V. E. KNECHT.

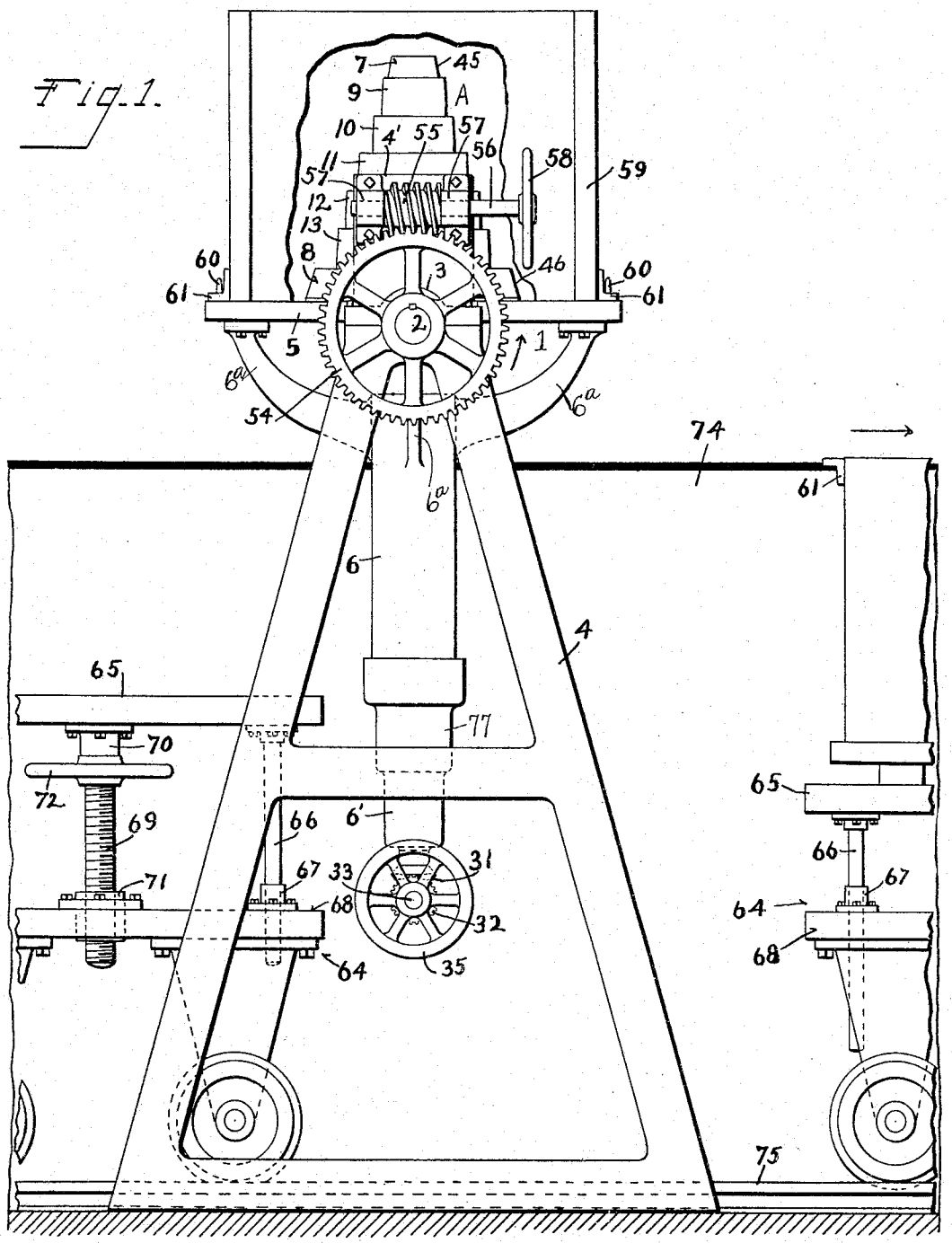
MOLDING MACHINE.

APPLICATION FILED AUG. 21, 1907.

939,032. **Patented Nov. 2, 1909.**

3 SHEETS—SHEET 1.

Fig. 1.



Witnesses.

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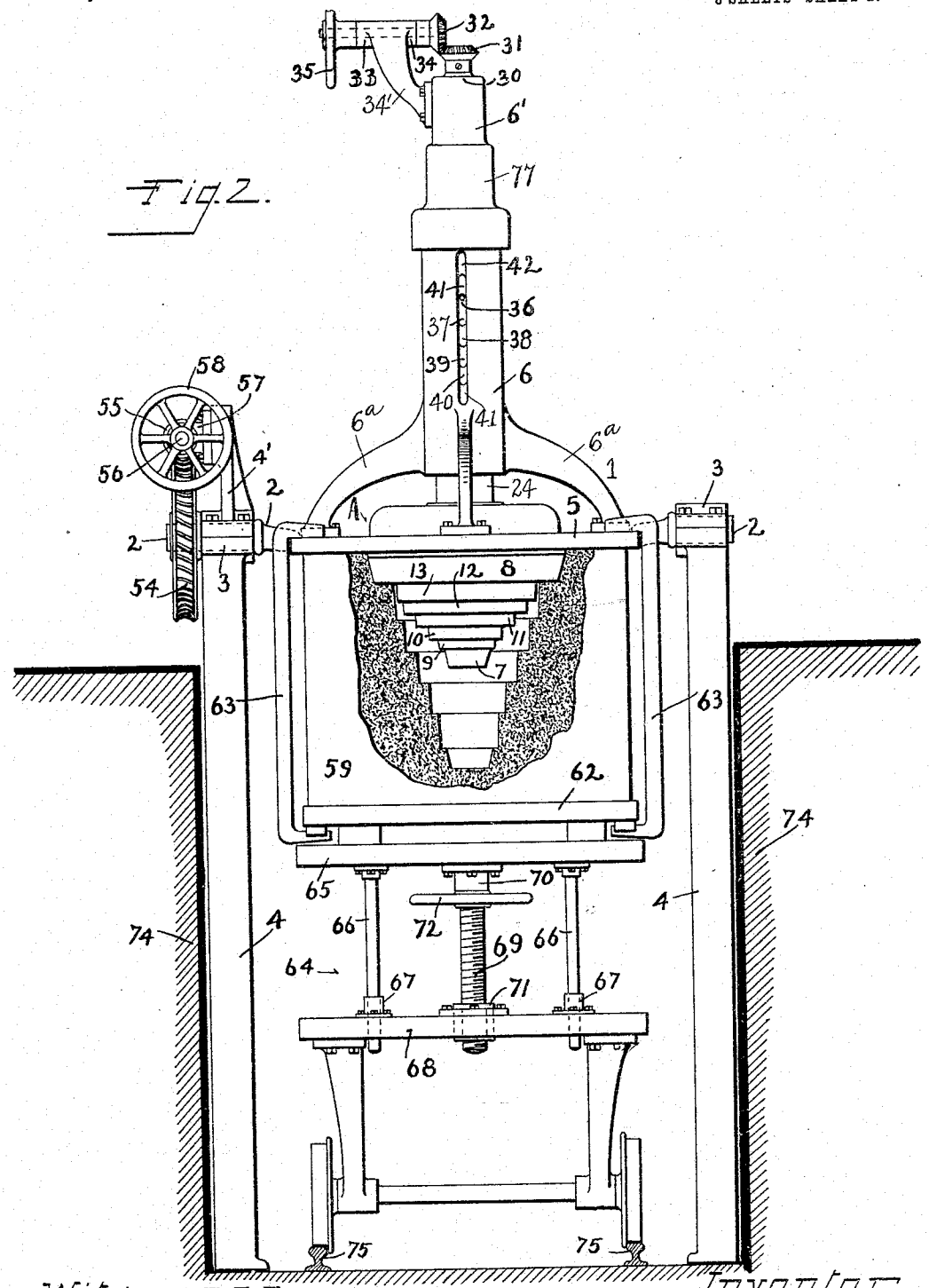
3 SHEETS—SHEET 2.

Fig. 2.



Witnesses.

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3 SHEETS—SHEET 3.

Fig. 3.

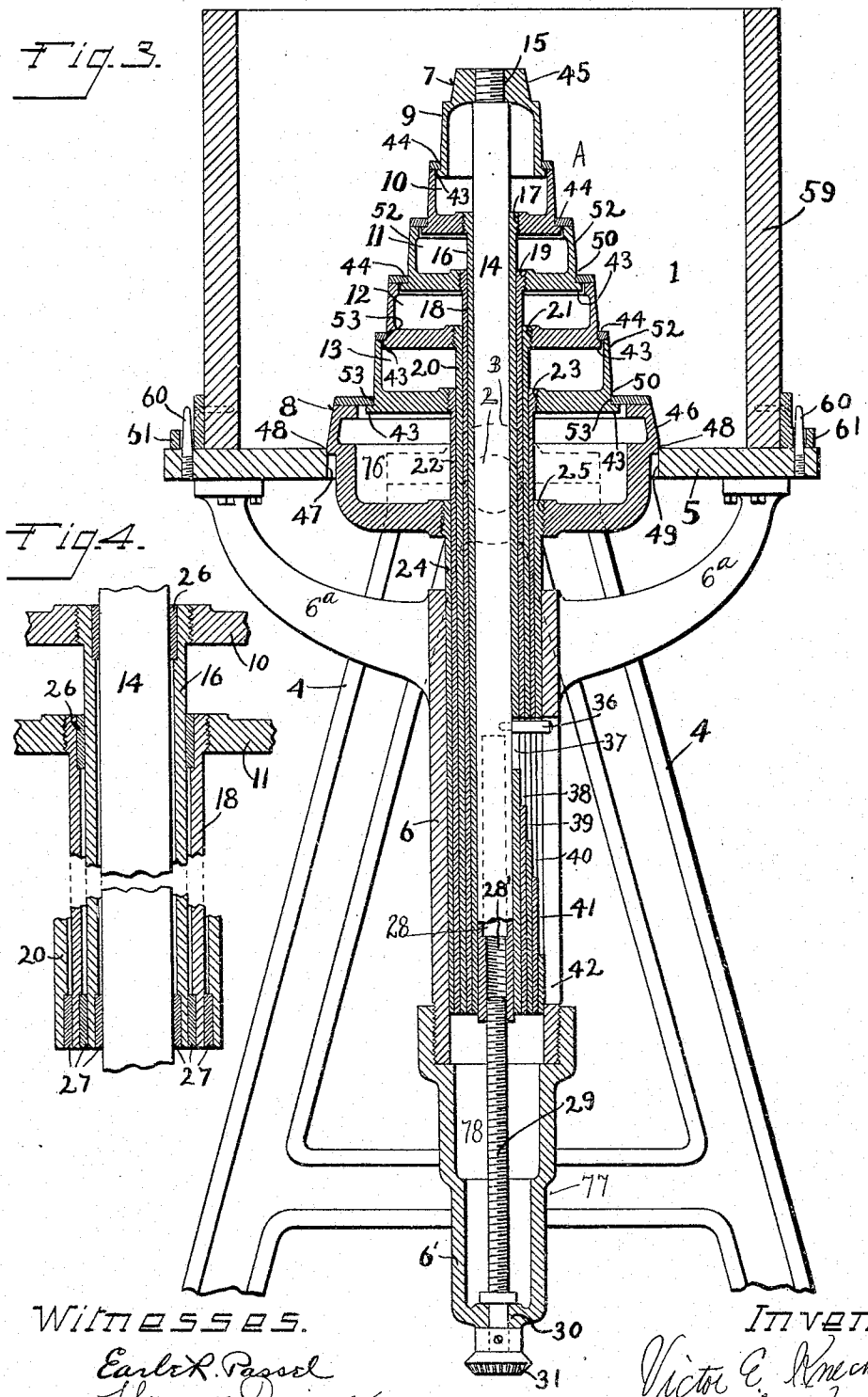

Fig. 4.

Witnesses.

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UNITED STATES PATENT OFFICE.

VICTOR E. KNECHT, OF CINCINNATI, OHIO.

MOLDING-MACHINE.

939,032. Specification of Letters Patent. **Patented Nov. 2, 1909.**

Application filed August 21, 1907. Serial No. 389,559.

To all whom it may concern:

Be it known that I, VICTOR E. KNECHT, a citizen of the United States, residing at Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Molding-Machines, of which the following is a specification.

My invention relates to molding machines of the character employed in making molds for castings, and has for its object the providing of means for making stepped molds, in which the danger of injury to the mold may be minimized, and further, the providing of a stepped pattern, about which the sand may be tamped, with means for releasing the pattern in telescoping sections, while the unreleased sections maintain the mold in molded condition, the respective sections preferably representing the several steps of the pattern.

The invention will be further readily understood from the following description and claims, and from the drawings, in which latter:

Figure 1 represents a side elevation of my improved device, partly broken away, shown in connection with a truck-pit, the pattern being in raised position and extended relation. Fig. 2 is a front elevation of the same, showing the pattern in inverted position and partially collapsed relation. Fig. 3 is a central vertical section of the pattern-frame, showing the head in extended relation and upright position; and, Fig. 4 is a detail in central longitudinal section showing the sliding connection between the pattern sections.

I have exemplified my invention as employed in making molds for casting so-called cone-pulleys, but the same may be employed in the forming of molds and cores of other various articles, in which a stepped formation is desired or in which off-sets are to be formed in the article, such for instance as the steps or off-sets in the doors of safes and door-frames therefor.

1 represents the pattern-frame which is preferably supported on trunnions 2 mounted in bearings 3 of standards 4. The trunnions are on the bed-plate 5 of the pattern-frame. This bed-plate supports a housing 6 for the purpose hereinafter described. The housing is preferably connected with the bed-plate by means of a spider 6^a.

The pattern proper, in the present exemplification, comprises a minor core-print section 7 and a major core-print section 8, between which body-sections 9, 10, 11, 12 and 13 are located. The body-section 9 is shown integral with the minor core-print section 7. These pattern-sections are arranged to telescope and form the pattern-head A. The movement of the sections is controlled by a central rod 14, which is secured to the minor core-print section 7 as by having threaded connection 15 therewith. A sleeve 16 is guided by the rod and is secured to the body-section 10, as by having threaded connection 17 therewith. A sleeve 18 has sliding connection with a sleeve 16 and is secured to the body-section 11, as by having threaded connection 19 therewith. A sleeve 20 has a sliding fit about the sleeve 18 and is secured to the body-section 12, as by having threaded connection 21 therewith. A sleeve 22 has sliding connection with a sleeve 20 and is secured to the body-section 13, as by having threaded connection 23 therewith. A sleeve 24 has sliding connection with the sleeve 22 and is secured to the major core-print section 8, as by having threaded connection 25 therewith. The sleeve 24 also has sliding connection with the housing. In this manner each of the pattern-sections is permitted to have longitudinal sliding movement with relation to the other pattern-sections, all of the pattern-sections being guided with relation to each other, so that their movements may be in true longitudinal parallel lines, that is to say, the axes of all the pattern-sections may be maintained coincident, so that when the pattern is extended as a whole a true pattern which has a common center or longitudinal axis throughout may be formed, and so that further the various sections of the pattern may be withdrawn in true line while their axes are maintained coincident for insuring that a true mold is made and that danger of injury to the mold by withdrawal of the pattern may be minimized. For forming the sliding-fit between the rod and inner sleeve, and between the other sleeves, I prefer to provide the respective ends of each of the sleeves with bushings 26 27 suitably secured thereto, and the housing may be provided with similar bushings for the sliding-fit of the outer sleeve.

It has been a practice heretofore, in mak-

ing molds of the character shown in the present exemplification, to employ an integral pattern for making the entire mold and to withdraw this integral pattern as a whole from the mold, with the result that defective molds were made, the molds often being useless. For instance, in order to release the integral pattern it was the practice to tap the pattern, which was done by inserting a metal stem into the pattern and striking the same on its sides for vibrating the pattern to loosen it from the mold. This in itself detrimentally affected the true lines of the mold. Again the attempt to withdraw a comparatively large stepped pattern of this kind resulted in very frequent injury to the mold, especially at the stepped parts, as the pattern had a tendency to carry with it the sand of the mold in these stepped parts and especially at the corners thereof. This old method was also tedious. In my improved device I avoid all these objections and provide means whereby a perfect mold may be quickly made, minimizing the danger of injury to the mold and maximizing the number of molds made within a given time.

The rod is preferably operated longitudinally by means of having an internal bore 28, a portion only of which may be threaded as shown at 28′, with which threaded portion a screw 29 engages, the screw being journaled in a bearing 30 at the outer end of the housing 6. A bevel-pinion 31 is on the screw and is meshed by a bevel-gear 32 on a shaft 33 journaled in a bearing 34 on a bracket 34′ on the housing 6 and carrying a hand-wheel 35 for operating the screw 29.

The rod is provided with a pin 36, (see Fig. 3) and the sleeves are respectively provided with slots 37 38 39 40 41, the outer end walls of which the pin is adapted to successively engage for moving the respective sleeves with the pin and rod in the disengaging movement of the latter. The pin is further guided in a slot 42 of the housing 6. These slots are consecutively of greater length, so that when the shaft is moved for withdrawing the pattern, the minor core-print section and smallest body-section are first withdrawn, the pin meanwhile moving in the slot 37 of the sleeve of pattern-section 10. When the pin strikes the outer end wall of this slot, the rod will on further withdrawing movement, carry with it the pattern-section 10, the pin meanwhile moving in the slot 38 of the sleeve of pattern-section 11 until the pin strikes the outer end wall of said slot 38 and thereby carries the pattern-section 11 with it in its further withdrawing movement, the other body-sections and the major core-print section being successively withdrawn in similar manner.

The minor core-print section and the respective body-sections are provided with outward projections 43 preferably in the form of flanges, and the major core-print section and the body-sections are provided with inward projections 44, preferably in the form of flanges, which are adapted to be engaged by the outward projections 43 when the pattern-head is expanded, for limiting the outward movement of the respective sections, and in the exemplification shown, determining the width of belt-face of the respective steps of the cone-pulley. The minor core-print section has a frusto-conical portion 45 and the major core-print section has a frusto-conical part 46 which form the core-prints in the mold. The bed-plate is provided with an opening 47, into which the major core-print section is drawn when releasing the pattern from the mold, the major core-print section being also provided with an annular face 48 adapted to fit the annular face 49 of the opening 47. This annular face 49 of the bed-plate acts as a stripper for preventing damage to the mold adjacent to the frusto-conical part 46. The body-sections are also each provided with an annular face 50 adapted to fit in the opening formed at the inner wall of the respective flanges 44. These faces may also be of other cross-sectional form. In this manner a close joint is formed between the bed-plate and the pattern and the respective sections of the pattern with each other for arresting sand which would otherwise seep into the interior of the pattern-head when filling the flask or tamping the sand. These joints aid in maintaining the working parts of the pattern clean.

In order to relieve the body-sections on withdrawal of the same from the mold, the outer faces of said sections are preferably slightly beveled toward their outer ends, as shown at 52, the core-print sections being beveled as heretofore stated. This also prevents binding between the respective outer faces of the sections and the flanges within which they move. The respective inner walls 53 of these flanges thereby also act as strippers for each preceding section for preventing injury to the mold and breaking of the stepped corners of the same, and insuring that the pattern-sections shall respectively be cleanly withdrawn from the mold without injury to the mold.

54 is a worm-wheel secured to one of the trunnions 2. A worm 55 meshes the worm-wheel. The worm is on a shaft 56 journaled in bearings 57 on upward extensions 4′ of one of the standards 4, a hand-wheel 58 being on the shaft for manipulating the same.

In operation, if it is desired to form a mold, the pattern-frame is turned so as to bring its pattern-head upwardly, the hand-wheel 35 having been manipulated for placing the pattern-sections in extended relation. The pattern-frame having been turned so as

to present the pattern-sections upwardly, a flask 59 is positioned on the bed-plate, pins 60 on the bed-plate being received by positioning lugs 61 on the flask for positioning the flask on the bed-plate. Molding sand is now introduced between the flask and pattern and the same tamped. After the sand has been tamped for forming the mold, a bottom-board 62 is clamped upon the flask, as by means of ordinary founders' clamps 63. The hand-wheel 58 is then turned for swinging the pattern-frame upon its trunnions and presenting the pattern-head with the flask thereabout and the bottom-board clamped in position, downwardly, or in inverted position. A suitable truck 64 is then placed under the bottom-board, preferably in manner so as to have the bottom-board and truck platform touch. I prefer to accomplish this by forming the truck with an adjustable platform 65 having posts 66 slidable in bearings 67 of the truck-frame 68, an adjusting screw 69 being journaled in a bearing 70 secured to the bottom-board, the adjusting screw being threaded into an internally threaded socket-piece 71 secured to the truck-frame, a hand-wheel 72 being on the adjusting screw 69 for raising and lowering the platform. When the platform has been raised so as to contact the bottom of the bottom-board, the hand-wheel 35 is manipulated for first withdrawing the minor core-print section 7 and body-section 9 upwardly from its place in the mold, the body-section 9 being stripped by the flange 44 of the pattern-section 10, the withdrawal of the said section continuing until the pin 36 engages the outer wall of the slot 37, when the pattern-section 10 will begin to move and be stripped by the flange 44 on the pattern-section 11 until the pin impinges the upper end wall of the slot 38, when the pattern-section 11 will begin to move and be stripped by the inwardly extending flange 44 of the pattern-section 12, which, with the pattern-section 13 and the major core-print section 8, are successively withdrawn and stripped by the means heretofore described.

It will be noted that the major core-print section is provided with a cavity 76 into which the pattern sections are substantially drawn, the movement of the major core-print section further drawing the pattern-head through the plate 5 so that, when the head is in collapsed relation, it will be withdrawn from the mold and be in collapsed relation adjacent the bed-plate 5.

For accommodating the outer ends of the sleeves the housing comprises the cap 77, into the cavity 78 of which the said outer ends are adapted to be drawn.

When the pattern-head has been collapsed, the bottom-board being supported upon the truck platform, the platform is lowered, whereby the flask, together with the mold, is lowered away from the pattern-frame to sufficient extent to clear the latter and the pattern-head. The truck is then removed from under the pattern-head and the pattern-head again extended by means of the hand-wheel 35, the pattern-frame being turned by means of the worm and worm-wheel for again presenting the pattern-head into upward position ready for the next mold to be formed. In order that the pattern when raised and the flask thereabout, may be at convenient height for proper molding, I prefer to provide a pit 74 in which the trucks may be received, this permitting the axes of the trunnions to be brought sufficiently low for conveniently filling and tamping the mold. I prefer to run the trucks upon tracks 75, the trucks being received at one side and discharged at the other side of the pattern-frame.

Having thus fully described my invention what I claim as new and desire to secure by Letters Patent is:

1. In a molding machine, the combination of a plurality of relatively telescoping pattern-sections and a movable pattern-frame on which the same are mounted, and means for telescoping said pattern-sections movable with said pattern-frame.

2. In a molding machine, the combination of a swinging frame comprising a bed-plate, a pattern-head comprising a plurality of telescoping pattern-sections to one side of said bed-plate and means for telescoping said pattern-sections arranged to the other side of said bed-plate, said last-named means being mounted for movement with said bed-plate.

3. In a molding machine, the combination of a swinging frame comprising a housing, telescoping pattern-sections having telescoping extensions in said housing, and means for causing telescoping movement of said sections and extensions, said last-named means being mounted on and movable with said swinging frame.

4. In a molding machine, the combination of a swinging frame comprising a housing, telescoping pattern-sections having telescoping extensions in said housing, means for causing telescoping movement of said sections and extensions, said last-named means being mounted on and movable with said swinging frame, and, said housing having a bore for accommodating the movement of the ends of said extensions.

5. In a molding machine, the combination of a swinging frame comprising a housing, telescoping pattern-sections of relatively increasing diameter having telescoping extensions in said housing, means for causing telescoping movement of said sections and extensions, said last-named means being mounted on and movable with said swinging frame, the major one of said sections having a cav-

ity for receiving a plurality of said sections upon the telescoping movement thereof, substantially as described.

6. In a molding machine, the combination of a supporting frame, a swinging frame thereon, a pattern-head on said swinging frame, said pattern-head comprising a plurality of relatively telescoping pattern-sections, strippers on the respective pattern-sections for adjacent pattern-sections, and means mounted on said swinging frame for swinging with relation to said supporting frame, said last-named means relatively moving said pattern-sections longitudinally for causing telescoping thereof.

7. In a molding machine, the combination of telescoping pattern-sections, a central rod having attachment with one of said sections and sleeves having attachment with others of said sections successively slidable upon said rod and sleeves.

8. In a molding machine, the combination of a pattern-head comprising a plurality of relative telescoping pattern-sections of relative increasing diameter, a rod having attachment with one of said pattern-sections, sleeves having attachment with others of said sections and surrounding said rod, a projection on said rod, said sleeves provided with slots of successively greater length in which said projection is adapted to move, substantially as described.

9. In a molding machine, the combination of a pattern-head comprising a plurality of relatively telescoping pattern-sections, a rod having attachment with one of said pattern-sections, sleeves having attachment with others of said pattern-sections, a housing for said rod and sleeves, a projection on said rod, said sleeves and housing respectively having slots of increasing lengths for said projection for limiting the relative movement between said rod and sleeves.

10. In a molding machine, the combination of pattern-head sections comprising a plurality of relatively telescoping pattern-sections, a rod having attachment with one of said pattern-sections, sleeves having attachment with others of said pattern-sections, a housing for said rod and sleeves, a projection on said rod, said sleeves and housing respectively having slots of increasing lengths for said projection for limiting the relative movement between said rod and sleeves, said housing having a cavity for receiving the ends of said rod and sleeves upon collapsing movement of said pattern-sections.

11. In a molding machine, the combination of a swinging pattern-frame comprising a bed-plate and a housing secured thereto, a pattern-head comprising a plurality of pattern-sections of relatively increasing diameter, said sections having abutments between them, said sections comprising extensions in said housing, and means mounted on and movable with said pattern-frame for successively moving said extensions longitudinally for causing collapsing or extending movement of said pattern-head, substantially as described.

12. In a molding machine, the combination of a swinging pattern-frame comprising a bed-plate and a housing secured thereto, a pattern-head comprising a plurality of pattern-sections of relatively increasing diameter, said sections having strippers for adjacent sections, said sections comprising extensions in said housing and having abutments between them, and means mounted on and movable with said pattern-frame for successively moving said extensions longitudinally for causing collapsing or extending movement of said pattern-head, substantially as described.

13. In a molding machine, the combination of a pattern-frame comprising a bed-plate and a housing having a hub transversely spaced from said bed-plate, a pattern-head comprising a minor core-print section and a major core-print section with body sections therebetween, said sections arranged to relatively telescope, a rod having connection with said minor core-print section, sleeves respectively having connection with the others of said sections and having successive sliding connection with said rod and with each other and said hub, a screw, said rod and respective sleeves successively having abutments between them for causing successive longitudinal movement of said sleeves from said screw, substantially as described.

14. In a molding machine, the combination of a pattern-frame comprising a bed-plate and a housing having a hub transversely spaced from said bed-plate, a pattern-head comprising a minor core-print section and a major core-print section with body-sections therebetween, said sections arranged to relatively telescope, a rod having connection with said minor-core-print section, sleeves respectively having connection with the others of said sections and having successive sliding connection with said rod and with each other and said hub, a screw, said rod and respective sleeves successively having abutments between them for causing successive longitudinal movement of said sleeves from said screw, and strippers on said sections acting on adjacent sections, substantially as described.

15. In a molding machine, the combination of a pattern-frame comprising a bed-plate and a housing having a hub transversely spaced from said bed-plate, a pattern-head comprising a minor core-print section and a major core-print section with body-sections therebetween, said sections arranged to relatively telescope, a rod having connection with said minor core-print sec-

tion, sleeves respectively having connection with the others of said sections and having successive sliding connection with said rod and with each other and said hub, a screw, said rod and respective sleeves successively having abutments between them for causing successive longitudinal movement of said sleeves from said screw, and strippers on said sections, said housing having a cavity at its end for receiving the ends of said shaft and sleeves upon collapsing movement of said head, substantially as described.

16. In a molding machine, the combination of a swinging pattern-frame comprising a base-plate and a housing, said housing comprising a hub, a pattern-head comprising a major core-print section and a minor core-print section with intermediate body-sections, said sections having extensions in said hub, means swinging with said pattern-frame for longitudinally moving said sections, limiting means between said extensions for successively causing movement of one from the other, a trunnion-support for said frame, and means for causing swinging of said frame on said trunnion, substantially as described.

17. In a molding machine, the combination of a supporting frame, a swinging pattern-frame thereon, a collapsible pattern-head on said swinging pattern-frame, means mounted on and swinging with said pattern-frame for causing said collapse, and a pit for said pattern-head, said pattern-frame supported relatively to said pit for causing a molding about said pattern-head to be received by said pit, substantially as described.

18. In a molding machine, the combination of a supporting frame, a swinging frame, telescoping pattern-sections mounted on said swinging frame, a molding flask thereabout, a pit, said frame mounted for swinging at said pit for causing said flask to be received by said pit by the swinging of said frame, means between said supporting frame and swinging frame for causing the swinging of said last-named frame, and means mounted on and movable with said swinging frame for longitudinally moving said telescoping pattern-sections.

19. In a molding machine, the combination of a frame, a pattern-head thereon comprising pattern sections at one end of said frame, means for telescoping said pattern-sections, operating means for the latter at the other end of said frame, said frame arranged for receiving a flask about said head, a pit at which said frame is mounted, and means for swinging said frame for causing said flask or operating means to be received by said pit.

20. A molding machine comprising a rotatably mounted pattern-carrying plate, a flask, means for releasably securing said flask to said plate, a collapsible pattern carried by said plate, and means for collapsing and expanding said pattern.

21. A molding machine comprising a rotatably mounted pattern-carrying plate, a collapsible pattern on said plate, means for collapsing and expanding said pattern, a flask-section adapted to be placed upon said plate to surround the expanded pattern, a bottom plate for said flask-section, and means for clamping said bottom plate to said flask-section and said flask-section to said plate.

In testimony whereof, I have subscribed my name hereto in the presence of two subscribing witnesses.

VICTOR E. KNECHT.

Witnesses:
EARLE R. PASSEL,
FLORENCE QUINN.