(No Model.) 2 Sheets—Sheet 1.

L. T. BOWMAN.

MACHINE FOR MOLDING BUNG BUSHES.

No. 437,968. Patented Oct. 7, 1890.

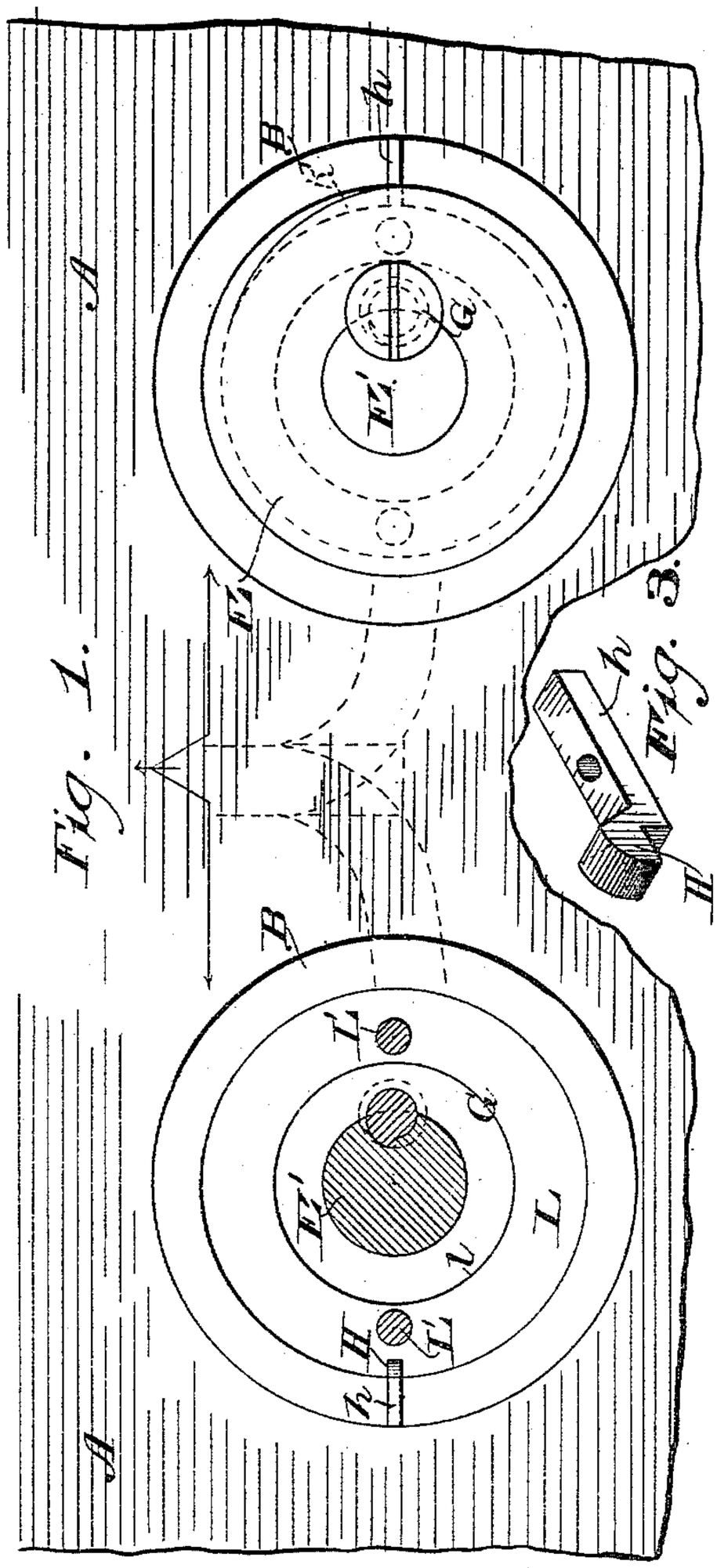

Fig. 1.

Fig. 3.

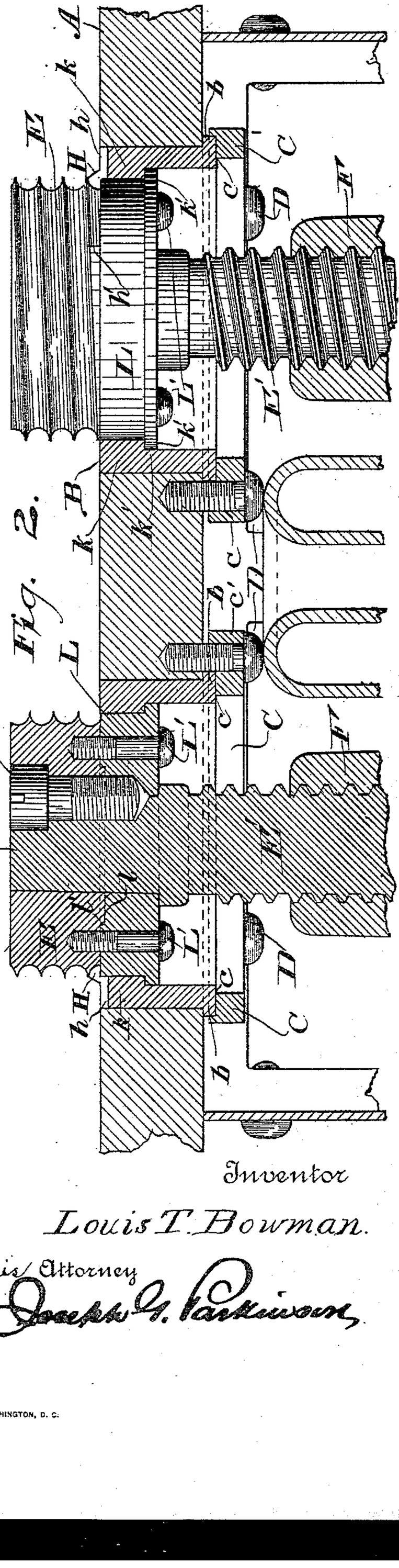

Fig. 2.

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(No Model.) 2 Sheets—Sheet 2.

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No. 437,968. Patented Oct. 7, 1890.

Fig. 4.

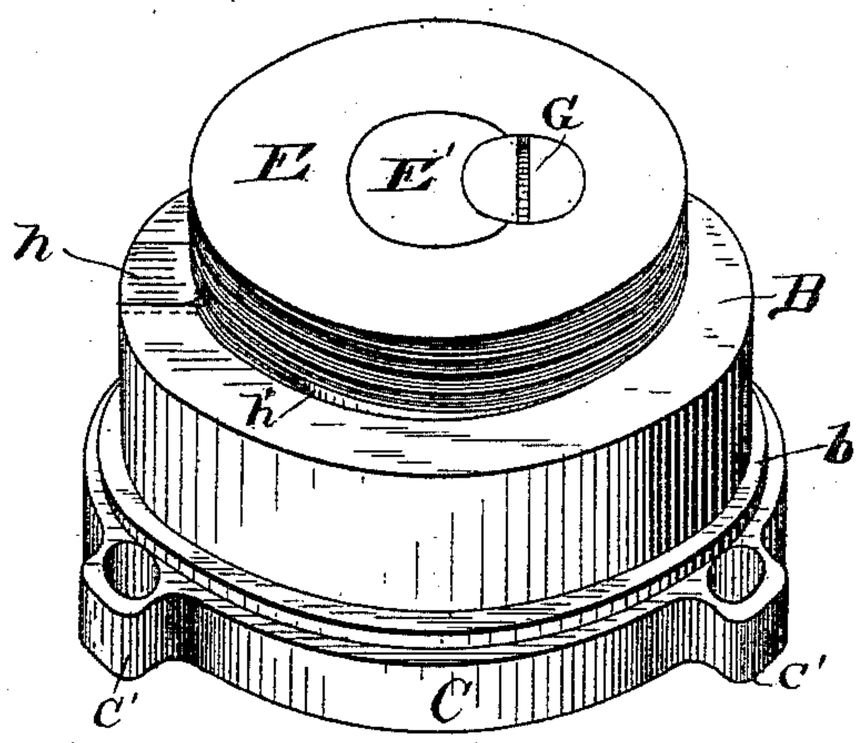


Fig. 5.

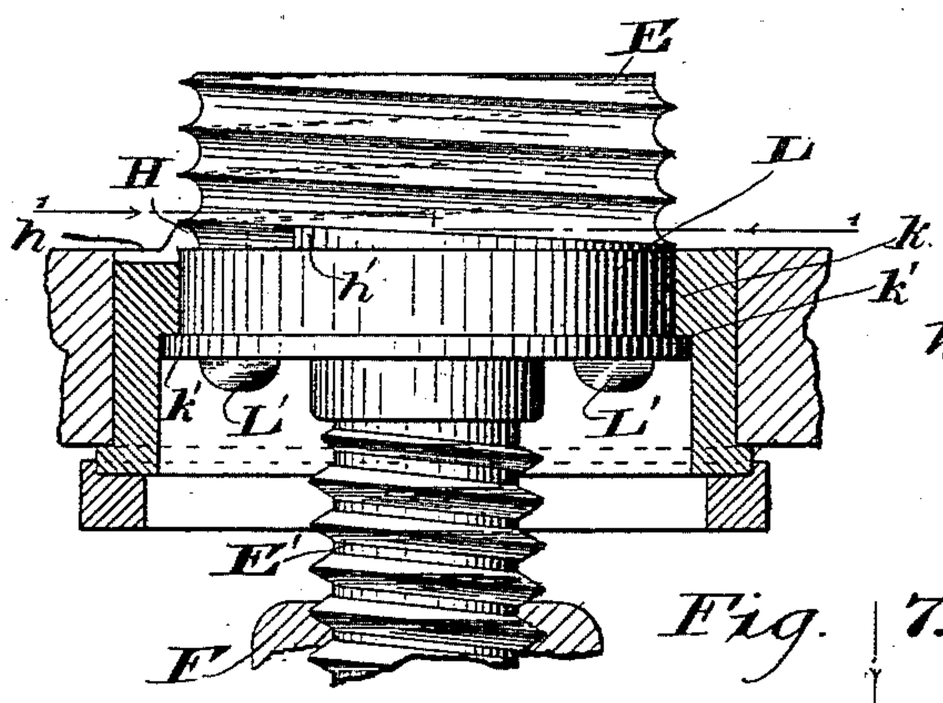


Fig. 6.

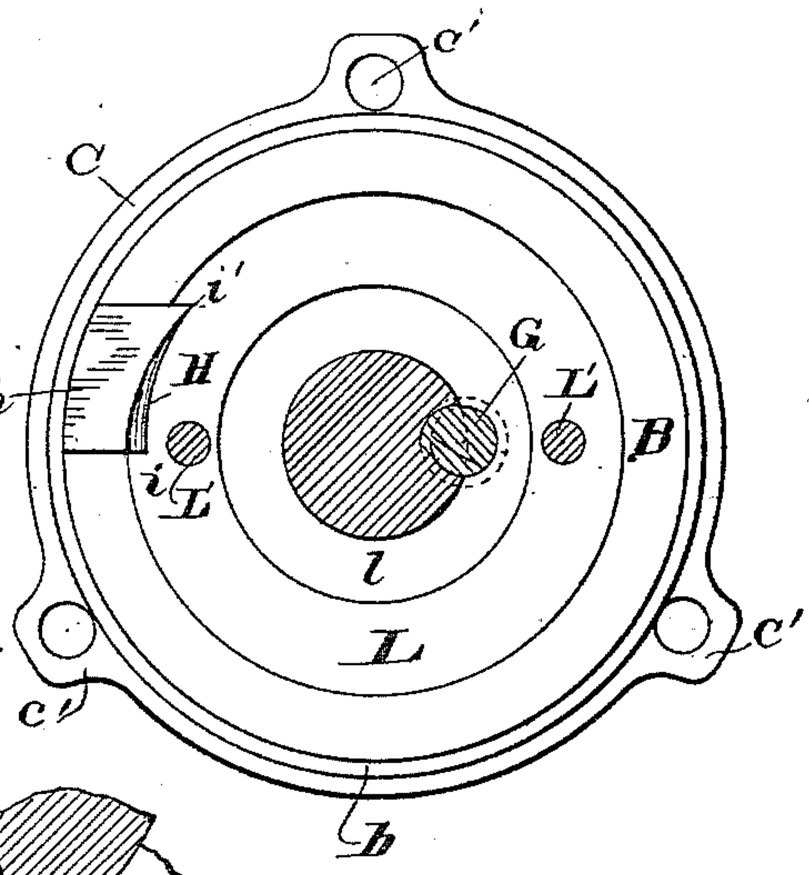


Fig. 8.

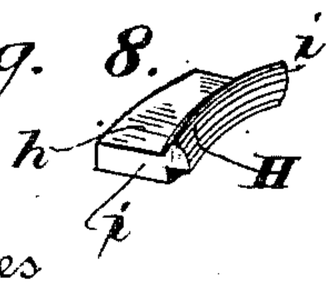
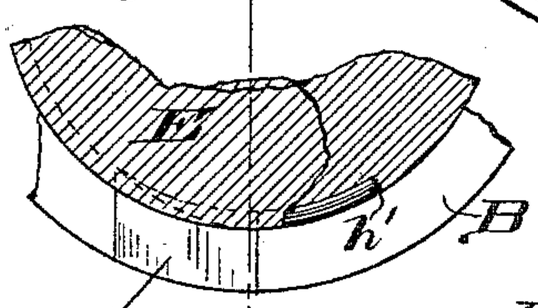


Fig. 7.



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UNITED STATES PATENT OFFICE.

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MACHINE FOR MOLDING BUNG-BUSHES.

SPECIFICATION forming part of Letters Patent No. 437,968, dated October 7, 1890.

Application filed April 3, 1890. Serial No. 346,378. (No model.)

To all whom it may concern:

Be it known that I, LOUIS T. BOWMAN, a subject of the King of Norway and Sweden, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Machines for Molding Bung-Bushes, of which the following is a specification.

Letters Patent of the United States No. 360,404 were granted to A. G. Anderson on the 5th day of April, 1887, for an improvement in bung-bush-molding machines, wherein, among other things, the threaded lining in the top plate or table, through which the pattern is carried up into the flask, has its upper thread extended above the flush surface of the table to about the extent of half the pitch and then terminating in an abrupt shoulder or "stop-off," which defines the end of the thread in the mold, the purpose of this stop-off being to prevent the formation of a thin wedge-shaped block of sand in the mold at this point, which, together with much more, would be apt to crumble away with the withdrawal of the pattern—that is, whenever the pattern is retracted its revolution would be apt to carry away with it particles of sand from the "wind-up" of the thread in the mold were it not for the presence of this abrupt stop-off filling the thread in the pattern and opposing the sand of the mold. In the Anderson device the lining is threaded quite a considerable distance of its whole length from the top, and the stop-off is but a continuation of the thread. This seems to have been thought necessary, although the pattern is carried up, as a whole, by a revoluble spindle, which has a thread of the same pitch as the pattern, and therefore would lift the latter without the presence of the threads in the lining, in order to form a "cut-off" or sort of collar to prevent the sand falling through when the flask is filled or while being rammed; but in practice it has been proved that notwithstanding this precaution some sand will collect between the pattern and the lining when the latter is threaded, whereby the withdrawal of the pattern will tend to grind down and ruin the threads of both pattern and lining, and that the greater the distance the lining is threaded the greater will be the wear. Another drawback in the said device is that no provision is made for registering the stop-off thread with the thread on the pattern, or adjusting its position with reference to the ingate of the mold or for the purpose of taking up wear. In practice in machines of this nature two parallel rows of patterns have been employed upon a single table, so arranged that the runway in the completed flask shall lie centrally between the molds, the ingates branching from it on either side to each individual mold; but the stop-off when used has not been located with any reference either to the ingate or to uniformity of position, as often as not being so placed that the full force of the molten stream strikes the end of the thread in the sand mold and crumbles it away, and at such different points around the circumference of the pattern that the molder, in packing the sand with his hands, is obliged to grope for the angle formed by the stop-off, which requires special care in packing, like all other angles and recesses in a pattern. To obviate these difficulties and otherwise improve the construction of the mechanism for forming the molds, I propose to bore the inside of the lining smooth throughout its entire length, and at the top run a very short thread above the face of the table to the height of about one-half the pitch to form the stop-off, and, further, to preserve the integrity and sharpness of such stop-off I prefer to construct it entirely of hard metal, separate from and affixed to the top of the lining or table. With the lining and stop-off thus formed a pattern will be employed having its upper part threaded, but its lower part or hub turned smooth and cylindrical to fit snugly into the smooth bore of the lining, such cylindrical part extending practically to the top surface of the lining. For the purpose of securing the lining to the table it may be flanged outwardly at the bottom, and an annular ring having a seat to receive such flange may be applied thereto and secured to the table by screws, thus holding the lining by the frictional contact of said flange with the under surface of the table and enabling it to be adjusted when loosened to properly register the stop-off. The cylindrical part of the pattern or plug, or that part fitting within the lining,

may also most conveniently be formed separate from the screw-threaded part or pattern proper and turned so as to fit the lining, and it advisably will have at its base an annular flange which, by coming against an annular internal shoulder on the lining, or by playing in an enlarged part of said lining and being stopped by the shoulder where the diameter of the lining is diminished, will serve to gage the height to which the pattern may be projected above the table. Finally, the stop-off in each row is given a practically defined and uniform position relatively to the runway or length of the row, so that the operator or molder will be required only to pack the sand at the same point around each pattern to fill the angle or recess in front of the stop-off, and advisably this point is that farthest from the runway or ingate to protect the end of the thread in the sand mold from the force of the inflow of the molten metal, thus bringing all stop-offs on the outer side of the row of patterns.

In the drawings, Figure 1 represents in top plan view a part of the table of a bung-bush-molding machine, showing a pair of patterns, one on each side of the line of the runway and having my invention applied thereto, the threaded part of the pattern on the left-hand side being removed to expose the top of its hub and the screws for uniting the two parts, together with that for uniting both to the spindle and the spindle itself in section. Fig. 2 is a vertical transverse section through the machine, showing one of the pair of patterns in section and the other in elevation. Fig. 3 is an enlarged detail of the stop-off shown in the preceding figures; Fig. 4, a perspective view of a bung-bush-molding pattern with its lining and the clamping-ring for the latter detached, showing an alternative and preferable form of my invention. Fig. 5 is an elevation of the same with the table, the lining, and the clamping-ring in section; Fig. 6, a top plan view of the same with the threaded part of the pattern removed and the uniting-screws in section; Fig. 7, a sectional detail, and Fig. 8, a perspective view of the stop-off represented in the preceding four figures.

A represents the top plate or table of my improved machine, which plate, if it is of brass, will not need any lining to its openings, as they can then be turned or bored in the same way as independent linings themselves, and therefore in the ensuing description where "linings" are spoken of, unless specifically defined and limited, it may be understood that the table itself is meant to be included within the scope of the term, provided it is of brass; but as a rule the table is of cast-iron, and the openings therethrough necessarily receive snugly-fitting linings B of brass. These independent linings are formed with an annular flange *b* at their base to rest against the under surface of the table, and this flange in turn fits into a seat *c* in an annular ring C, provided with ears *c'*, bored to receive screws D, which enter threaded sockets in the under side of the table beyond the body of the lining and serve to clamp the ring against the flange of said lining and the latter against the table, whereby it will be held by friction against displacement, but can be readily adjusted whenever the screws are loosened, and then set up or clamped against the table again to hold it in position. Such capacity of adjustment enables it and the stop-off, which it carries, to be brought into proper register with the thread of the pattern and in proper relation to the gate for the induction of the molten metal, as hereinafter explained.

The patterns E are carried up through these linings until they project the proper height above the table by means of threaded spindles E', passing through nuts or internally-threaded sleeves F, rising from the usual benches, their threads being the same pitch as those of the patterns, so that when revolved they may project the patterns or withdraw them. The patterns are secured to the top of these spindles in any proper manner—for instance, by the screw G, driven down into a threaded bore formed between the two, a part in each, the pattern itself fitting over the turned-off or reduced top of the spindle. When thus applied, the screw serves not only to unite the pattern to the spindle, but as a key to prevent the pattern from radial displacement thereabout.

Now, as already explained, I propose to make the inside of the lining smooth, with the exception of a single short thread rising above the surface of the table to about one-half the pitch or a little over, and turn the hub of the pattern also smooth to fit the smooth bore of the lining, thereby obviating the grinding of the threads or other objectionable features existing when the inside of the lining is threaded and threads from the hub of the pattern engage therewith, since any sand that gets in between the pattern and lining will go straight down between the smooth walls either before the withdrawal of the pattern or at the time the withdrawal is taking place, while also by this means such a snug fit is obtained that the risk of sand finding entrance between the walls is reduced to a minimum.

In order to bore the lining smooth and yet secure a uniform fit of the stop-off at the top of the lining with the thread of the pattern, it is advisable to first turn the periphery of the lining to fit the hole through the table so that when its bottom flange is resting against the under surface of the table its top shall be flush with the upper surface thereof. A channel should then be formed radially or thereabout in the top surface of the lining, reaching to the central bore, which latter should be smooth—that is, formed without threads—and perfectly cylindrical. This channel will be of such depth only as to receive a plate *h* of sufficient strength to support the stop-off H and leave the top of the plate flush with the surface of the table. This, as shown in Fig. 3 of the drawings, may have a vertical

face at each side and have the sectional outline indicated in the various figures—that is to say, it should be about one-half the pitch of the pattern, the lower half being cut away to leave a plane face, which when the pattern is carried to its full height will rest upon the upper face of the hub at the point where the thread terminates; but if the hub is integral with the pattern proper the stop-off may be full pitch and the thread of the pattern will be brought to an abrupt stop without diminishing the pitch. One side of this stop-off, when the pattern is in position for forming the sand mold, will rest against the abrupt shoulder *h'*, where the thread of the pattern terminates, at or adjacent to its juncture with the hub, while the other face will be presented to the sand of the mold, so that when the sand has been packed and the pattern withdrawn this face will meet the end of the thread formed in the mold and will prevent it from being drawn away or broken with the recession of the pattern. It will be understood, of course, that the stop-off itself will be formed with the proper "draw" to enable the mold to be lifted off of it without injury after the pattern has been withdrawn.

Instead of constructing the stop-off as shown in the first three figures, and particularly in Fig. 3, it may be and preferably is constructed as in the succeeding figures—that is to say, it has but one abrupt or vertical face *i*, intended to come against the shoulder at the end of the thread in the pattern, as will be understood from Figs. 5 and 7, and from this face it is extended in a gradual taper fitting within and corresponding to the pitch of the threads of the pattern until it finally comes to an edge *i'*, lying close against the core and base of such thread, as if a scraper. When thus constructed, it serves fully the purpose of a stop-off, but leaves no abrupt shoulder in the mold, the thread in the latter ending gradually and losing itself without any sharp angles such as might crumble or be broken in withdrawing the mold, or by inflow of the molten metal in the process of the casting. The lining provided with this stop-off, the base of which will be secured in the seat formed for it in such manner as to leave a flush surface with the top of the lining, may now be placed in position and by adjusting it upon its axis and clamping it at the proper time may be so arranged that the shoulder or abutment or tapering thread forming the stop-off will come opposite the gate, which arrangement, if not absolutely essential, is at least very desirable, since, as already suggested, it protects the end of the thread in the sand mold from the abrasive force of the fluid metal and brings all the stop-offs in a series of molding-patterns in line with each other, so that sand may be packed around them by a practically unbroken sweep of the hand down the series.

That part of the pattern which is not intended to rise above the surface of the top plate, and so much, also, of that which rises above the top plate as is necessary to the abrupt termination of the base-thread of the pattern, will of course be turned off to a cylindrical surface to smoothly fit the smooth cylindrical interior of the lining, but as a precaution against sand from the flask working through the lower internal wall of the lining is bored to a greater diameter than the upper, thus leaving at the top an annular rim or collar *k*, closely fitting the hub of the pattern, as shown, and beneath this, either upon said hub or secured thereto, is formed a flange or disk *k'*, fitting closely the enlarged diameter of the lining and coming against the shoulder between said enlarged diameter and the more constricted upper part or annulus when the pattern is at its extreme height.

In practice I have constructed the lower cylindrical part or hub L of the pattern-head as a separate section or body integral with the flange, and have secured it to the upper section or threaded part of the pattern proper by means of a central annular seat *l*, receiving an intermatching boss *l'* from the upper section, and by screws L', driven through the lower section into the other, as indicated in the drawings; but this has been for convenience and is not essential to the other features of my present invention, except in so far as it may tend to greater perfection of the machine, and I do not intend by any means to limit myself to such specific construction. Nor do I limit myself to any precise method of raising or retracting the pattern, nor to the employment of an independent supporting-plate for the stop-off, nor by the use of the term "lining" in the ensuing claims do I intend to limit myself to the employment of an actual lining when the top plate itself is of such material as to enable a lining to be dispensed with and the features of my invention to be applied directly to said plate, nor do I confine the application of my invention to the manufacture of bung-bushes alone; but

What I do claim, and desire to secure by Letters Patent, is—

1. The combination, with the threaded pattern and its smooth hub, of a lining bored or turned smooth internally to its top to closely fit such hub, and a stop-off commencing at and rising above the top of said lining.

2. The combination of the pattern, its smooth hub and flange, the lining bored smooth, of two diameters, the upper to fit the hub of the pattern and the lower to fit its flange, and the stop-off rising above the top of said lining.

3. The combination of the pattern, its smooth hub and flange, the lining bored smooth, of two diameters, the upper to fit the hub of the pattern and the lower to fit its flange, and the stop-off thread rising above the top of said lining and constructed with an abrupt or vertical face to come against the shoulder at the end of the thread in the pat-

tern, extending therefrom in a gradual taper to fit within and correspond to the pitch of the threads of the pattern and terminating in an edge.

4. The combination of the pattern, its smooth hub and flange, the lining turned smooth, of two diameters, the upper to fit the hub of the pattern and the lower to fit its flange, the stop-off rising above the top of said lining, and the shoulder or abutment at the end of the thread in the pattern.

5. The combination, substantially as hereinbefore set forth, of the pattern, the lining having a peripheral flange at its base, the table, the annular rim receiving said flange, and the binding-screws.

6. The combination, substantially as hereinbefore set forth, with the lining and peripheral flange at its base, of the table, the annular rim receiving said flange, the stop-off rising above said lining, and the binding-screws.

7. The combination, substantially as hereinbefore set forth, of the pattern having part of an internal screw cut in its central bore, its supporting and actuating spindle having the other part of said screw cut in its periphery, and the external screw serving to unite said pattern to the spindle and as a key to prevent the pattern from being displaced axially around the spindle.

8. The combination, substantially as hereinbefore set forth, of the pattern formed of a smooth-turned hub with an annular seat in its upper face and a threaded ring having an annular tongue to enter said seat and steady said ring laterally, the spindle, and a screw uniting the pattern to the spindle inserted into a threaded bore, part of which lies in the pattern and part in the periphery of the spindle, whereby said screw serves to prevent revolution and as a fastening-screw.

9. The combination, with the molding-table, of a series of threaded patterns arranged in rows and a series of stop-offs, one for each pattern, arranged at the outer side of the rows opposite the position of the ingate of the finished mold.

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