

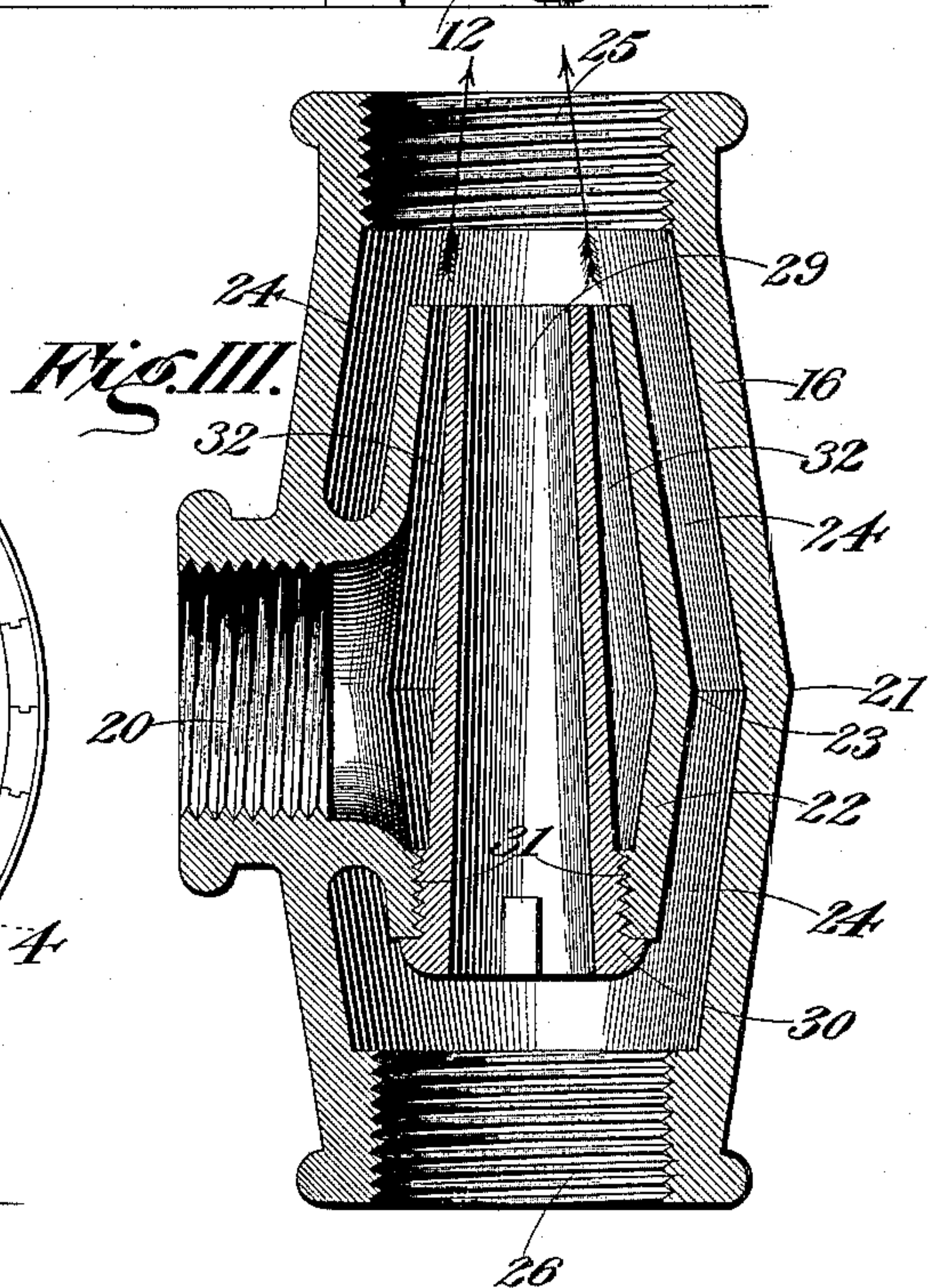
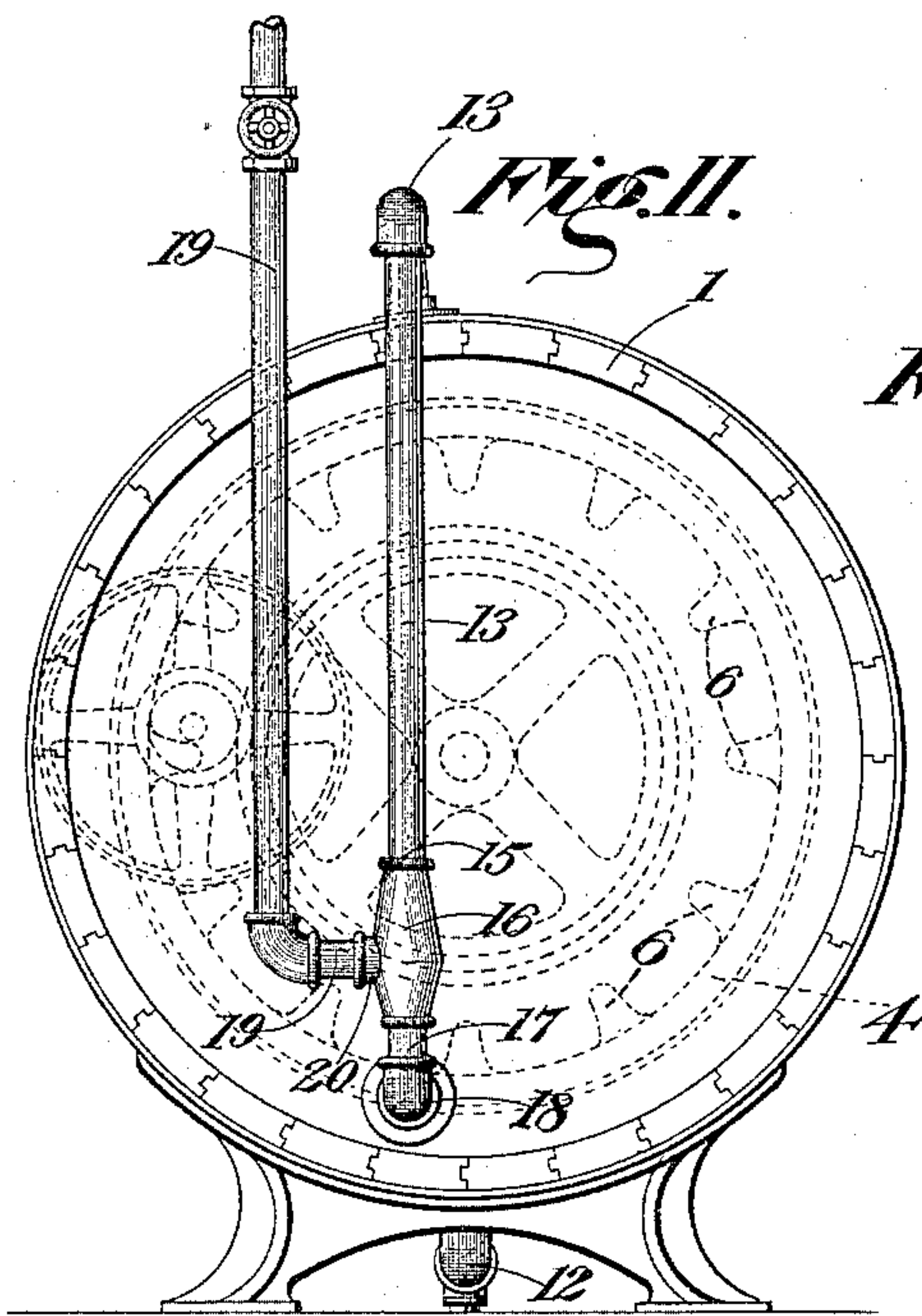
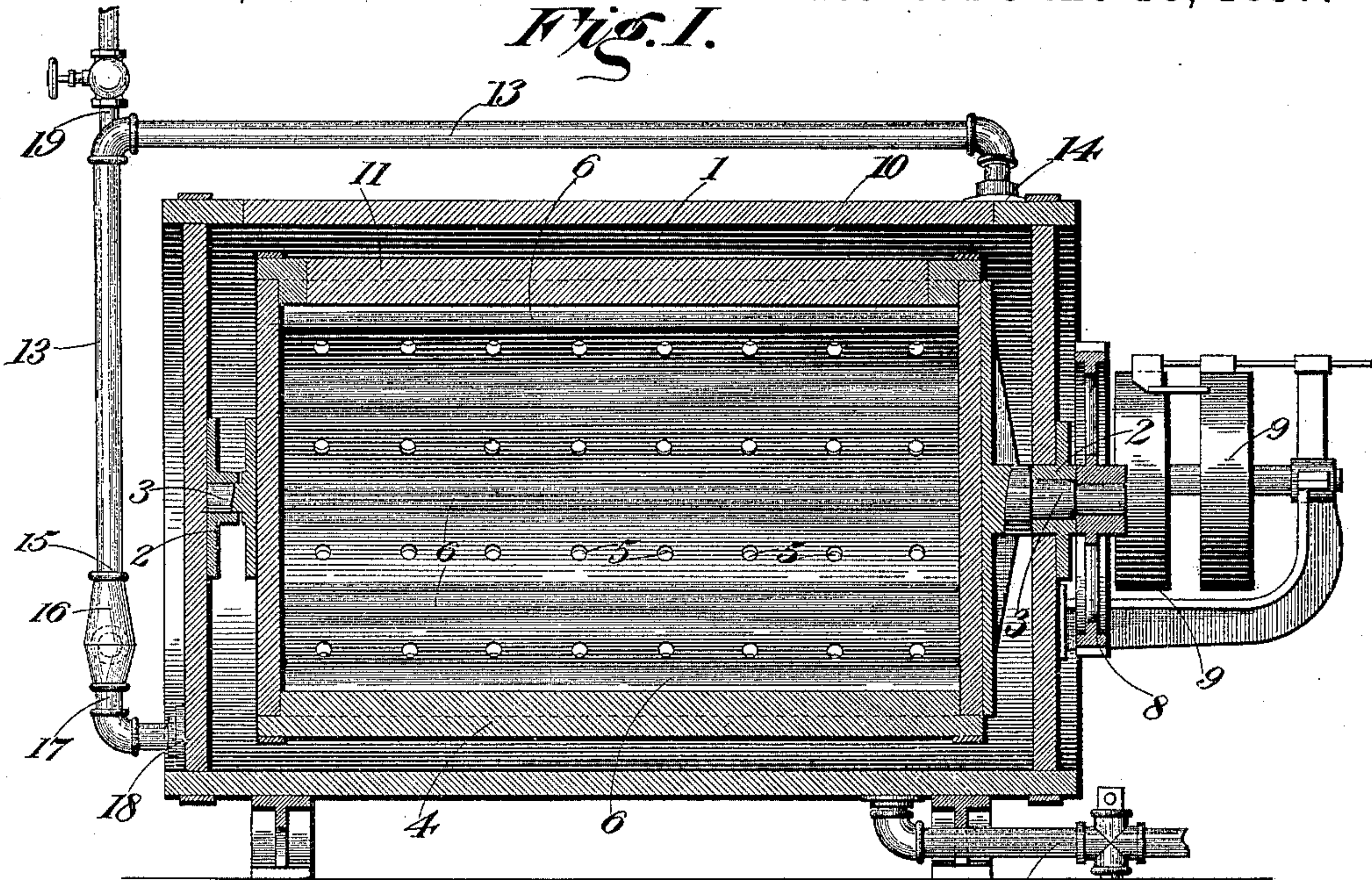
(No Model.)

2 Sheets—Sheet 1.

J. H. McDONALD.  
WATER CIRCULATOR AND HEATER.

No. 584,394.

Patented June 15, 1897.



Witnesses

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*S. M. Acker*

Inventor  
*Joseph H. McDonald*

By *Joseph L. Perkins*  
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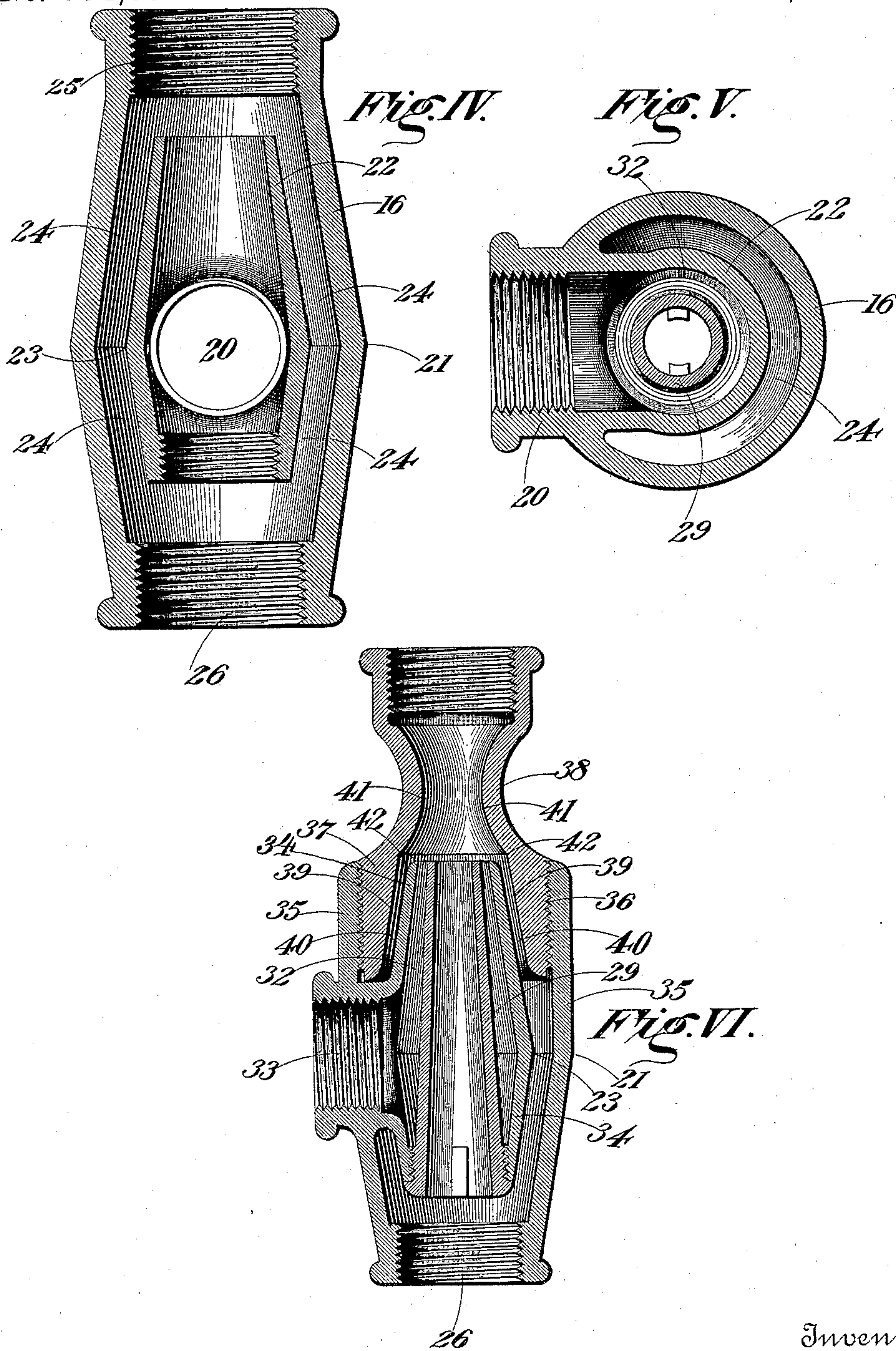
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# UNITED STATES PATENT OFFICE.

JOSEPH H. McDONALD, OF NEW YORK, N. Y., ASSIGNOR TO A. ROSENBERG,  
OF SAME PLACE.

## WATER CIRCULATOR AND HEATER.

SPECIFICATION forming part of Letters Patent No. 584,394, dated June 15, 1897.

Application filed April 22, 1896. Serial No. 588,532. (No model.)

*To all whom it may concern:*

Be it known that I, JOSEPH H. McDONALD, of New York, county of New York, State of New York, have invented certain new and useful Improvements in Water Circulators and Heaters, of which the following is a specification, reference being had to the accompanying drawings.

The object of my invention is to produce improved means for noiselessly heating and circulating water through a laundry-machine, so as to quickly and thoroughly amalgamate soap and water for washing purposes.

My invention operates upon the principle that a volume of combined soap and water being forced through a small passage several times per minute while heating will produce a perfect suds, or, in other words, complete amalgamation of the water and soap.

In washing-machines in common use the amalgamation of the soap and water employed is defective, thereby producing yellow stains in white fabrics, and the operation of the machine is slow, tedious, and noisy.

The purpose of my invention is to avoid all disagreeable noise and to produce a perfect suds, thereby increasing the general efficiency of the machine and its capacity and promoting the economy of soap in use.

In the accompanying drawings, Figure I is a central vertical section of a washing-machine equipped with my circulator and heater. Fig. II is an end view thereof. Fig. III is a central longitudinal section of my water circulator and heater. Fig. IV is a similar section taken at right angles to the view shown in Fig. III and with the nozzle removed. Fig. V is a central transverse section of the same. Fig. VI is a central longitudinal section of a modified form of my circulator.

Referring to the figures on the drawings, 1 indicates the shell of a washing-machine, which is preferably cylindrical in form and of suitable water-tight construction. In bearings 2 in the opposite ends thereof upon journals 3 is revolvably secured a rotary cylinder 4, that is provided with numerous apertures 5, that communicate through its side walls with the interior of the shell 1, and which are located between radially-projecting ribs 6. One journal 3 is extended through its bearing

2 and carries, for example, a fixed gear 8, that is operatively connected with shifting-pulleys 9, the gear and pulleys 8 and 9 being merely an example of suitable driving mechanism for imparting rotary motion to the cylinder 4 through the gear 8.

The shell is provided, preferably, on its upper side with a hinged door 10, and the cylinder 4 with a similar door 11, which, through the rotation of the cylinder 4, may be brought opposite to each other, and which, being opened, permit the introduction of material to be washed.

Communicating through the lower part of the shell 1, I prefer to employ a valve-controlled wash-out pipe 12.

13 indicates a pipe which communicates at its end 14 with the interior of the shell 1 at its upper part and, as indicated at 15, with my circulator, the outer shell of which is indicated by the reference-numeral 16. A pipe 17, which constitutes a prolongation of the pipe 13, communicates, as indicated at 18, with the interior of the shell 1 at its lower part. The respective points of communication between the pipes 13 and 17 and the shell 1 are preferably at opposite ends of the shell.

19 indicates a steam-supply pipe communicating at one end with a source of steam (not illustrated) and at the other end, through a branch 20, with the interior of the circulator, the shell 16 and branch 20 being preferably cast in one piece.

In Figs. III to VI, inclusive, I illustrate the details of my circulator and heater.

Referring to the numerals in Figs. III to V, inclusive, in which is illustrated one form of my circulator, let it be observed that the shell 16 is from a central plane 21 tapered in opposite directions. The branch 20 extends entirely through the wall of the shell 16, carrying upon its inner end an inner shell 22, which, although shorter than the outer shell 16, is made to conform to its shape, being tapered in opposite directions from the plane 23, which coincides with the plane 21. By this arrangement, as is clearly shown in Fig. V, a passage 24 is formed between the shells 16 and 22 on all sides except the one on which the branch 20 unites them. The shells 16 and 22 and the branch 20 are preferably made



of one casting, as illustrated, the shell being provided with internal screw-threaded openings 25 and 26 at its opposite ends, respectively, and the branch 20 being internally screw-threaded for the reception of the pipe 19, above referred to.

Concentrically supported within the shell 22 I provide a tapered barrel or, as I will call it for want of a better term, a "nozzle" 29. It is preferably provided at its wider end with a head 30 and adjacent thereto with exterior screw-threads 31, which, screwing into the internally-screw-threaded end of the shell 22, serve to support it rigidly in position concentrically within the shell, as specified. The nozzle defines between its exterior wall and the interior wall of the shell 22 a passage 32.

In practice steam being admitted through the branch 20, as from the pipe 19, is discharged from the passage 32 convergently toward the longitudinal axis of the shells 16 and 22, or, when the specified parts are assembled as shown in Figs. I and II, into the pipe 13. That pipe is in practice filled with water which the steam, entering in the manner described, acting upon the principle of the injector, heats and sets in motion, the movement being in the direction of the arrows shown, for instance, in Fig. III.

A portion of the water drawn forcibly through the nozzle 29 is discharged through its narrower end into the pipe 13. The remaining volume of water passes through the passage 24, being twice deflected in its course through the same. The longitudinal axes of the nozzle 29 and of the passages 24 and 32, respectively, being coincident and each of those elements discharging in a convergent direction the currents are made to cross at a common point within the pipe 13. By the conflict of currents thus produced a violent agitation and complete commingling of the fluids is effected.

In Fig. VI, I illustrate a modified form of circulator in which an additional means for bringing the currents into violent conflict is employed. In that figure a branch pipe 33 and inner shell 34 correspond entirely to the branch pipe 20 and shell 22, above specified. The outer shell 35 is, however, modified by making it cylindrical at its discharge end and providing it with interior screw-threads 36, which receive the externally-screw-threaded end 37 of that which I will call a "constrictor" 38. The inner wall 39, however, of the end 37 is convergent, so as to define between it and the shell 34 a converging passage 40, corresponding to the passage 24, above described, with the additional feature that by the aid of the screw-threads 36 the end 37 of the constrictor is made adjustable to and from the end of the inner shell 34. The constrictor is so named in virtue of its concave annular walls 41, which define a constricted neck in front of the discharge end of the elements which constitute the circulator, by the em-

ployment of which the fluids discharged from the circulator in the manner above described are caused to strike one another at a sharper angle and with greater force than that caused in the form of circulator previously described.

It may be noted that by reason of the adjustability of the constrictor to and from the circulator-shell 34 the distance between the inner ends 42 of the concave walls 41 and the end of the inner shell 34 may be increased or diminished at will, thereby regulating the angle at which the current of water from the passage 40 is deflected toward its axes.

The operation of the machine as a whole is as follows: The material to be cleansed being introduced into the cylinder 4 and soap and water in suitable proportions having been supplied to the interior of the shell 1 the doors 10 and 11 are closed. The cylinder 4 is then set in rotation and steam is supplied through the pipe 19. The steam passing into the circulator and following the direction of the arrows operates, in the manner described, to cause the commingled soap and water within the shell 1 to circulate rapidly from it through the pipes 17, the circulator, and the pipe 13. The commingling of the steam and water as they issue from the circulator is accomplished in the manner previously described without disagreeable noise, the perfect amalgamation of the soap and water being thereby produced.

What I claim is—

1. In a water circulator and heater, the combination with outer and inner shells defining a water-passage, a nozzle defining a steam-passage at one end and closed at the other, and an adjustable constrictor opposite the water-passage and the open end of the steam-passage, the constrictor having concave walls terminating in ends 42 opposite the water-passage, which, through the adjustability of the constrictor, with respect to the circulator-shell, regulate the angle at which the current of water is deflected toward its axis, substantially as set forth.

2. In a circulator and heater, the combination with an outer shell, tapered inner shell, and nozzle assembled substantially as set forth, of a constrictor adapted to screw into the outer shell, and provided with an interior converging end 37, coaxial with and extending over and surrounding the tapered end of the inner shell, and adapted by being screwed in or out of the outer shell to cause the constricted portion of the constrictor to approach or recede from the inner shell, and thereby to control the angle of discharge of the passage 40, substantially as set forth.

3. In a water circulator and heater, the combination with an outer shell, tapered inner shell and nozzle supported within the inner shell and defining a steam-passage within it, of a constrictor adjustably secured within the outer shell, said constrictor being provided with annular concave walls and terminal ta-



pered walls corresponding with the tapered wall of the inner cylinder which it surrounds, substantially as set forth.

4. In a water circulator and heater, the combination with an outer shell, tapered inner shell, and nozzle supported within the shell, and defining a steam-passage within it, of a constrictor adjustably secured within the outer shell, and means provided upon the con-  
5  
10 strictor for regulating through its adjustabil-

ity, the size of the passage between the inner and outer shells, respectively, substantially as set forth.

In testimony of all which I have hereunto subscribed my name.

JOSEPH H. McDONALD.

Witnesses:

I. ROSENBERG,  
OTTO P. HOLLE.