No. 659,747 Patented Oct. 16, 1900.

H. HARTWIG & A. W. FELTMANN.

DENTAL VULCANIZER AND CELLULOID PRESS.

(Application filed Nov. 4, 1899.)

(No Model.)

Fig. 1.

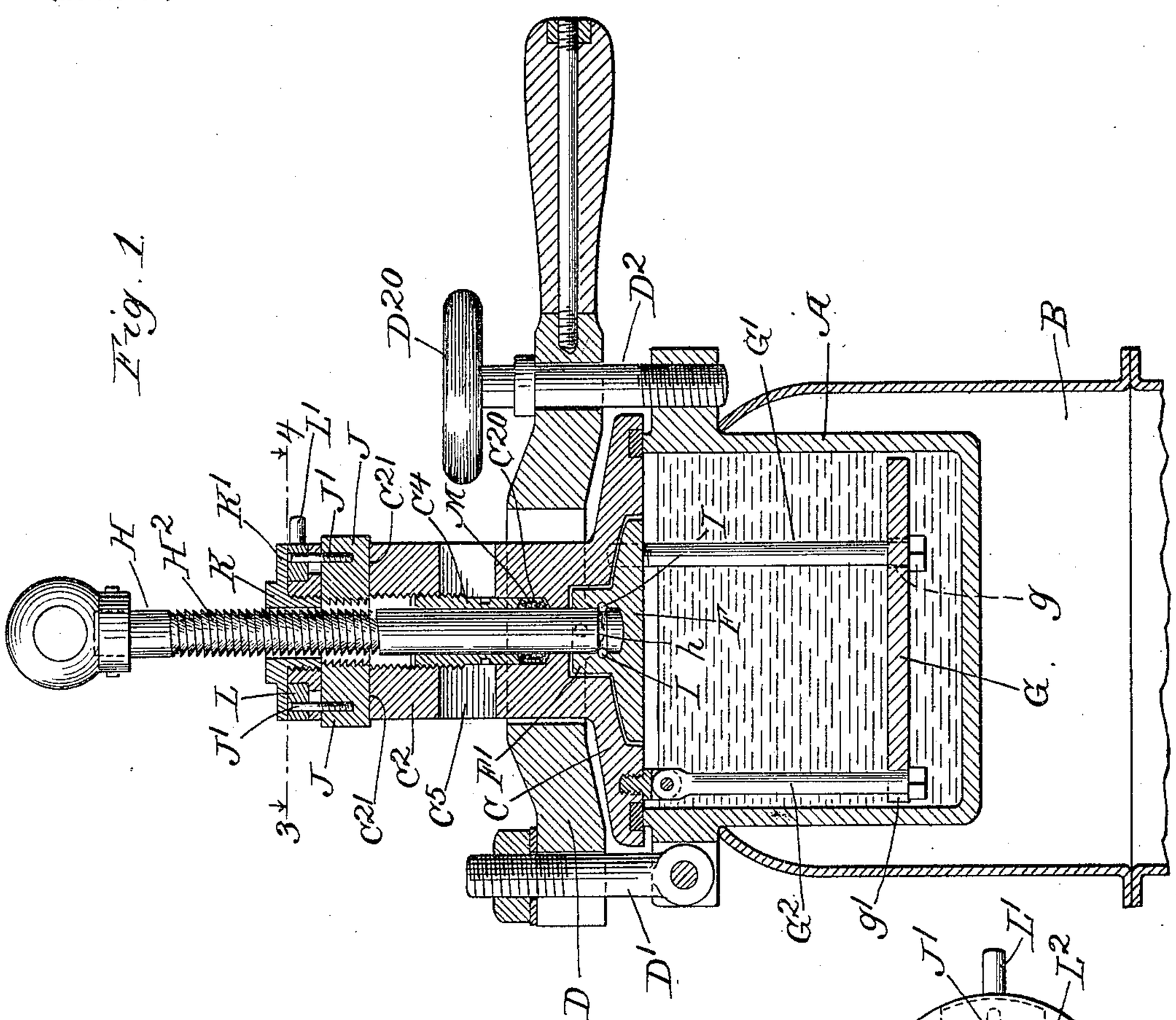

Fig. 2.

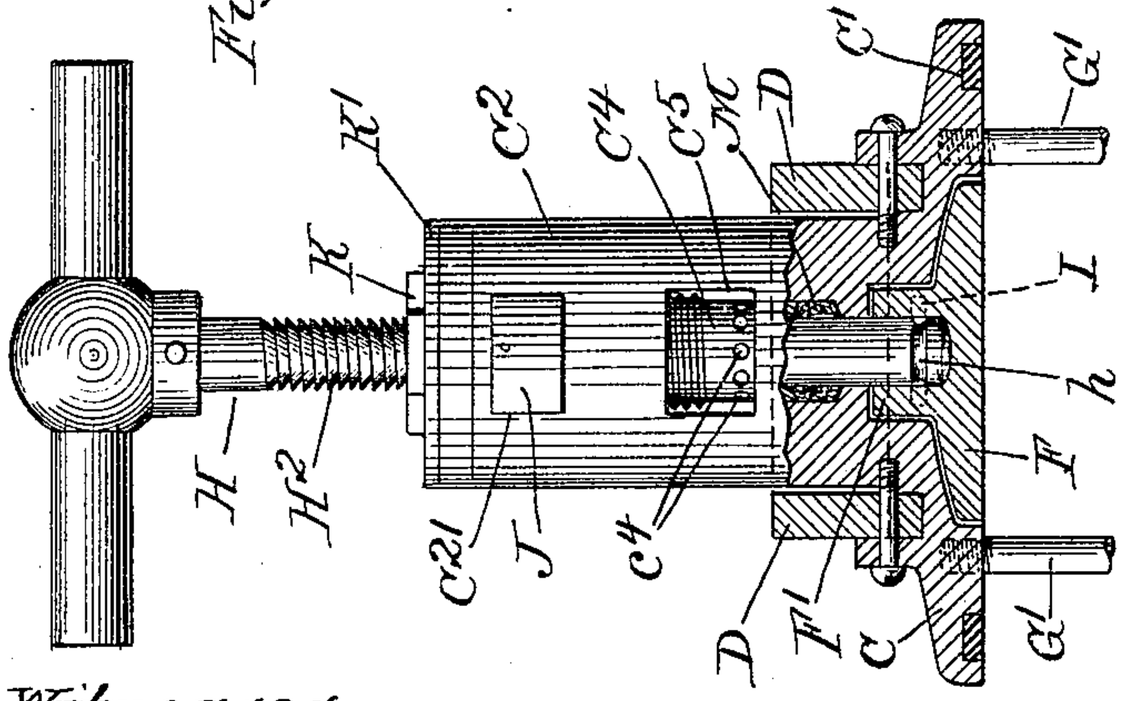

Fig. 3.

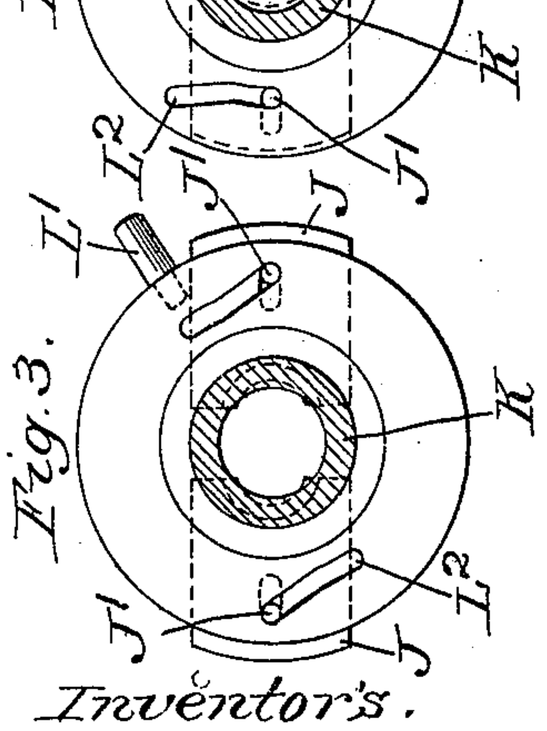

Fig. 4.

Witnesses.

Edward T. Wray.

Howard L. Kraft

Inventor's.

Henry Hartwig and

Adam Wm. Feltmann.

by Burton & Burton their Atty's

UNITED STATES PATENT OFFICE.

HENRY HARTWIG AND ADAM WM. FELTMANN, OF CHICAGO, ILLINOIS.

DENTAL VULCANIZER AND CELLULOID-PRESS.

SPECIFICATION forming part of Letters Patent No. 659,747, dated October 16, 1900.

Application filed November 4, 1899. Serial No. 735,852. (No model.)

To all whom it may concern:

Be it known that we, HENRY HARTWIG and ADAM WM. FELTMANN, citizens of the United States, residing at Chicago, Cook county, Illinois, have invented certain new and useful Improvements in Dental Vulcanizers and Celluloid-Presses, which are fully set forth in the following specification, reference being had to the accompanying drawings, forming a part thereof.

The purpose of this invention is to provide an improved apparatus in the nature of a dental vulcanizer and celluloid-press for forming and vulcanizing celluloid and rubber plates for dental work.

In the drawings, Figure 1 is a vertical axial section of our improved press and vulcanizer. Fig. 2 is a detail side elevation, partly sectional, in a plane at right angles to that of the section in Fig. 1. Figs. 3 and 4 are detail sections at the line 3 4 in Fig. 1, showing the nut-closing cam-plate in plan view in its two positions.

A is the pot or crucible.

B is the cupola or flame-dome, into which the pot A is inserted and by which it is supported and exposed to the flame, which it is the purpose of the cupola to gather and direct about to the pot for the purpose of heating the same.

C is the cap or cover of the pot. It is provided with the customary means for making it tight at its junction with the upper edge of the pot, consisting of asbestos packing lodged in a groove C′ in the cover and forming the seat of the upper edge of the pot on the under side of the cover.

D is the clamp by which the cover C is bound to the pot. It is secured by a bolt D′, hinged to the pot and adapted to swing up into engagement with the notched end of the clamp, the other end of the clamp being secured by a bolt D^2, inserted through the clamp and provided with an operating-handle D^{20} The cap or cover C has a turret or hub C^2 extending up at the center to afford guidance and bearing for the screw-shaft H, which operates the disk or follower F, as hereinafter explained, in closing up the flask or mold.

G is a plate which carries the flask within the pot. It is suspended from the cap C by three rods G′ G′, screwed into the cap, and G^2, pivoted to the cap, the rods G′ being inserted through the apertures *g g* in the plate G and the rod G^2 being arranged to be swung into the notch *g′* in the plate G after the flask or mold has been put in position on the plate G. The length of the rods G′ G^2 is such as to support the plate G at a short distance above the bottom of the pot, so that the flask or mold supported on the plate is kept out of contact with the pot, being at some distance both from its side walls and bottom. The cap C is recessed in the under side to accommodate the follower F when the latter is withdrawn upward to the highest point, as seen in Fig. 1. The follower has for its stem a screw-shaft H, to which it is connected so as to be depressed and lifted by the latter, but not to be rotated by it, a groove *h* being made around the shaft near the lower end and keys I I being inserted through the hub F′ of the follower F, so as to extend tangentially past the opposite sides of the shaft, lodging in the groove, being engaged half their diameter in the groove and half their diameter in the hub.

An important feature of this invention consists of the adaptation of the device to afford opportunity for the operator to test or "sense" the condition of the substance in the mold—that is, as to whether it is softened sufficiently to permit the mold to be forcibly closed up without danger of rupturing the same or displacing the teeth or other insets which may be lodged in it for the purpose of becoming embedded in the plate to be made therein—and also its adaptation to afford opportunity for the removal of the entire flask from the pot in order that the condition may be observed by the eye, as well as tested by the hand, without relieving the pressure upon the mold. These two results are accomplished by the structure shown, in which the mold is held between the bottom plate G and the follower F independently of any support on the pot, either top or bottom, and by the provision, about to be described, which permits the follower to be depressed directly by the hand of the operator on pressing the upper end of the screw-shaft and also to be depressed forcibly by the rotation of the screw-shaft and to be locked by the nut or released therefrom at will. The upper portion of the

screw-shaft has a ratchet-thread H^2, having its abrupt face upward, so that when engaged with a corresponding nut it tends to resist upward pressure and is adapted, therefore, to be operated to press downward with a minimum liability to injure or jam the thread. The nut with which this ratchet-thread of the shaft is engaged is made of two parts J J, for which a seat is provided by an aperture C^{21}, extending through the hub C^2 of the cover toward the upper end, so that the two parts of the nut may be moved apart or may be closed up upon the thread of the shaft. This two-part nut is retained in its seat by the nut K, which is screwed into the upper end of the hub or turret C^2 and has a flange K′ extending out over the upper end of the turret and serving to retain in a rabbet formed at the upper end of the latter a cam-plate L, which is provided with a handle L′, by which it may be rotated on the hub. Said cam-plate has two oblique or eccentric slots L^2 L^2, into which project studs J J′, rooted in the two parts, respectively, of the divided nut J J. It will be understood that the rotation of the cam-plate in one direction will force the two parts of the nut apart, and its rotation in the opposite direction will move them together and close them up upon the screw-shaft. In order to lock them in the latter position, the slots L^2 L^2 at their inner ends terminate in a portion extending concentric with respect to the axis of the parts for a sufficient distance to afford a seat for the studs, so that the outward pressure of the latter has no tendency to crowd the cam-plate around in a direction to permit outward movement of the two parts of the nut.

Suitable packing M for the stem is provided at the recess C^{20} in the turret C, and the packing-nut C^4 is screwed into the stem above such packing, and in order to obtain access to this nut to compress the packing without removing the two-part nut and other elements at the upper end of the hub a transverse aperture is made at C^5 entirely through the hub above the packing-seat, and the nut C^4 is provided with sockets c^4 to permit its engagement by lever-pins to rotate it.

The mode of use of this device may be understood by one familiar with the details of dental vulcanizers and celluloid-presses now in common use. The pot A is designed to contain a suitable amount of water, from which when the pot is closed and exposed to the heat of the flame in the cupola steam-pressure is generated to any desired degree, producing any desired temperature—for example, about 225° Fahrenheit for celluloid and 320° Fahrenheit for rubber, these temperatures being suitable for the purposes, respectively, of softening the celluloid to cause it to take the shape of the mold and of softening and vulcanizing the rubber. The flask or mold of plaster-of-paris is supported on the plate G, the lower half or drag being lodged thereon. The cavity is suitably charged with the celluloid or rubber to be molded or vulcanized and the cope or upper half of the mold or flask is placed in position above the drag and under the follower F. The rod G^2 is then latched in place and the cap holding the cage comprising the plate G and the suspending rods and now containing the flask is now put in place over the pot, the cage and its contents being suspended within the latter. The clamp being tighted and the proper heat applied the operator will be able to determine by pressing upon the upper end of the screw-shaft when the divided nut is open and the shaft is free therefrom when the celluloid or rubber is suitably softened to yield to proper pressure and fill the cavity of the mold without danger of rupturing the latter or displacing the teeth which have been set therein. If it is difficult to judge in this way in any instance, the operator will depress the follower by means of pressure upon the upper end of the shaft to such an extent as is manifestly safe, and then closing up the nut to lock the shaft in that position he may open up the pot and withdraw the cover and flask carried thereby and examine its condition without relieving the pressure by which the flask has been closed and therefore without changing its condition in any respect during such examination, and he can then restore the flask to the pot and close it up and raise it again to the necessary temperature to finish the process. Whenever it is determined either by inspection or by the resistance felt by the hand in attempting to force the flask together by pressure on the screw-shaft that the material is in a proper condition, the nut J J will be closed upon the shaft and the latter rotated to completely close up the flask, forcing out through the crevice between the drag and cope any excess of material. The temperature being maintained for a sufficient time to effect the vulcanizing (when rubber is the substance operated upon) the pot will be opened, the cover and flask withdrawn, the pressure being still maintained by the screw, and the flask may be cooled by being plunged immediately into water. The advantage of this will be understood by those accustomed to using the devices now in common use, in which the cooling can only be effected by cooling the pot before the removal of the flask therefrom. Such cooling reducing the pressure in the pot, which is relied upon to hold the two parts of the flask together, the plate is liable to be sprung and it is therefore necessary in the use of these devices to allow the cooling to occur gradually, occupying several hours and delaying the finishing of the work, whereas with our device the cooling can be effected within a very short time for the reasons above explained.

In order to avoid the accidents which are so liable to occur in the use of the ordinary devices, operators are frequently led to suspend the process before the best temperature in obtained for fear of exceeding a safe tem-

perature and spoiling the work. With our apparatus, however, no uncertainty need ever exist as to whether the substance is sufficiently fluid to effect the desired result before the flask is closed up tight, and the flask being held securely closed by the screw it is possible and safe to continue the process to a higher temperature than would ordinarily be risked were it not for this certainty. The result is a much tougher plate than can be produced when the flask is thus securely closed by pressure independent of that generated in the chamber in which the flask is exposed to the heating element.

In the celluloid-presses in common use the flask rests upon a frog or upraised boss on the bottom of the pot and the heat is thereby conducted directly through metal to the flask and that side of the flask is almost certain to be hotter than the remainder or to be heated in advance of the remainder. If the heat is continued therefore until the best temperature is obtained throughout the remainder of the flask and the substance being molded therein the proper temperature is liable to be exceeded at the lower side, especially along the lines corresponding to the line of contact of the flask with the frog. The unequal temperature not only causes inequality in texture, but frequently causes fatal defects by reason of overheating at the lower side, and it is therefore a very important advantage of our device than no contact occurs between the flask and the pot during the entire process.

When our apparatus is employed for the purpose of molding and vulcanizing rubber plates, another important advantage is obtained by its use by reason of the opportunity it affords for closing up the flask by means of the screw operated from the exterior when the temperature is at the highest point, or at least at the point where the rubber is in the best condition for taking the form of the mold—that is, approximately fluid. This advantage is that thereby the sulfureted hydrogen gas which is generated in the rubber in the process of vulcanizing and at the temperature indicated and which, failing to escape, renders the plate porous in the thicker parts is forced out by the pressure applied to the rubber when it is at that stage in the process, and thereby the plate is rendered of substantially-uniform density throughout both thinner and thicker portions. The presence and subsequent working out of the sulfureted hydrogen gas from the plate while it is being worn in the mouth is the cause or is at least commonly understood to be the cause of what is known to be "rubber sore mouth," and the use of our apparatus in making these plates tends largely, therefore, to prevent rubber sore mouth resulting from the wearing of the plates thus made.

It will be evident upon consideration of this apparatus and the specific purpose which it is intended to serve that it is not absolutely essential to these purposes, or to some of them at least, that the cage or means of suspending the flask in the pot should be attached to the cover; but in order to close up the flask by means of the screw or other mechanical expedient operated from the exterior and to hold it closed positively while it is removed from the pot bodily it is necessary that the mechanical device by which the follower is advanced upon the flask to close up the latter while such flask rests upon the support provided for it must obtain its bearing and the resistance necessary to adapt it to close up the flask on a part which is connected to the support of the flask. In the structure shown the cover is the bearing for the device—to wit, the screw which advances the follower—and the rods G' G^2 constitute the connection from that bearing to the support of the flask—to wit, the plate G. Any structure in which there is a support for the flask and a bearing for the element which advances the follower and a connection between such bearing, and in which the entire structure comprising such support and bearing and their connections is supported by the pot and in which the means for operating the mechanical device which advances the follower is accessible outside the pot when the latter is closed by the cover will involve the essence of this feature of our invention.

We claim—

1. An apparatus for the purpose indicated, comprising a pot and a cover adapted to be secured thereon, having suspended on its lower side into the pot a support for the flask; a follower for closing up the flask having its stem extending through the cover and in position to be operated by hand; and means disengageably connected with the stem for holding it against withdrawal or advance under direct longitudinal pressure in either direction; whereby the condition of the material which is molded in the flask may be tested by direct hand-pressure on the stem, and mechanical power may be applied to compress it.

2 An apparatus for the purpose indicated, comprising a pot, a cover, and a flask-supporting cage suspended therefrom within the pot, a flask within the cage, a stem for operating the follower extending out through the cover and threaded, and a divided nut mounted on the cover and adapted to be closed up to engage the threaded portion of the stem and to be opened to release the same at will.

3. In an apparatus for the purpose stated in combination with the pot and means therein for supporting the flask, a follower adapted to be advanced upon the flask to close it up and having a stem which extends out through the cover and is threaded, and a divided nut mounted on the cover and stopped against movement longitudinally with respect to the stem, and adapted to be closed up to engage the latter and to be opened to release it, as well.

4. An apparatus for the purpose indicated, comprising the pot, means for supporting the

flask therein, the follower within the pot and a stem for the same extending out therefrom; mechanical means for operating upon the stem for advancing the follower, adapted to be engaged therewith and released therefrom at will; whereby the follower may be advanced by the hand of the operator and then engaged with the mechanical devices and retained, or further advanced, at will.

5. In combination with the pot and the cover for the same, the follower having its stem extending out through the cover, the latter having a seat, C^{21}, extending transversely to the axis of the stem, the divided nut lodged in said seat, and the cam-plate L journaled about the stem and longitudinally stopped in respect to the axis of its journal-bearing, and having eccentric slots, L′, L′, the two parts of the nut having abutments which engage such slots, whereby the rotation of the plate opens and closes the nut.

6. In combination with the pot, the cover having the extended hub or turret, the follower having its stem extended through such hub and threaded on an upper portion of its length, a divided nut mounted in the turret, adapted, when closed up, to engage the threaded portion of the stem, and suitable means for closing it up, the hub, having a packing-cavity below the seat of the divided nut, and threaded below said seat; a nut to engage with such threaded portion to compress the packing, the hub being transversely apertured above the packing-seat and giving access to the packing-nut for the purpose of operating it.

In testimony whereof we have hereunto set our hands, in the presence of two witnesses, at Chicago, Illinois, this 25th day of October, 1899.

HENRY HARTWIG.
A. WM. FELTMANN.

Witnesses:
CHAS. S. BURTON,
ODNA H. BOWEN, Jr.