No. 754,777. PATENTED MAR. 15, 1904.

F. KEPP.

GEAR MOLDING MACHINE.

APPLICATION FILED AUG. 27, 1903.

NO MODEL. 3 SHEETS—SHEET 1.

Fig. 1.

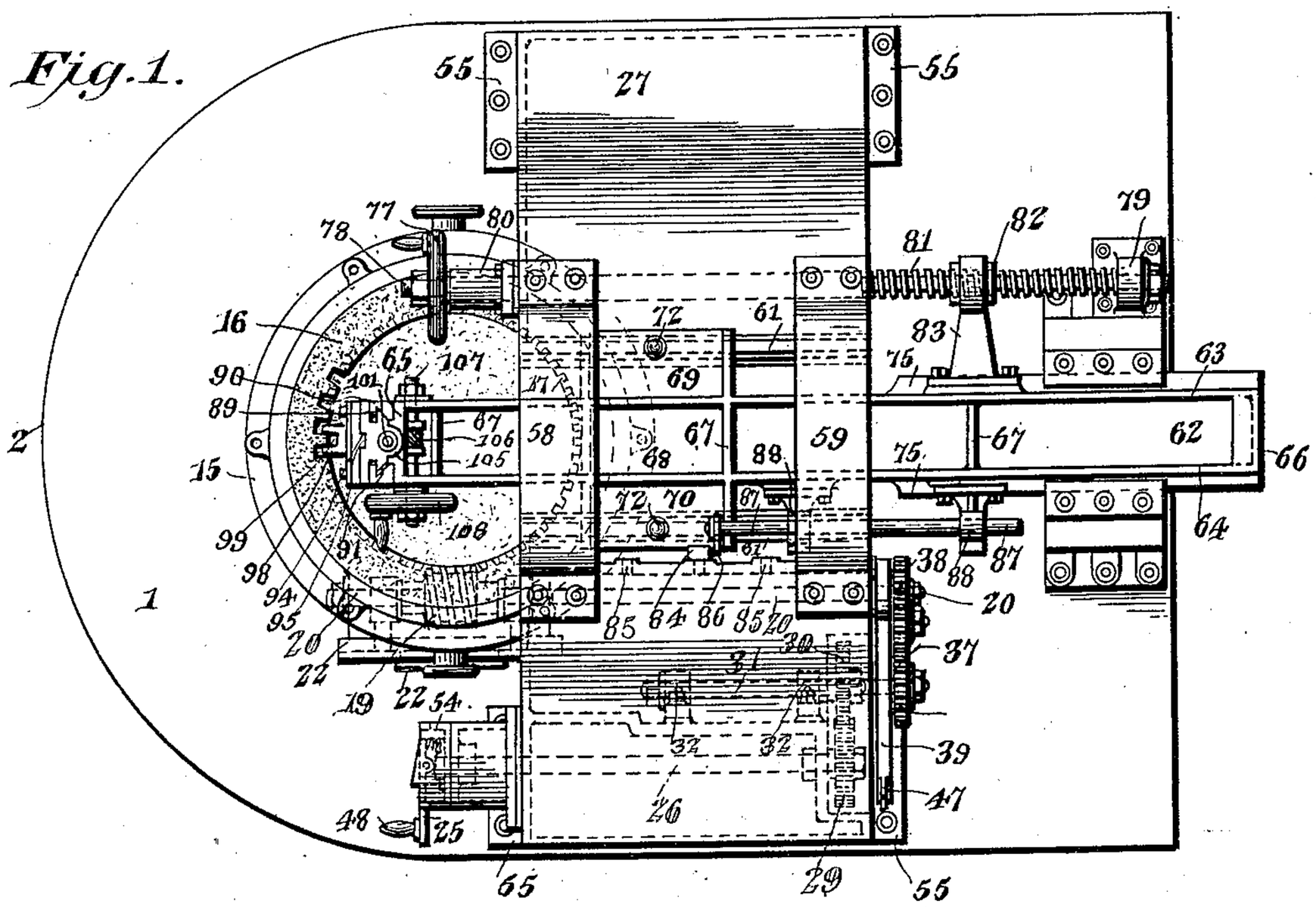
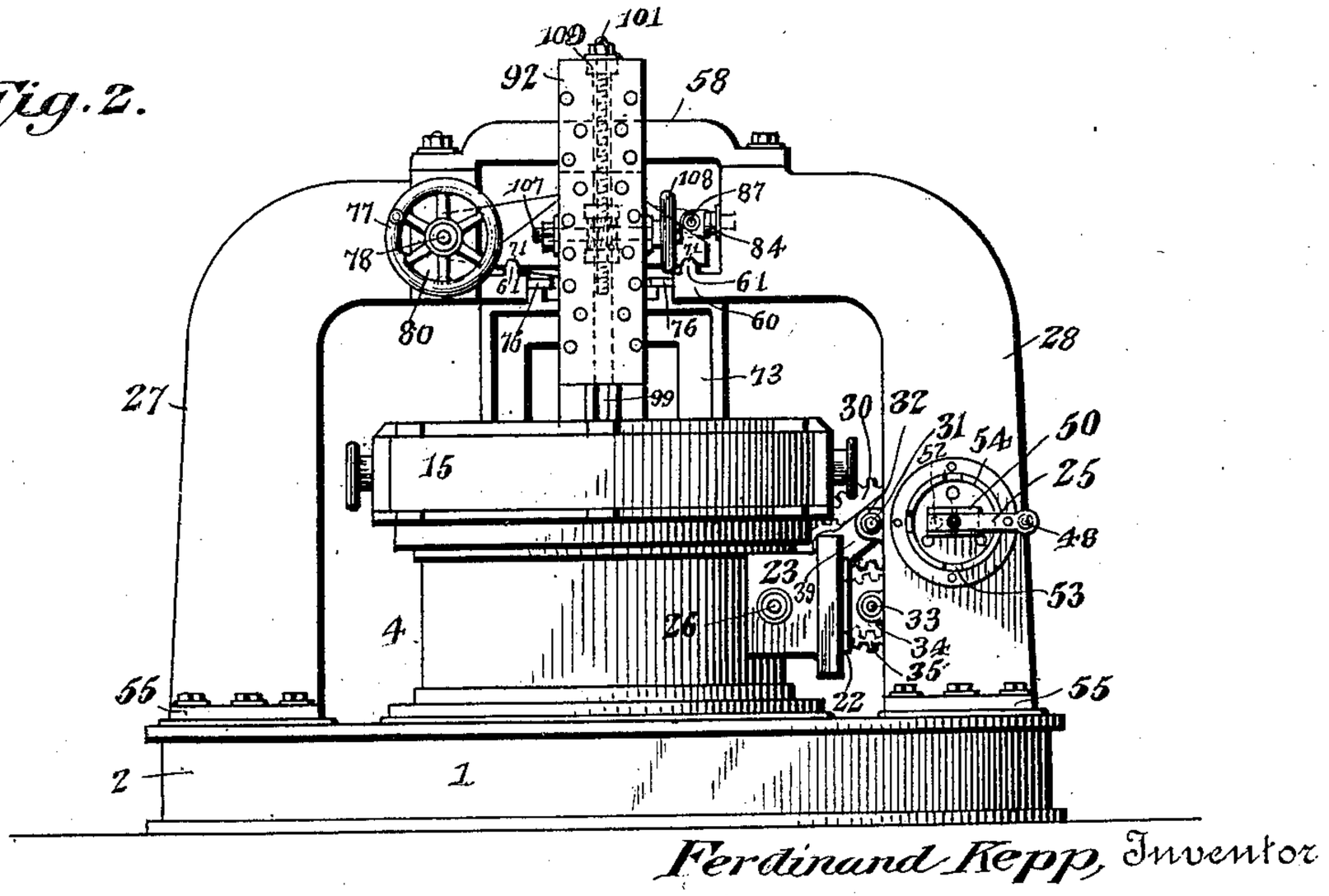


Fig. 2.



Witnesses
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NO MODEL. 3 SHEETS—SHEET 2.

Fig. 3.

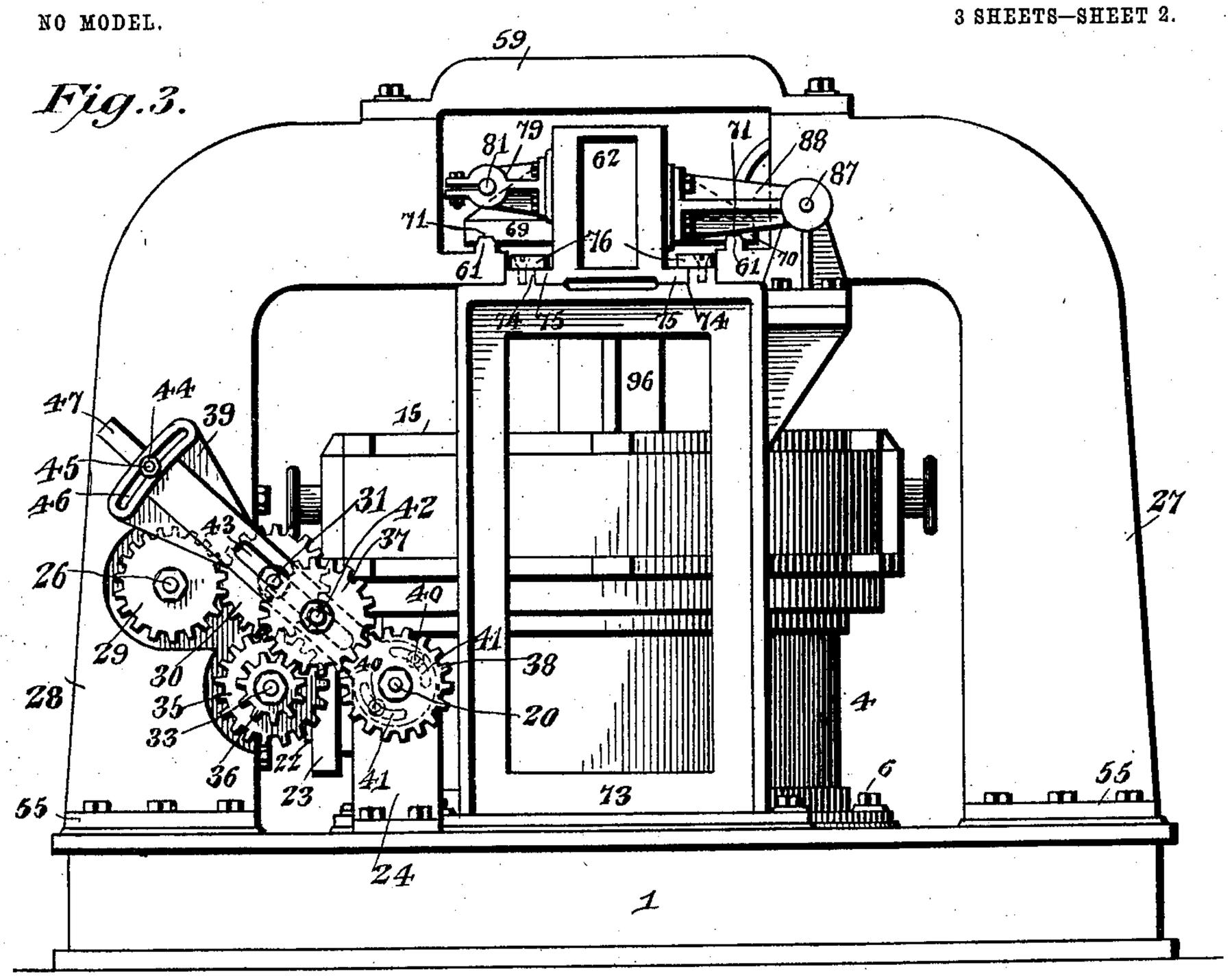


Fig. 9.

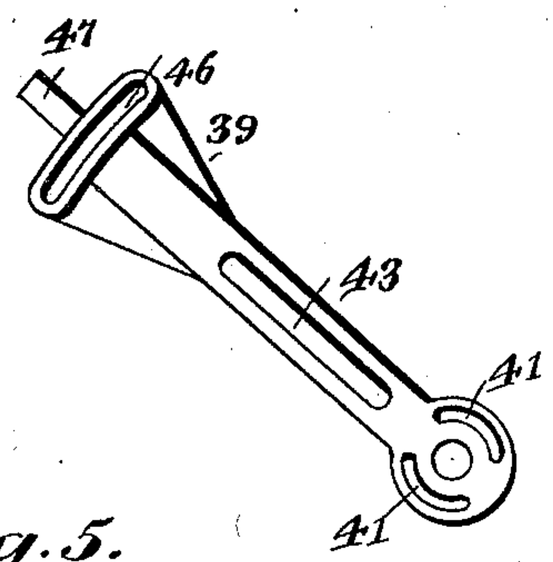


Fig. 8.

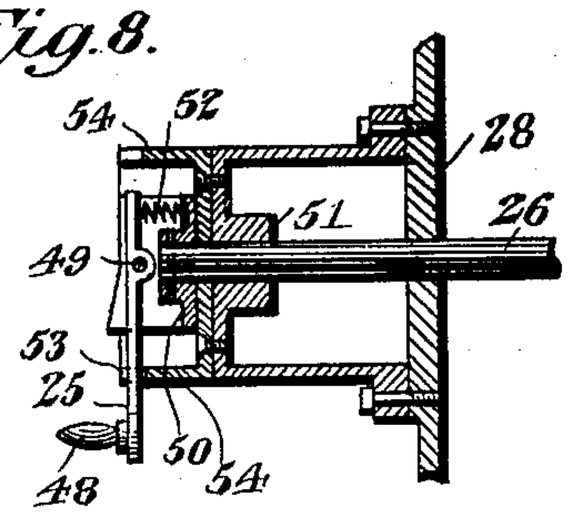
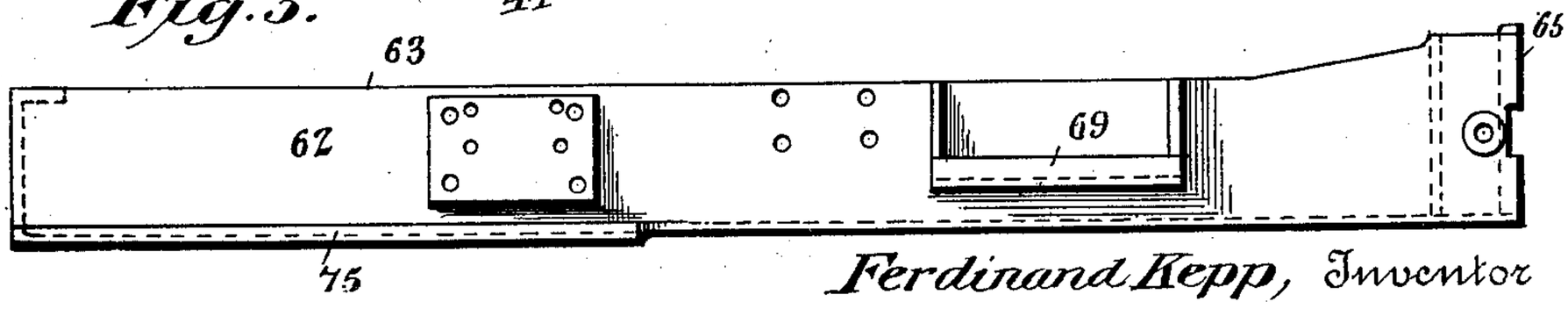


Fig. 5.



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NO MODEL. 3 SHEETS—SHEET 3.

Fig. 6.

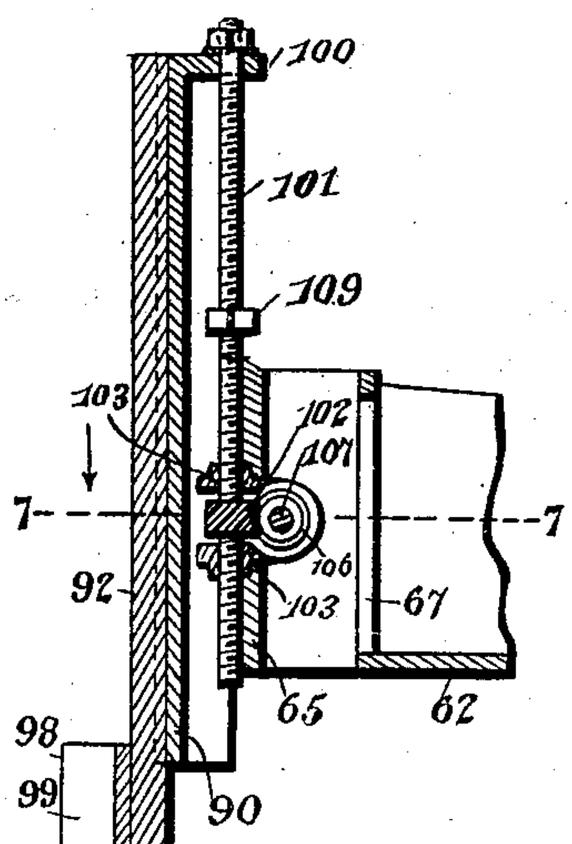


Fig. 7.

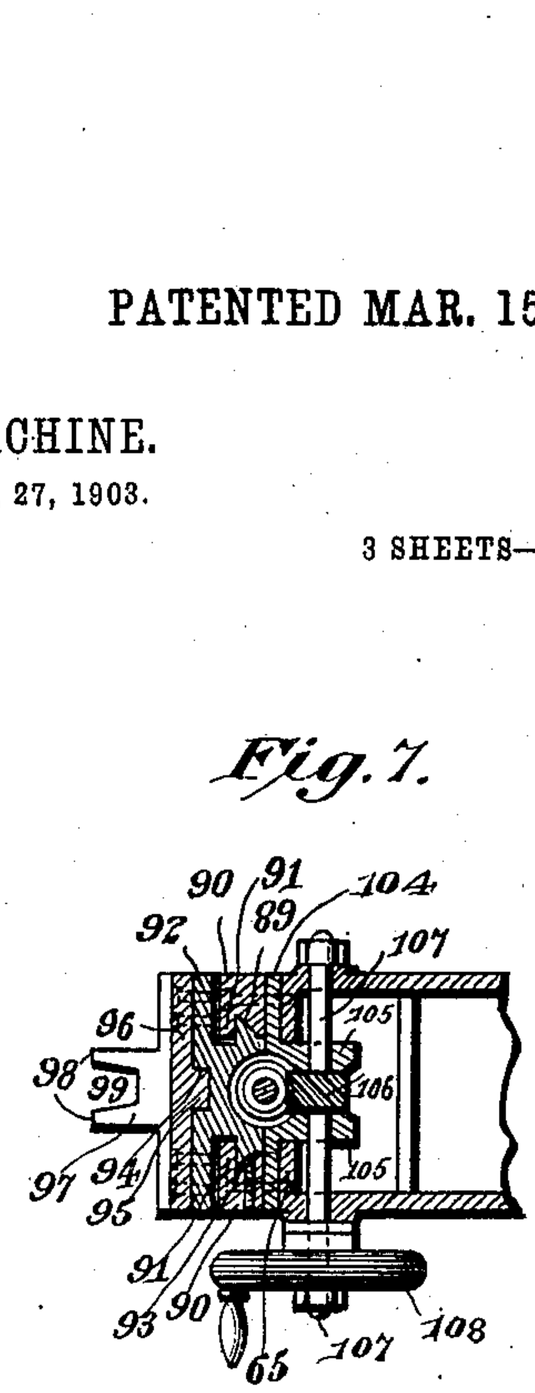
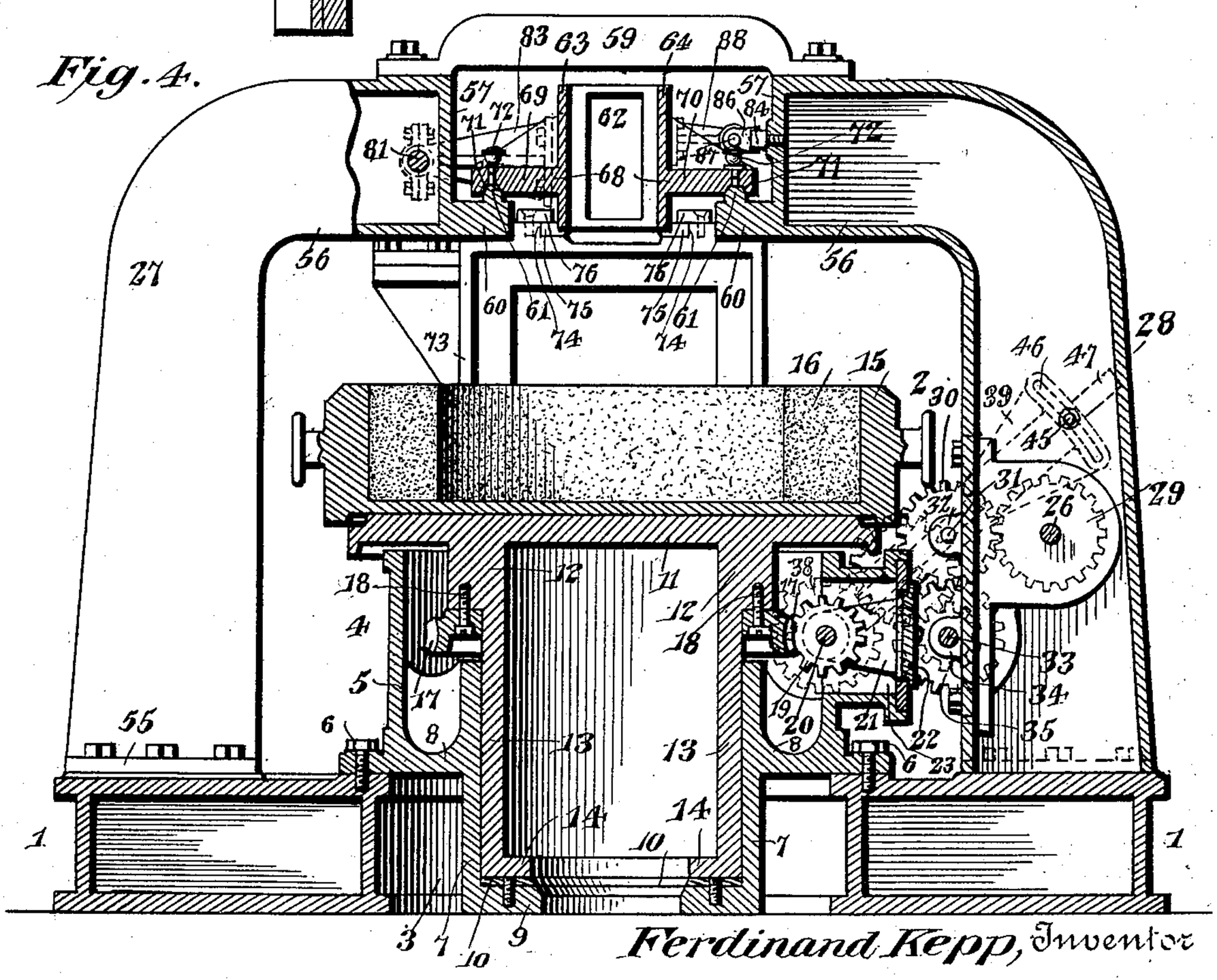


Fig. 4.



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No. 754,777. Patented March 15, 1904.

UNITED STATES PATENT OFFICE.

FERDINAND KEPP, OF BROOKLYN, NEW YORK.

GEAR-MOLDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 754,777, dated March 15, 1904.

Application filed August 27, 1903. Serial No. 171,029. (No model.)

To all whom it may concern:

Be it known that I, FERDINAND KEPP, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented a new and useful Gear-Molding Machine, of which the following is a specification.

This invention relates to gear-molding machines of that general type disclosed in my Patent No. 653,350, characterized by a flask-supporting table and a relatively movable pattern arranged to produce a mold by properly forming a body of sand within a flask supported by the table.

The patented machine is especially designed for the molding of comparatively large gear-wheels and embodies in its organization a stationary flask-supporting table and a superstructure including a top frame movable in a rectilinear path and supporting a revoluble pattern-carrying frame presentable over the flask by the movement of the top frame and formed with radial guides slidably supporting a pair of pattern-carriages movable horizontally in the pattern-supporting frame and each sustaining a vertically-adjustable pattern-holding slide to which a pattern or pattern-section is rigidly secured. In connection with these elements, variously movable, as stated, is associated suitable operating mechanism for moving the parts to accomplish their several functions. The top frame is shifted to a proper position over the flask. The pattern-slide is then moved down to present the pattern within the confines of the flask. The pattern-supporting slide is then moved outwardly in a horizontal direction to urge the pattern into the sand body. The carriage is then moved back, and after the pattern-carrying frame has been partially rotated the carriage is again moved forward and back to form another portion of the mold and to withdraw the pattern from the sand body. The described movements of the pattern-carrying frame and the carriage is repeated until the mold is completed, and the pattern is then withdrawn from the confines of the flask by the elevation of the pattern-slide.

The object of the present invention is to produce a machine particularly adapted for the molding of small and medium-sized gears and incidentally to simplify and strengthen the structure and to facilitate the manipulation of the machine.

A further object of the invention is to equip the machine with a rotary flask-supporting table associated with a pattern movable horizontally and vertically and supported by a superstructure including a main slide or pattern-carriage movable horizontally and a pattern-slide directly supported by the carriage and movable vertically upon the main slide or carriage, the manipulation of the associated slides in different directions serving to present the pattern within the confines of the flask and to project it into the sand body to form the mold and the rotation of the flask-supporting table serving to present successive portions of the sand body opposite the pattern.

A further object of the invention is to so construct the bearings for the several moving parts as to preclude the possibility of lost motion, the rotary flask-supporting table being provided with an extended journal formed with a wear-face of maximum area and associated with mechanism for imparting rotary movement to the table without exerting undue lateral strain thereon.

To the accomplishment of these recited objects and others subordinate thereto the invention in its preferred embodiment resides in the construction and arrangement of parts to be hereinafter described, illustrated in the accompanying drawings, and succinctly defined in the appended claims.

In the said drawings, Figure 1 is a plan view of the complete machine, certain of the parts being indicated in dotted lines. Fig. 2 is a front elevation thereof. Fig. 3 is a rear elevation. Fig. 4 is a sectional elevation. Fig. 5 is a detail view of the main slide or pattern-carriage. Fig. 6 is a sectional view of the pattern-carriage, the pattern-slide, and the intermediate operating connection for moving the slide vertically with reference to the carriage. Fig. 7 is a sectional view on the line 7 7 of Fig. 6. Fig. 8 is a sectional view of the manually-operated device for imparting intermittent rotary movement to the flask-supporting table and showing the index mech-

anism for accurately limiting the extent of such rotary movement, and Fig. 9 is a detail view of of the gear-carrying lever.

Like numerals of reference designate corresponding parts in the several figures of the drawings.

The machine includes in its organization a comparatively heavy metal base or bed 1, preferably in the form of a hollow casting formed adjacent to its rounded front end 2 with an opening 3. This opening is designed to accommodate the lower end of a table-supporting frame 4. This frame is of substantially annular form and comprises a cylinder 5, secured, as by bolts 6, to the base, and a concentric bearing-sleeve 7 of somewhat smaller diameter than the cylinder 5 and preferably connected thereto, as by integral webs 8. The cylinder 5 rises a considerable distance above the top of the sleeve 7, and the latter is extended downwardly into the opening 3 in the base and provided at its lower extremity with an internal annular flange 9, upon the upper face of which is secured an annular wear-plate 10. This tubular supporting-frame 4, rigidly carried by the base and concentric with the opening 3 therein, is designed to rotatably support the flask-supporting table 11, formed with a depending hub 12, from which extends a hollow hub extension or journal 13, fitting within the bearing-sleeve 7 and resting upon the wear-plate 10 at the lower end of said sleeve, the terminal wear-surface of the journal 13 being preferably increased by an internal annular flange 14, as clearly shown in Fig. 4.

The flask-supporting table 11 is designed to support in a manner well understood in the art a flask 15, which may be of any approved construction and which contains a body of sand 16, designed when properly impressed by the pattern hereinafter described to constitute a mold for the gear-wheel. In the present machine the pattern is not moved around the interior of the flask to be presented to different portions of the mold, as in the patented machine; but, on the contrary, the flask-supporting table is mounted in the manner described to permit it to rotate smoothly and without undue friction for the purpose of successively presenting different portions of the sand body in a position to be impressed by the pattern.

The mechanism for imparting the necessary intermittent rotary movement to the flask-supporting table includes a worm-wheel 17 in the form of a toothed annular rim, snugly fitted upon the journal 13 and secured, as by bolts 18, to the under side of the hub 12 of the flask-supporting table. The worm-wheel 17 is thus rigidly associated with the flask-supporting table and constitutes a connection between the table and its operating mechanism. The table-operating mechanism also includes a worm 19, (see Figs. 1 and 4,) mounted on a worm-shaft 20, journaled in the parallel arms 21 of a bracket 22, bolted or otherwise rigidly secured at the outer end of a hollow lateral extension 23 of the frame 7. The extension 23 is preferably cast integral with the cylinder 5 and serves to incase the worm and the immediately adjacent supports or journals of the worm-shaft. The worm-shaft 20 is also afforded bearings in the front and rear walls of the extension 23 and at its rear end is journaled in a bearing-bracket 24, upstanding from and rigidly bolted upon the base or bed 1 of the machine. The worm 19 meshes with the worm-wheel 17, as shown in Figs 2 and 4, and is designed to be rotated by the manipulation of the handle-lever 25 through the medium of an intermediate train of gearing. The operating-handle or handle-lever 25 is connected in a manner to be described to a driving-shaft 26, disposed parallel with the worm-shaft 20 and journaled in suitable bearings in the front and rear walls of one of a pair of supporting-columns 27 and 28, rising from the base 1, adjacent to the opposite sides thereof, in a manner and for the purpose to be hereinafter more fully explained.

Upon the rear end of the driving-shaft 26 is keyed or otherwise secured a gear-wheel 29, (see Figs. 1 and 3,) meshing with a gear-wheel 30, keyed upon a counter-shaft 31, journaled in suitable bearing-brackets 32, formed upon or rigidly attached to the inner side of the column 28. Below the counter-shaft 31 is located a second counter-shaft 33, journaled in bearing-brackets 34, constructed and mounted in a manner similar to the brackets 32. Upon this second counter-shaft 33 are keyed a gear-wheel 35, meshing with the gear-wheel 30, and a pinion 36, meshing with an intermediate gear 37, which in turn is enmeshed with a gear-wheel 38, keyed or otherwise rigidly attached to the rear end of the worm-shaft 20. (See Figs 3 and 4.)

It will be understood that each increment of movement imparted to the flask-supporting table is designed to be effected by one complete rotation of the driving-shaft 26. Since it is contemplated to mold gears of different diameters, it is obvious that some means must be provided between the driving-shaft and the table for effecting the differential movement of the latter in accordance with the size of the gear intended to be molded. Provision for thus varying the extent of movement imparted to the rotary flask-supporting table by a complete rotation of the driving-shaft is made by mounting the intermediate gear 37 detachably upon an adjustable gear-carrying lever 39, so that the relative movement of the driving-shaft and table may be regulated by substituting for the intermediate gear 37 another gear of proper size to insure the desired movement of the table. The lever 39 is preferably fulcrumed upon the bracket 24, the latter being provided with guide-pins 40, engaging oppositely-disposed

segmental slots 41, formed in the lever 39, concentric to the axis thereof. The intermediate gear 37 is carried by a stud-shaft 42, adjustably retained in a longitudinal slot 43, formed in the lever 39, the lever after its proper adjustment has been effected being rigidly retained by a clamping-nut 44, screwed upon the stud 45, extending from the rear side of the column 28 and passed through a transverse arcuate slot 46, formed in the lever 39 adjacent to its outer end. (See Fig. 3.)

The lever 39 is formed with a terminal handle 47, by means of which after the nut 44 has been loosened the lever may be swung to disengage the intermediate gear 37 from the pinion 36, after which the stud-shaft of said gear may be shifted in the slot 43 to disengage the intermediate gear from the gear 38. When this has been accomplished, the intermediate gear 37 may be displaced and replaced by another gear of different size and the lever 39 again securely locked in position by screwing up the nut 44. The handle-lever 25 is provided at one end with a grip 48 and is pivotally mounted at 49 upon an operating-head 50, fixed to the front end of the shaft 26, extended beyond a bearing-bracket 51, bolted or otherwise secured to the front side wall of the column 28. The extremity of the lever 25 opposite the grip is disposed to bear upon a locking-spring 52, seated upon the head 50 to urge the lever into engaging relation with an arresting-shoulder 53, formed in the index-flange 54, concentric with the shaft 26 and projecting forwardly from the bracket 51.

When it is desired to partially rotate the flask-supporting table 11 and the flask thereon, the operator swings the handle-lever against the resistance of the spring 52 to release said lever from the shoulder 53 of the index-flange. The lever is then swung around to rotate the driving-shaft 26, and thus operate the flask-supporting table through the intermediate train of gears. When a complete rotation of the driving-shaft has been effected, the operating-handle, the outward pull upon which has been relieved, will engage the arresting-shoulder 53, thus terminating the movement of the shaft at the exact limit of the required movement, and it will of course be understood that the extent of the movement imparted to the flask-supporting table by this manipulation of the table-operating mechanism will be determined by the dimensions of the particular intermediate gear 37 employed.

We have now seen how the flask-supporting table is constructed and mounted and intermittently rotated, the manner in which each operation of the table-driving mechanism is made exactly uniform, and the means whereby the degree of movement imparted to the table is regulated in accordance with the dimensions of the gear-wheel to be molded.

It remains now to be explained how the pattern is supported in coöperative relation with the flask-supporting table and the provision which has been made for effecting the vertical and horizontal movements of the pattern which are necessary to the proper performance of its functions. The supporting-columns 27 and 28, heretofore referred to, are preferably in the form of hollow castings, as shown, provided with foot-flanges 55, bolted securely to the base 1 adjacent to the opposite side edges thereof. These columns are formed with horizontally-disposed upper extremities 56, the vertically-disposed end walls 57 of which are separated by a considerable interval spanned by a pair of bridge-plates 58 and 59, which rigidly connect the columns and complete what may be termed a "supporting-arch" formed by the columns and bridge-plates. At the lower edges of the vertical end walls 57 of the columns are formed a pair of horizontal parallel flanges 60, extending from the front to the rear of the columns. Upon the upper sides of these flanges are cast or otherwise formed the tracks or rails 61, designed to slidably support the main slide or pattern-carriage 62 of the machine. This slide or carriage is one of the primary elements of the machine and is that element the movement of which is designed to impart to the pattern such horizontal movements thereof as are necessary to present it to the sand body and to effect a retraction of the pattern therefrom preparatory to the advance of the flask by the partial rotation of its supporting-table. The main slide or pattern-carriage 62 is in the form of an open casting comprising parallel side walls 63 and 64, front and rear end walls 65 and 66, and transverse webs or braces 67, which result in the production of a slide or carriage of great rigidity combined with a lightness requisite to the movement of the slide without undue expenditure of power. The main slide proper is considerably narrower than the interval between the flanges 60, but at a point somewhat nearer its front end is provided with a cross-head 68, defined by opposite lateral extensions 69 and 70, formed in their under sides with grooves 71, snugly fitting the rails 61 and designed to slide thereon, the antifrictional movement of the cross-head upon its rails being insured by the provision of oil-cups 72, carried by the cross-head and arranged to constantly lubricate the tracks 61.

The main slide 62 is of considerable length, as shown in Fig. 1 of the drawings, and for this reason it is desirable to provide additional bearings for its rear end. For this purpose a rear supporting-column 73 is bolted at the center of the base adjacent to its rear end and is provided at its top with guideways 74 for the reception of guide-flanges 75, cast upon opposite sides of the main slide adjacent to its rear end, as shown in Fig. 1, the flanges 75 being retained in the ways by cover-plates

76, bolted to the rear supporting-column 73 and overhanging the flanges 75 of the slide. It will be observed that these extensive bearings for the slide reduce the wear to a minimum and insure the movement of said slide or pattern-carriage without undue friction or lost motion.

The operating mechanism for the main slide or pattern-carriage 62 includes a hand-wheel 77, keyed to the front end of a screw-shaft 78, journaled at its rear end in a bracket 79, carried by the rear supporting-column 73, and at its front end with a bearing-bracket 80, bolted to the front side of the column 27. For a considerable portion of its length the shaft 78, which is disposed parallel with the slide 62, is formed with a screw 81, upon which is mounted a traveling nut 82, fixed in the outer end of a bracket 83, extending laterally from the slide 62 and bolted or otherwise rigidly secured thereto. The screw-shaft 78 is rotated by means of a hand-wheel 77, and the rotation of the screw 81 thus causes the nut 82 to travel in one direction or the other to effect the longitudinal movement of the main slide or pattern-carriage 62.

It is of course necessary to accurately determine the movement of the slide or carriage in order that the impressions made in the sand body will be absolutely true, and obviously the limit of movement will vary in accordance with the size of gear to be molded. I therefore provide stop mechanism including a fixed stop 84, projecting from the vertical end wall 57 of the column 28 and designed to be screwed into any one of a series of openings 85 formed in said wall. With this stop 84 is designed to contact a stop-finger 86, carried at the end of a stop-rod 87, adjustably retained by a pair of clamping-brackets 88, projecting laterally from one side of the slide or carriage. The openings 85 permit the fixed stop 84 to be properly located in different positions for standard sizes of gears; but a further adjustment may be obtained if intermediate sizes are desired by adjusting the stop-rod 87 relative to its supporting-brackets 88.

The foregoing completes the description of the construction and mounting of the main slide or pattern-carriage, of the mechanism for imparting necessary movement thereto, and of the stop mechanism whereby such movement is accurately limited in accordance with the size of the gear to be molded.

I will now proceed to describe the pattern and the means whereby said pattern is carried by the main slide and is moved vertically to present it within the flask and to effect its withdrawal therefrom. It may be stated at this point, however, that the mounting of the pattern on the main slide of the present machine is substantially identical with the mounting of the patterns on the carriages shown in my former patent hereinbefore identified. At the front end of the main slide or carriage 62 is formed a dovetailed guideway 89, defined by a pair of oppositely-arranged guide-strips 90, bolted or otherwise rigidly secured to the end wall 65 of the slide. Within this way is slidably received a correspondingly-shaped tongue 91, formed at the inner or rear side of the vertically-adjustable pattern-slide 92, wear-plates 93 being preferably interposed between the tongue 91 and the opposite sides of the dovetailed guideway. The vertically-adjustable pattern-slide 92 is provided in the front face thereof with a longitudinal groove or seat 94 for the reception of a retaining-tongue 95, projecting from the rear face of the pattern-attaching arm or backing 96, screwed or otherwise secured to the slide 92 in a manner to insure the rigid retention of the backing 96, while permitting its easy detachment when required. At the lower end of the pattern-attaching arm or backing 96 is retained the pattern 97, accurately formed to the pitch and shape of the teeth of the wheel to be molded and usually constructed with two half-teeth 98, separated by a complete interdental space 99, within which when the half-teeth are pressed into the sand body of the mold is formed a sand body corresponding to the interdental space between two teeth and separating the impressions formed in the sand body and corresponding to the adjacent halves of two teeth.

To provide for the vertical adjustment of the pattern-slide and the pattern associated therewith, said slide is formed at its upper end with an ear 100, from which depends a vertically-disposed adjusting-screw 101, arranged parallel with the slide at the inner or rear side thereof and adapted to travel through a feed-gear 102, which may be internally threaded to engage the screw, but is preferably provided with a chased bushing, as described in my former patent. The feed-gear 102 is mounted between a pair of horizontal bearing-lugs 103, formed integral with a gearing-bracket 104, rigidly secured to the front wall of the main slide or carriage 62. This bracket 104 is provided with a second pair of bearing-lugs 105, disposed vertically at right angles to the lugs 103. Between the lugs 105 is interposed a spiral gear-wheel 106, meshing with the feed-gear 102 and mounted on a horizontal pattern-operating shaft 107, passed through the opposite side walls of the carriage 62 and through the bearing-lugs 105. The shaft 107 is designed to be rotated by a hand-wheel 108 for the purpose of effecting the rotation of the feed-gear 102 and the consequent longitudinal movement of the screw 101, which in turn effects the movement of the pattern-slide to raise or lower the pattern. The vertical movement of the pattern is limited by a stop 109 in the form of a nut adjustable on the screw 101 and arranged to contact with a portion of the slide, and thus determine the position of the pattern when completely depressed.

Briefly, the operation of the machine is as follows: The relation of the table-driving mechanism with respect to the flask-supporting table having been properly determined by the attachment of the lever 39 to an intermediate gear bearing a proper proportional relation to the size of the gear to be molded and the horizontal and vertical movements of the pattern having been properly determined by the adjustment of the stops 84 and 109, a flask containing a body of sand suitable for the formation of a mold of the desired size is placed upon the flask-supporting table, as is shown in Fig. 4. The hand-wheel 108 is next operated to lower the pattern into the flask, after which the feed-screw 81 is rotated by the manipulation of the hand-wheel 77 to advance the main slide or pattern-carriage 62, and thus cause the pattern to be moved forward for the purpose of impressing the sand body within the flask. Having thus formed a segment of the desired mold, the hand-wheel 77 is operated in the reverse direction to cause the retraction of the main slide or pattern-carriage 62 for the purpose of withdrawing the pattern from the mold. The flask-supporting table is now rotated by the manipulation of the handle-lever 25 in the manner heretofore described to present another portion of the sand body opposite the pattern. The slide or carriage 62 is again reciprocated to form an additional segment of the desired mold, after which the flask-supporting table is again partially rotated, and these described movements of the pattern-carriage and the flask-supporting table are continued in alternation until the complete mold has been formed, at which time the hand-wheel 108 will be operated in a reverse direction to effect the withdrawal of the pattern from the flask.

It is thought that from the foregoing the construction, operation, and many advantages of my improved gear-molding machine will be clearly comprehended; but while the present embodiment of the invention appears at this time to be preferable I do not limit myself to the structural details herein described, as, on the contrary, I desire to be distinctly understood as reserving the right to effect such changes, modifications, and variations of the illustrated structure as may fall fairly within the scope of the protection prayed.

What I claim is—

1. In a gear-molding machine, the combination with a base having an opening; of a table-supporting frame rigidly secured to the base and having a bearing-sleeve extended into the opening therein and provided at its lower end with a bearing-flange, and a rotary flask-supporting table provided with a hollow cylindrical journal mounted to revolve in the bearing-sleeve and having an end flange opposed to the bearing-flange of the sleeve.

2. In a gear-molding machine, the combination with a base having an opening; of a table-supporting frame rigidly secured to the base and having a bearing-sleeve extended into the opening therein and provided at its lower end with a bearing-flange, a rotary flask-supporting table provided with a hollow cylindrical journal mounted to revolve in the bearing-sleeve and having an end flange opposed to the bearing-flange of the sleeve, and an annular wear-plate interposed between said flanges.

3. In a gear-molding machine, the combination with a base and a flask-supporting table; of rigid front and rear supports rising from the base, a pattern-carriage slidably mounted on said supports, means for moving said carriage, and a pattern-slide mounted at the front end of the carriage to support a pattern above the table.

4. In a gear-molding machine, the combination with a base and a flask-supporting table; of tracks located in a higher plane than the table, a long pattern-carriage provided with a cross-head mounted on the tracks, an independent rear support for the carriage, means for moving the carriage, and a pattern-slide adjustably supported by the front end of said carriage.

5. In a gear-molding machine, the combination with a base and a flask-supporting table; of a front supporting-arch rising from the base, a pattern-carriage supported by the arch, and means at the front end of said carriage for supporting a pattern and means for supporting the carriage in rear of the arch.

6. In a gear-molding machine, the combination with a base and a flask-supporting table; of a supporting-arch, a pattern-carriage slidably mounted in the arch, a separate support rising from the base and sustaining the rear end of the carriage, and means for supporting a pattern at the front end of the pattern-carriage.

7. In a gear-molding machine, the combination with a base and a flask-supporting table; of a pair of columns rising from the base and having their upper ends deflected toward each other spaced apart and connected to form a housing, a pattern-carriage slidably mounted in said housing, and means for mounting a pattern at the front end of said carriage.

8. In a gear-molding machine, the combination with a base and a flask-supporting table; of, a housing located above the table, a long pattern-carriage slidably mounted in said housing, a rear supporting-column located in rear of the housing to support the rear end of the carriage, and means for adjustably mounting a pattern at the front end of the carriage.

9. In a gear-molding machine, the combination with a base and a flask-supporting table; of a housing located above the table and provided with tracks, a main slide or pattern-carriage having a cross-head movable on said tracks, a rear supporting-column rising from the base and supporting the rear end of the

carriage, and means for adjustably mounting a pattern at the front end of said carriage.

10. In a gear-molding machine, the combination with a base and a flask-supporting table; of a pair of columns having spaced horizontally-disposed upper ends, bridge-plates connecting the upper ends of the columns, opposed flanges extending from the opposed ends of the columns and provided with tracks, a main slide constituting the pattern-carriage and provided with a cross-head movable upon said tracks, a rear supporting-column for the rear end of the main slide, and a vertically-adjustable pattern-slide mounted at the front end of the main slide and disposed to support a pattern above the table.

11. In a gear-molding machine, the combination with a base and a flask-supporting table; of a long main slide, independent front and rear rigid supports therefor, brackets carried by said supports, a slide-operating screw mounted in the brackets, a traveling nut engaging the screw and having connection with the slide, and means located at the front end of the slide for supporting a pattern above the table.

12. In a gear-molding machine, the combination with a base and a flask-supporting table; of front and rear supports rising from the base, a long main slide constituting a pattern-carriage having slidable connection with said supports, a bracket extending laterally from said slide, a traveling nut mounted in the bracket, a slide-operating screw engaging the nut and disposed parallel with the slide at one side thereof, and a hand-wheel for rotating the screw to effect the longitudinal movement of the slide.

13. In a gear-molding machine, the combination with a base and a flask-supporting table; of a main slide constituting the pattern-carriage, a rigid support for the slide, means for moving the slide longitudinally, and stop mechanism designed to limit the movement of the slide, and including a stop mounted on the rigid support.

14. In a gear-molding machine, the combination with a base and a flask-supporting table: of a long main slide constituting a pattern-carriage, front and rear supports rising from the base and sustaining the opposite ends of the slide, means for moving the slide longitudinally, and an adjustable stop mechanism for limiting the movement of the slide.

15. In a gear-molding machine, the combination with a base and a flask-supporting table; of a support, a main slide constituting a pattern-carriage mounted on said support, and stop mechanism including a stop member carried by the support and a stop-rod adjustably carried by the slide and having a stop-finger disposed to engage the stop.

16. In a gear-molding machine, the combination with a base and a flask-supporting table; of a support rising from the base, a main slide constituting a pattern-carriage mounted on the support, means for moving the slide longitudinally, a pair of brackets extending laterally from the slide, a stop-rod adjustably retained by said brackets and having a stop-finger, and an adjustable stop mounted on the support in the path of the stop-finger to limit the movement of the slide.

17. In a gear-molding machine, the combination with a base and a rotary flask-supporting table; of rigid supports rising from the base, a main slide mounted on said supports, means for moving the slide, vertically-movable pattern-supporting means mounted at the front end of the slide, and table-operating mechanism carried in part by a slide-support.

18. In a gear-molding machine, the combination with a base and a rotary flask-supporting table; of a pair of supporting-columns rising from the base and provided with tracks, a slide movable along said tracks and constituting a pattern-carriage, means carried by one of said columns for moving the slide, and means carried by the other column for operating the table.

19. In a gear-molding machine, the combination with a base and a rotary flask-supporting table; of a supporting-arch comprising a pair of connected columns rising from the base, a main slide constituting a pattern-carriage supported by the arch, carriage-supporting means in rear of the arch, table-operating mechanism including a handle-lever, and an index-plate secured to one of the columns and arranged to limit the movement of the handle-lever.

20. In a gear-molding machine, the combination with a base; of a flask-supporting table, elevated tracks, a main slide constituting a pattern-carriage said slide being provided with a cross-head movable on the tracks and with guide-flanges located at the rear end of the slide, and a rear supporting-column rising from the base and having guideways for the reception of the guide-flanges on the slide.

21. A main slide or pattern-carriage for gear-molding machines in the form of a long casting provided adjacent to its front end with a cross-head and having longitudinal guide-flanges at the rear end thereof in combination with front and rear supports engaging the cross-head and guide-flanges.

22. In a gear-molding machine, the combination with a base having a central opening and an arch rising from the base, a pattern-carriage slidably supported above the opening by the arch, and a pattern movable with the carriage, of a table-supporting frame bolted upon the base and comprising inner and outer cylinders, the inner cylinder being extended below the outer cylinder and into the opening in the base and provided with an end bearing, a flask-supporting table having a pendent

journal fitted within the inner cylinder of the table-supporting frame and resting upon the end bearing of the latter, and table-operating means housed in part within the outer cylinder of the frame.

23. In a gear-molding machine, the combination with a base, and a flask-supporting table, of a pair of columns rising from the base and having lateral extensions spaced apart and connected to form a housing, tracks supported within said housing, a pattern-slide mounted in the housing and slidably supported by the tracks, and means for supporting a pattern from the carriage.

24. In a gear-molding machine, the combination with a base, and a flask-supporting table, of a pair of columns having spaced upper ends formed with opposed flanges provided with tracks, a main slide constituting the pattern-carriage and provided with a cross-head movable upon said tracks, and means for supporting a pattern from the carriage.

25. In a gear-molding machine, the combination with a base, and a flask-supporting table, of a pair of columns having spaced horizontally-disposed upper ends, opposed flanges extending from the ends of the columns, a main slide disposed between the ends of the columns and slidably supported by the flanges, and means for supporting a pattern from the slide.

26. In a gear-molding machine, the combination with a base, and a flask-supporting table, of a main slide constituting a pattern-carriage located above the table, columns rising from the base at opposite sides of the slide and extended to form a supporting-arch for the same, and a pattern carried by the slide.

27. In a gear-molding machine, the combination with a base, and a flask-supporting table, of a main slide constituting a pattern-carriage located above the table, columns rising from the base at opposite sides of the slide, and having track-supports provided with tracks located in the same horizontal plane for the support of said slide, and means for supporting a pattern from the slide.

28. In a gear-molding machine, the combination with a base, and a flask-supporting table, of a main slide constituting a pattern-carriage located above the table, and a stationary arch spanning the flask-supporting table and disposed transversely of the slide to support the same for movement in a horizontal plane.

29. In a gear-molding machine, the combination with a base, and a flask-supporting table, of an arch rising from the base and spanning the table, said arch comprising a pair of columns having opposed ends provided with tracks, a bridge-plate connecting the columns above the tracks, and a main slide constituting the pattern-carriage located below the bridge-plate and provided with a cross-head engaging the tracks.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

FERDINAND KEPP.

Witnesses:
JULIUS BAYHA,
GEORGE J. HARTMANN.