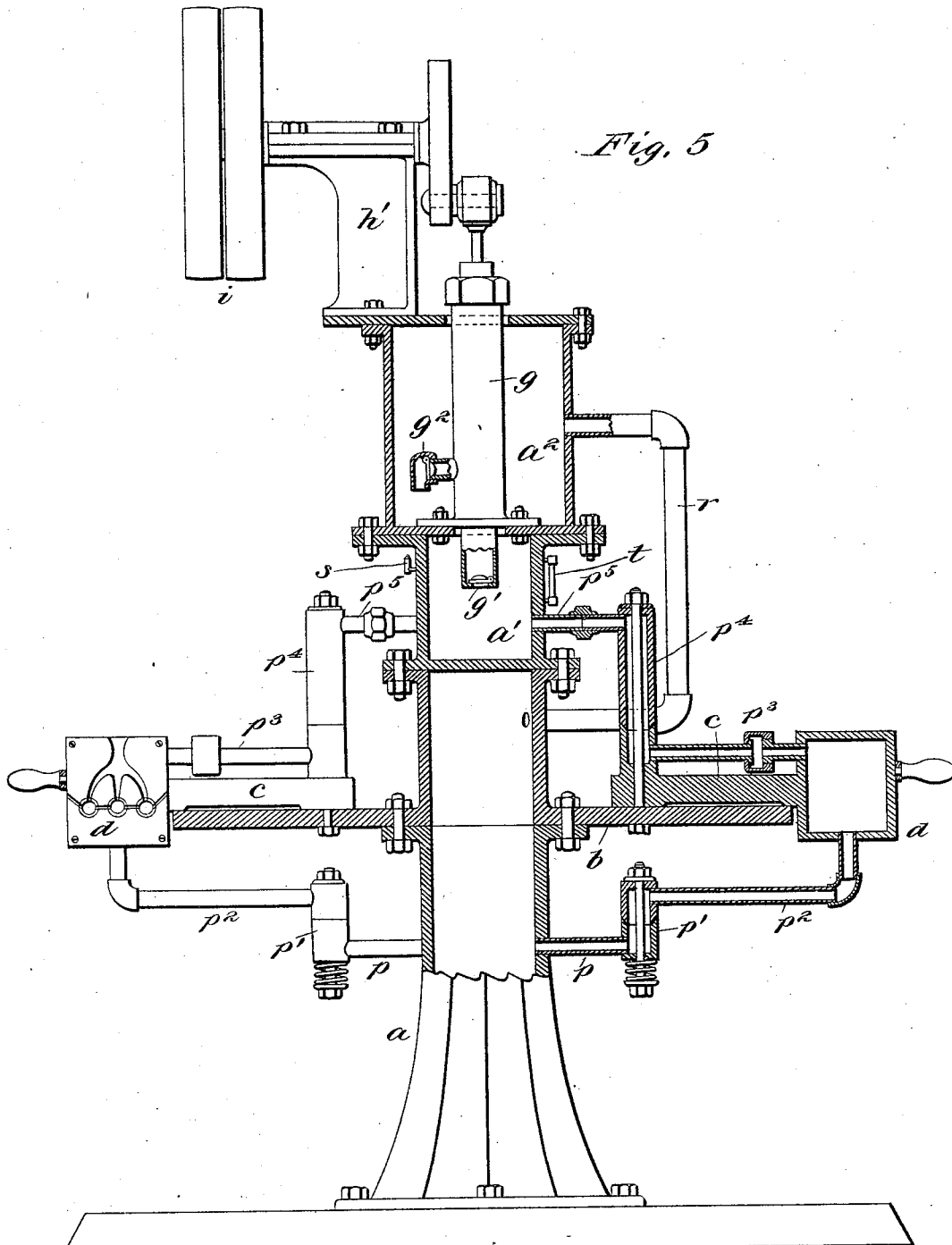
3 Sheets—Sheet 3.

H. A. DALRYMPLE & P. C. McGRATH.

BALL CASTING MACHINE.

No. 579,698.

Patented Mar. 30, 1897.



Witnesses
J. F. Coleman
Mellie Callahan.

Inventors
Hartwell A. Dalrymple,
Patrick C. McGrath,
by Wm. F. Tucker atty.

UNITED STATES PATENT OFFICE.

HARTWELL A. DALRYMPLE AND PATRICK C. McGRATH, OF RUTLAND,
VERMONT.

BALL-CASTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 579,698, dated March 30, 1897.

Application filed July 25, 1896. Serial No. 600,494. (No model.)

To all whom it may concern:

Be it known that we, HARTWELL A. DALRYMPLE and PATRICK C. McGRATH, citizens of the United States, residing at Rutland, in the county of Rutland and State of Vermont, have invented a certain new and useful Improvement in Ball-Casting Machines, of which the following is a full, clear, and exact description.

The object of this invention is to provide a machine for casting balls which are afterward dressed to form ball-bearings; but the invention is not limited in its application to that class of machines alone, its principle being applicable to machines for casting other objects, particularly small objects. The special end in view is to provide for the circulation of a medium for keeping the molds at an equable temperature.

In the accompanying drawings, illustrating our invention, in the several figures of which like parts are similarly designated, Figure 1 is a vertical sectional elevation of sufficient of a ball-casting machine to illustrate our invention. Fig. 2 is a view of a fragment of a machine, illustrating a modification. Fig. 3 is a perspective view of one of the mold-arms and molds detached. Fig. 4 is a vertical section and partial elevation of one modification, and Fig. 5 is a similar view of another.

a is a standard, upon which is erected a horizontal table *b*, and upon this table are pivoted the mold-arms *c*, to the faces of which are secured the molds *d*. The backs of the mold-arms are made hollow, as indicated by dotted lines at *c'*, Fig. 3, and as shown in Fig. 5. These mold-arms are arranged in pairs, as usual, and may be separated to discharge the castings.

Referring more particularly to Figs. 1, 2, and 3, *e* is a vessel or tank which may be arranged beneath the floor *f* and which may receive and support the standard. This vessel contains a pump *g*, of any approved construction, which may be driven from the shaft *h*, on which are the fast and loose pulleys *i*. The pump is provided with a pipe *j*, which opens into an overhead vessel or tank *k*, erected upon the upper end of the standard *a*. The vessel or tank *k* is connected by any suitable pipes *l* with the hollow backs of the

arms *c*, and said hollow backs have the return-cocks *m*, which open into funnels or tubes *n*, leading into the vessel or tank *e*.

The mouths of the funnels or tubes *n* may be wide enough to permit the necessary swinging of the molds in opening, or the cocks *m* may be above the said funnels for the same purpose.

Instead of using return-cocks and funnels or pipes *n*, as just described, we may use a pipe or tube *o*, provided with a valve or cock *o'*, for the return from the hollow backs, as shown in Fig. 2, and in this case the pipes or tubes may be flexible to permit the swinging of the molds.

The operation of the form of the invention shown in Figs. 1, 2, and 3 is as follows: The fluid by which it is desired to preserve an equable temperature in the molds is placed in the vessel *e*, and is pumped thence into the vessel *k*, and from the latter vessel is distributed to the molds through the pipes *l*, and, as desired or necessary, is let out of the molds through the cocks or pipes hereinbefore referred to and returned to the vessel *e*. If desired, a continuous circulation of fluid may be obtained by leaving open the outlet-cocks. The cocks may be used to regulate the reflux of the fluid, being opened more or less to this extent. The vessel *e* may be covered in, if desired.

In the form of the invention shown in Fig. 4 the pump is erected upon the top of the vessel *k* and is provided with an inlet-valve *g'*, opening into said tank. The outlet-valve *g''* has the pipe *j'* connected to it, and said pipe *j'* serves as a return-pipe. The shaft *h* is mounted in a standard *k'*, which is erected upon the vessel *k*. In this form of our apparatus the fluid is lifted from the vessel *e* by the pump through the pipes *o* and hollow mold-backs and the pipes *l* into the vessel *k*, and is returned to the vessel *e* through the pipe *j'*, thus effecting a forced circulation.

In the form of the invention shown in Fig. 5 the standard is divided into sections *a a'* *a''*, and these sections serve, respectively, in the places of the standard and the two vessels of Fig. 1. The pump *g* is arranged in section *a''* and draws the fluid from section *a* through pipes *p*, knuckle-joints *p'*, and pipes

p^2 into the hollow mold-backs, and thence through pipes p^3 , knuckle-joints p^4 , and pipes p^5 into the section a' , and thence into the section a^2 , whence it is returned through pipe r to the section a . An inlet-valve g' opens into the pump g from the section a' , and said pump discharges into the section a^2 through the outlet-valve g^2 . The section a' may have the pop-valve s and the water-gage t . The pump-shaft is mounted in a standard h' , erected upon section a^2 . The knuckle-joints are used in order to provide for the swinging movements of the molds in opening and closing them, and they may be of any approved construction. This form of the invention insures a positive forced circulation of the temperature-regulating fluid and makes a very compact machine.

What we claim is—

1. In a casting-machine, means for insuring the circulation of a medium for preserving an equable temperature in the molds, the same comprising the combination of a fluid-distributing and a fluid-receiving vessel, constructed as a standard divided into independent sections, arranged one above the other, a fluid connection between the fluid-distributing and fluid-receiving vessels, molds having hollow backs, fluid connections between the distributing vessel and the hollow backs of the molds and between the receiving ves-

sel and the hollow backs of the molds, and a fluid-forcing medium for circulating the fluid through these connections, vessels and molds, and for returning it to the distributing vessel, substantially as described.

2. In a casting-machine, means for insuring the circulation of a medium for preserving an equable temperature in the molds, the same comprising the combination of a fluid-distributing and a fluid-receiving vessel, constructed as a standard of three sections, divided from one another, the two lower sections having pipe connections with the hollow backs of the molds, and the uppermost section communicating with the section next below it and independently connecting with the lowermost section, a pump arranged in the uppermost section and communicating independently with the section next below and the lowermost section and to circulate the fluid through the molds, combined with the molds and their hollow backs, substantially as described.

In testimony whereof we have hereunto set our hands this 23d day of July, A. D. 1896.

HARTWELL A. DALRYMPLE.
 PATRICK C. McGRATH.

Witnesses:

M. J. FRANCISCO,
 T. F. MARK.