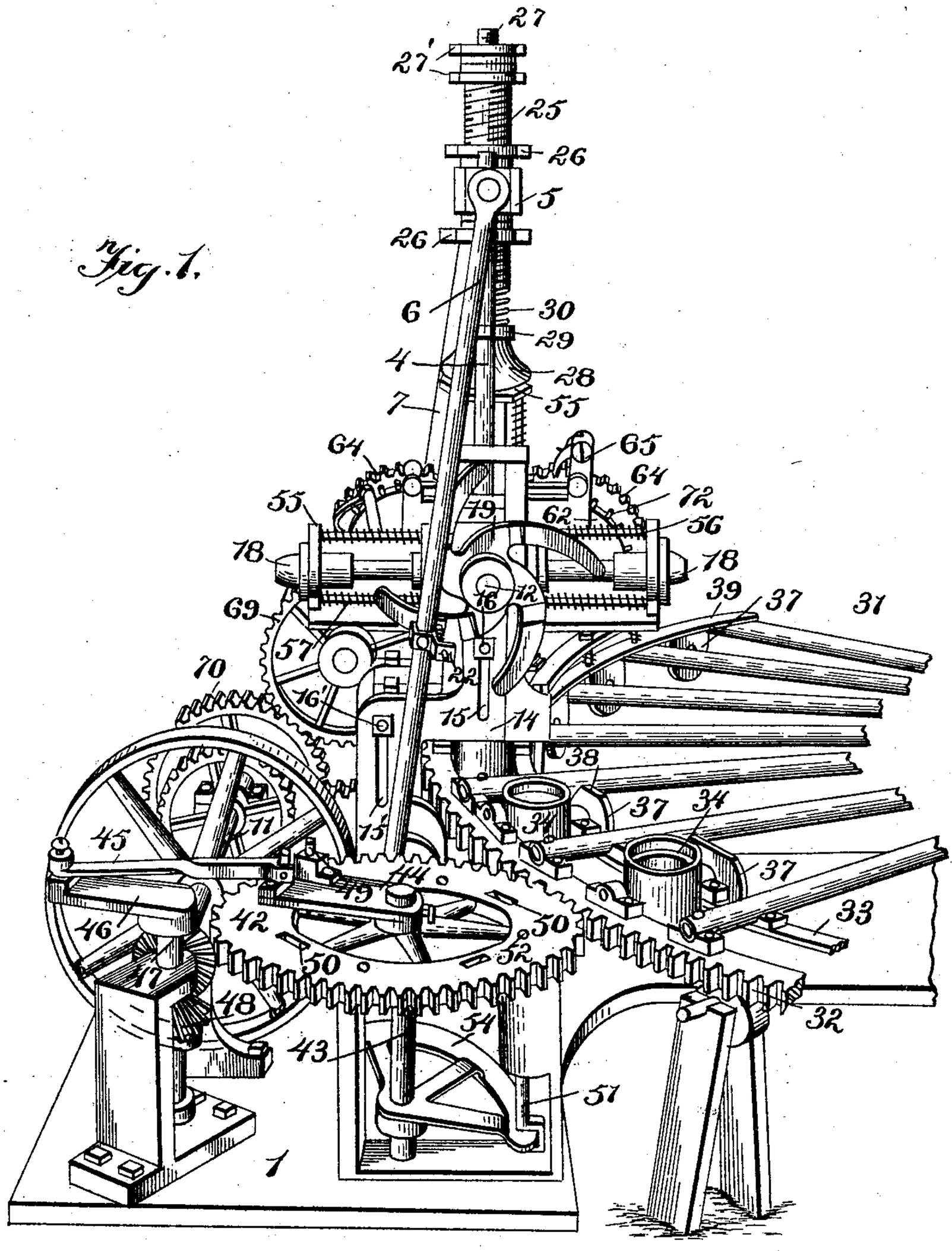
(No Model.) 5 Sheets—Sheet 1.

F. O'NEILL.

MACHINE FOR MANUFACTURING GLASSWARE.

No. 605,648. Patented June 14, 1898.

Fig. 1.



Witnesses
Geo. E. Frech.
A. D. Keyser

Inventor
Frank O'Neill
By Jno. Wedderburn
Attorney

(No Model.) 5 Sheets—Sheet 2.

F. O'NEILL.

MACHINE FOR MANUFACTURING GLASSWARE.

No. 605,648. Patented June 14, 1898.

Fig. 5.

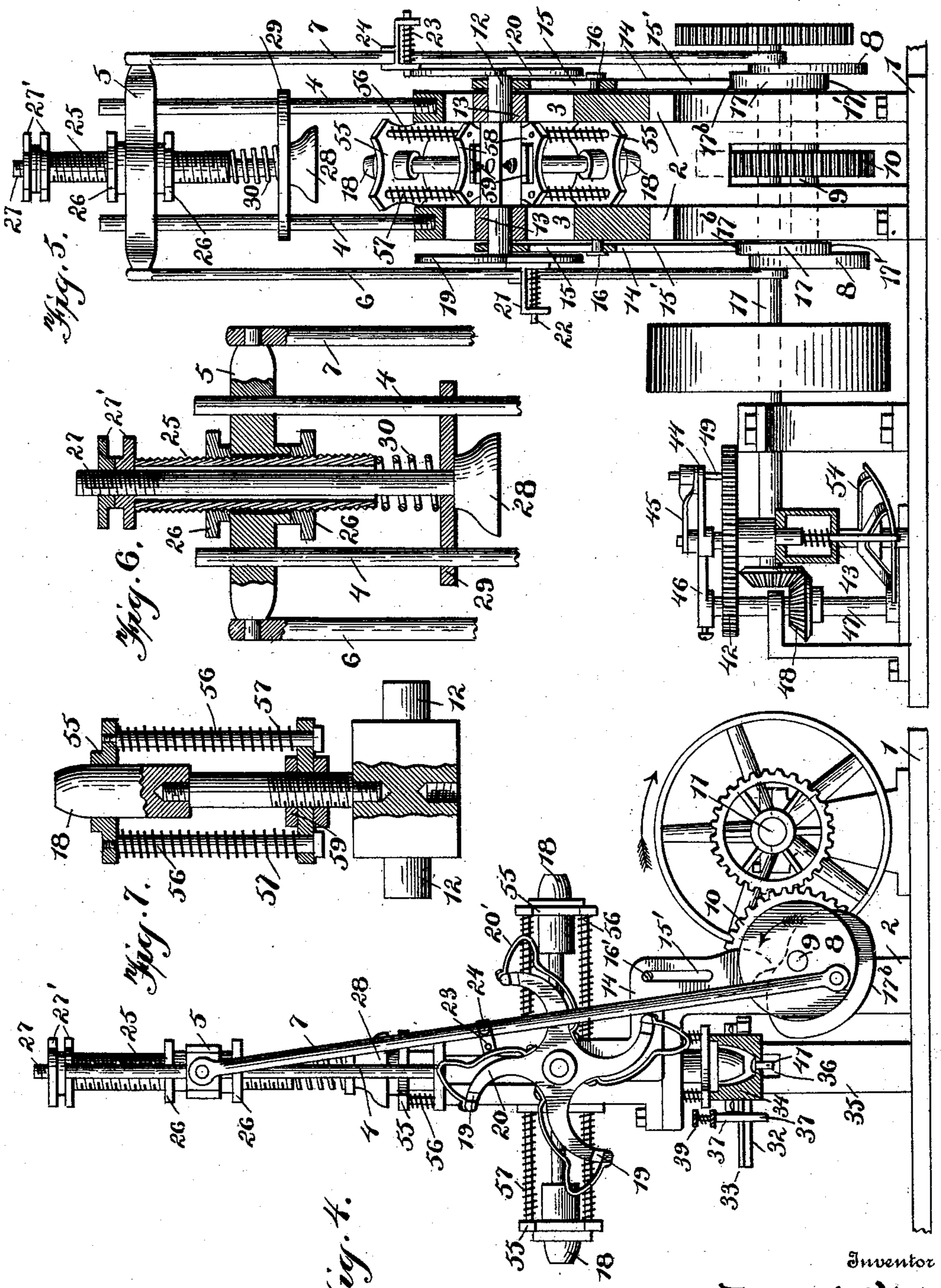


Fig. 6.

Fig. 7.

Fig. 4.

Witnesses
Geo. E. Fuchs
Chas. C. Kain

Inventor
Frank O'Neill
by Jas. Dicht
Attorney

(No Model.) 5 Sheets—Sheet 3.

F. O'NEILL.

MACHINE FOR MANUFACTURING GLASSWARE.

No. 605,648. Patented June 14, 1898.

Fig. 3.

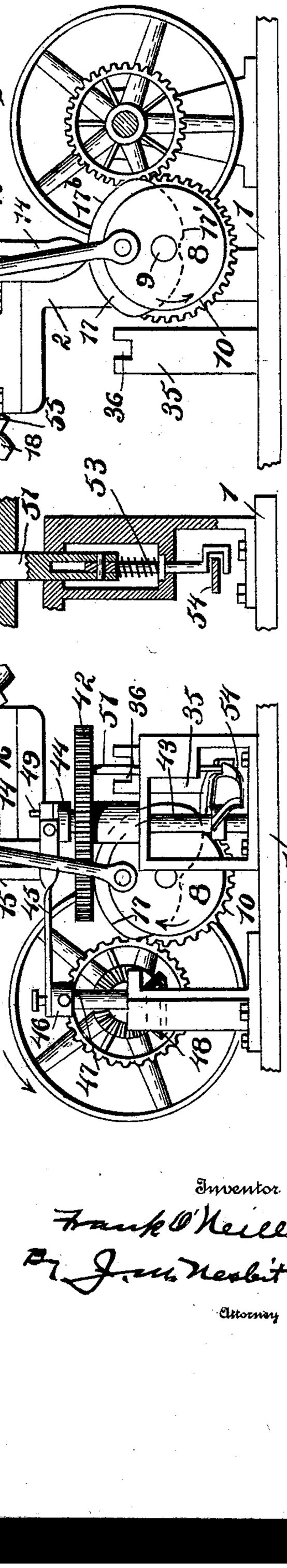


Fig. 8.

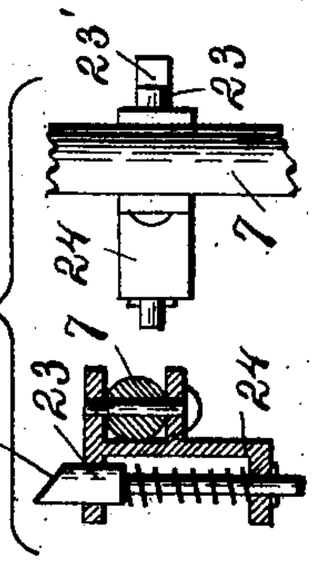


Fig. 9.

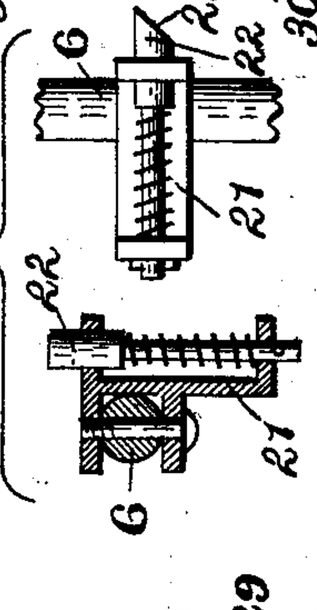


Fig. 11.

Fig. 2.

Fig. 10.

Witnesses

Geo. E. Fuchs.

Chas. C. Lear

Inventor.

Frank O'Neill

By Jno. Neubit

Attorney

(No Model.) 5 Sheets—Sheet 4.

F. O'NEILL.

MACHINE FOR MANUFACTURING GLASSWARE.

No. 605,648. Patented June 14, 1898.

Fig. 13.

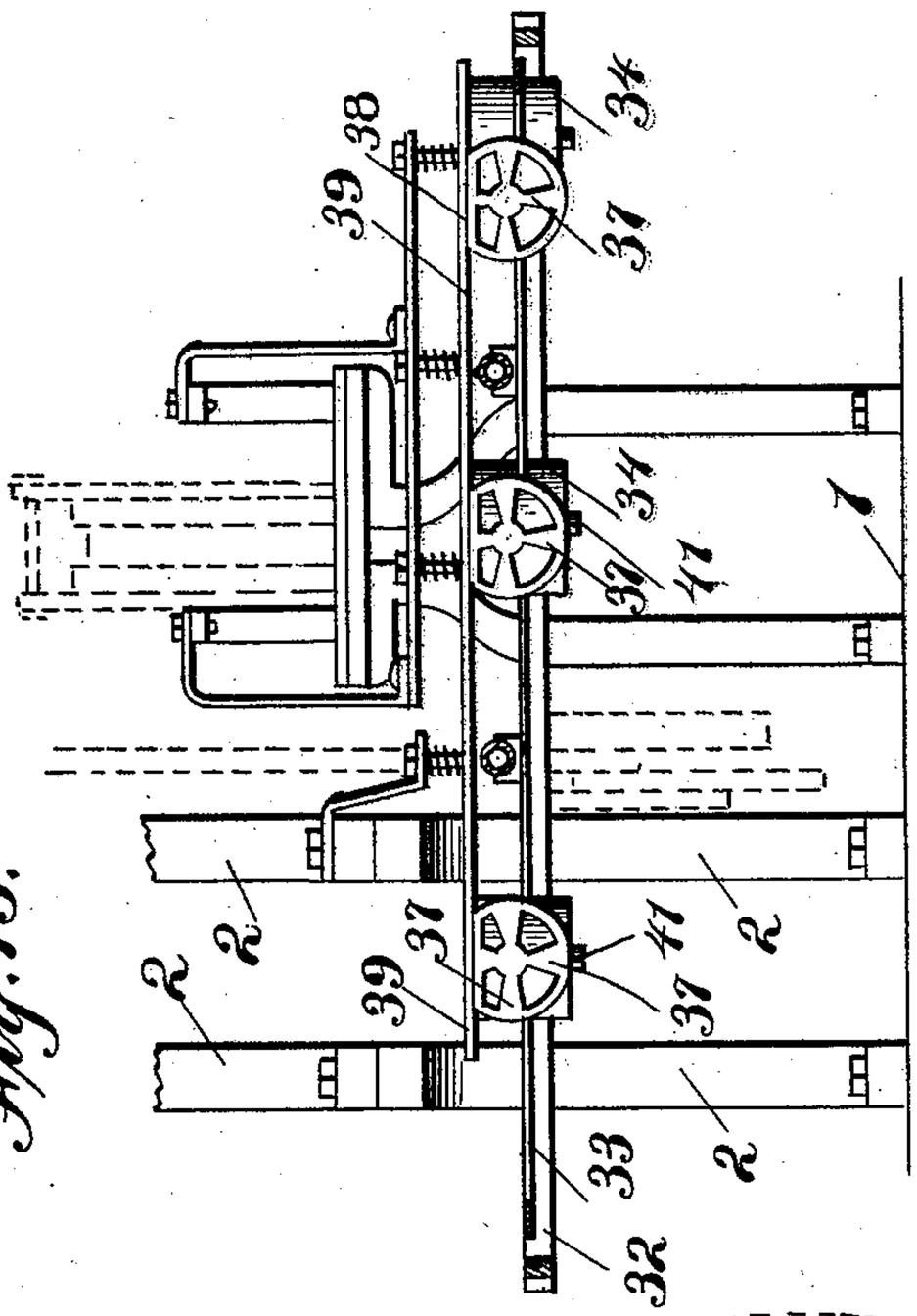


Fig. 14.

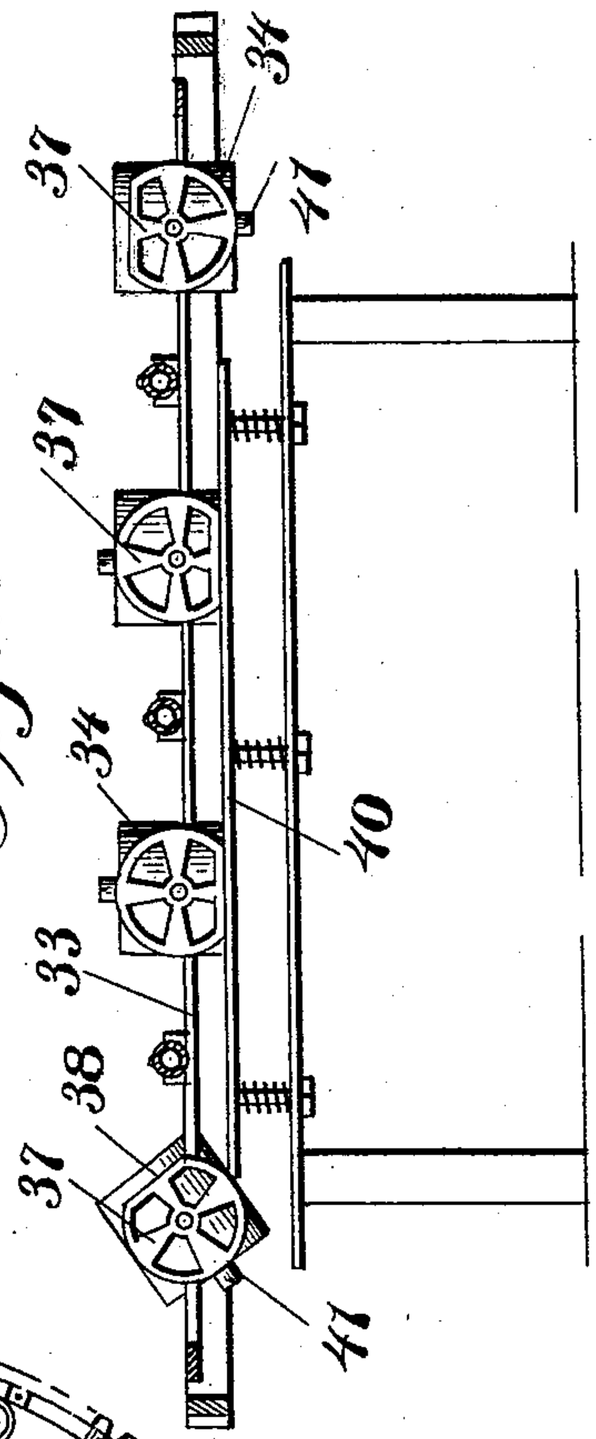
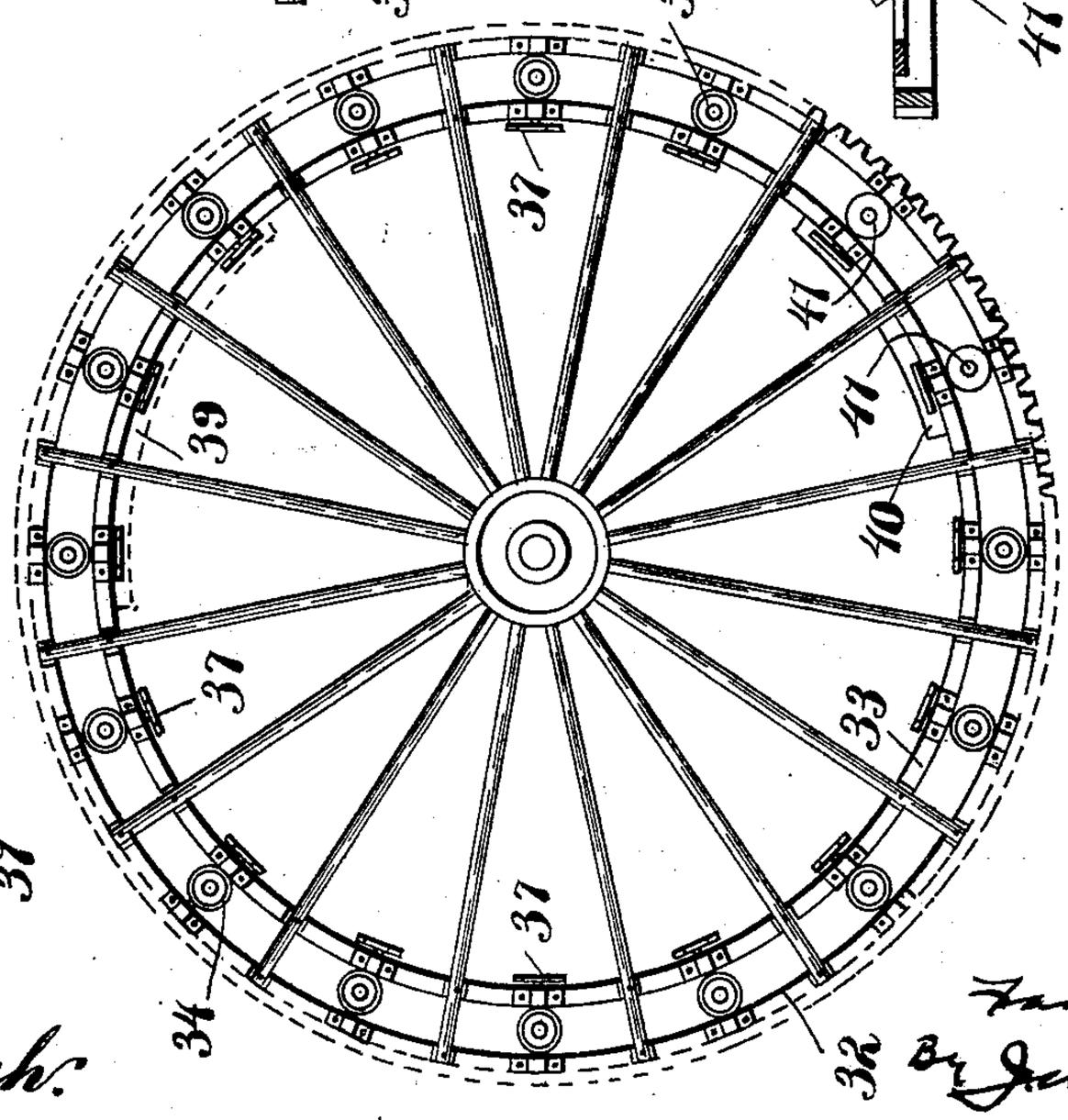


Fig. 12.



Witnesses:
Geo. E. Fuchs.
Chas. Clean

Inventor
Frank O'Neill
By Jno. Nesbit.
Attorney

(No Model.) 5 Sheets—Sheet 5.

F. O'NEILL.

MACHINE FOR MANUFACTURING GLASSWARE.

No. 605,648. Patented June 14, 1898.

Fig. 16.

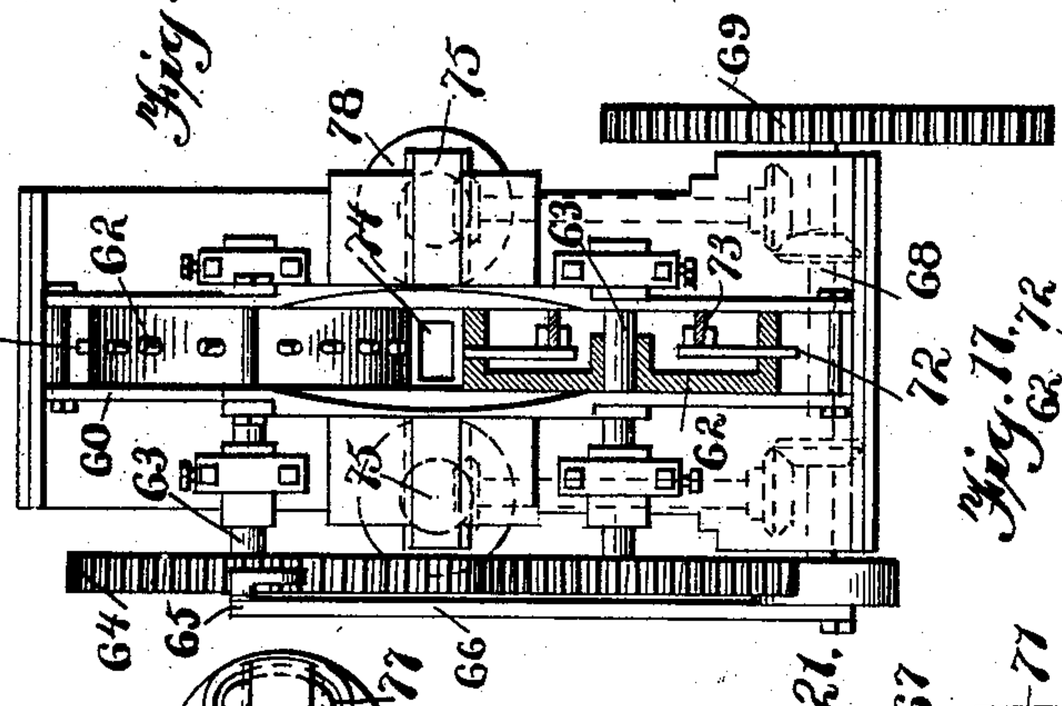


Fig. 17.

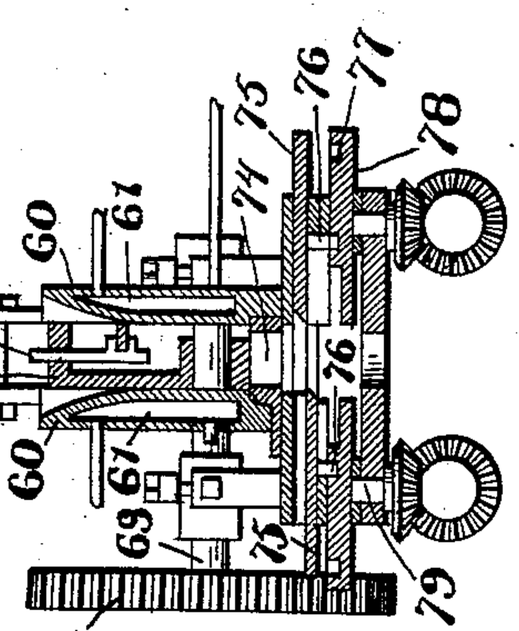


Fig. 19.

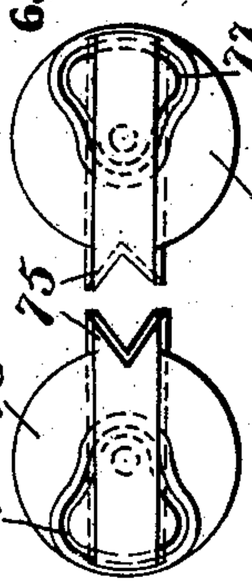


Fig. 20.

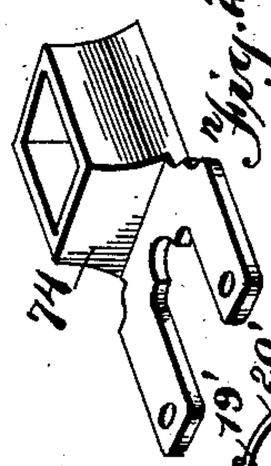


Fig. 21.

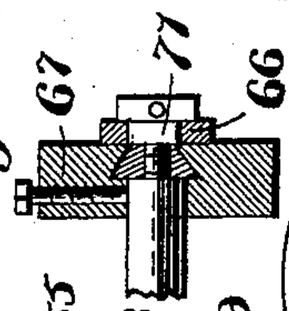


Fig. 18.

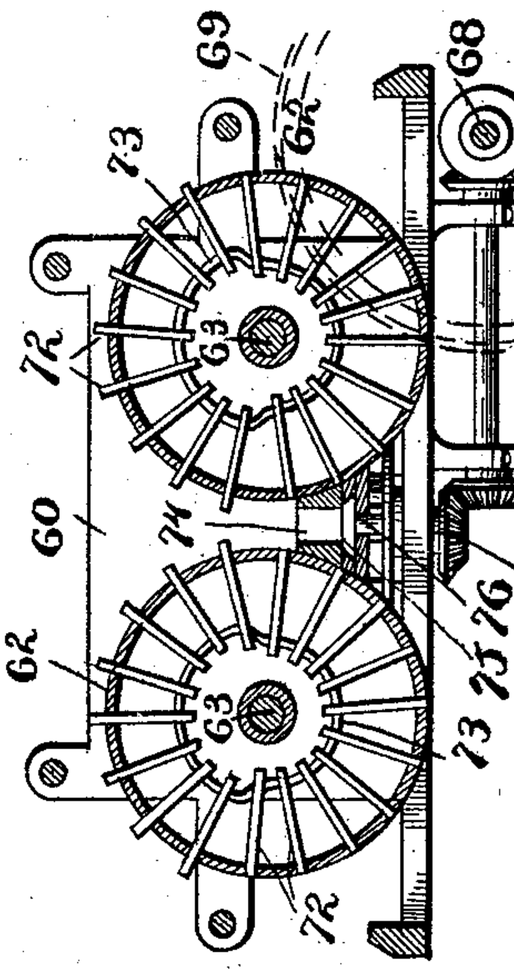


Fig. 15.

Witnesses

Geo. E. Frech.

Chas. C. Lear.

Inventor

Frank O'Neill

By Jno. Wedderburn

Attorney

UNITED STATES PATENT OFFICE.

FRANK O'NEILL, OF CICERO, INDIANA.

MACHINE FOR MANUFACTURING GLASSWARE.

SPECIFICATION forming part of Letters Patent No. 605,648, dated June 14, 1898.

Original application filed October 5, 1897, Serial No. 654,149. Divided and this application filed March 22, 1898. Serial No. 674,823. (No model.)

To all whom it may concern:

Be it known that I, FRANK O'NEILL, a citizen of the United States, residing at Cicero, in the county of Hamilton and State of Indiana, have invented new and useful Improvements in Machines for the Manufacture of Glassware, of which the following is a specification.

This invention is a division of my application filed October 5, 1897, Serial No. 654,149.

The present invention has particular reference to improved pressing mechanism, improved molds and mold-carrier, improved molten-glass-feeding mechanism, and to the coöperation of the pressing and feeding mechanisms and the mold-carrier.

The object of the invention is to provide an improved rapidly-working machine for the manufacture of tumblers, jelly-glasses, and other articles adapted to be formed by pressing.

The invention consists in the novel features of construction and in the combination and arrangement of parts hereinafter fully described and claimed, and illustrated by the accompanying drawings, in which—

Figure 1 is a perspective view of the machine, a portion only of the mold-carrier being shown. Fig. 2 is a side elevation of the pressing and actuating mechanisms, the former being in raised position. Fig. 3 illustrates the opposite side of the pressing mechanism in similar position. Fig. 4 is an elevation similar to Fig. 3, with the exception that the pressing mechanism is in lowered position, as in Fig. 1, and also includes a portion of the mold-carrier. Fig. 5 is a front elevation of the pressing and actuating mechanisms, a portion of the former being shown in section. Fig. 6 is an enlarged sectional view of the upper portion of the pressing mechanism. Fig. 7 is an enlarged sectional view of one of the pressing-plungers. Figs. 8 and 9 are detail views of the spider-actuating bolts. Fig. 10 is a detail sectional view of the ratchet connection between the intermittently-moving mold-carrier mechanism and the actuating mechanism. Fig. 11 is a similar view of the intermittently-operated lock for the mold-carrier mechanism. Fig. 12 is a plan view of the mold-carrier. Figs. 13 and 14 illustrate the mold-adjusting mechanism. Fig. 15 is a side elevation of the opposite side of the machine as seen in Fig. 1. Fig. 16 is a plan view, partly in section, of the molten-glass-feeding and cut-off mechanisms. Fig. 17 is a vertical cross-sectional view of the same. Fig. 18 is a longitudinal section. Fig. 19 is a detail plan view of the actuating-disks and cut-off knives. Fig. 20 is a detail view of the open box for passing glass to the knives. Fig. 21 is a detail view of the wrist-pin connection for regulating the speed of the cut-off mechanism.

Raised from base 1 are parallel overhanging uprights 2, slotted vertically at 3 and at their upper ends supporting vertical guides 4. Movable on these guides is head 5, connected at opposite ends by pitmen 6 and 7 to disks 8, the latter being secured to opposite ends of short shaft 9, journaled transversely on the lower portion of uprights 2, said shaft being connected by gearing 10 with power-shaft 11.

The vertically-reciprocating revoluble pressing mechanism is mounted on shaft 12 between uprights 2, said shaft being journaled in boxes 13, movable in slots 3. Shaft 12 is sustained and reciprocated by the angular plates 14, slotted at 15 and 15′ to move vertically on guide-bolts 16 and 16′, respectively. The lower reduced ends of said plates bear upon and are reciprocated by eccentrics 17, secured to the inner sides of disks 8.

The pressing mechanism here shown includes four plungers 18, arranged radially on shaft 12 and at equal distances apart, thus bringing in line two oppositely-arranged plungers. The pressing mechanism is given a quarter-turn after each pressing or molding operation in order to bring the next succeeding plunger to operative position, and the mechanism for effecting the turning of the raised plungers will now be described.

Facing the machine as seen in Fig. 5 spider 19 is secured to the left-hand extremity of shaft 12 between plates 14 and pitman 6, and spider 20 is secured to the opposite end of the shaft between plates 14 and pitman 7. Secured to pitman 6 is cuff 21, carrying longitudinally-movable spring-held bolt 22, projecting normally into spider 19. This pro-

jecting bolt engages successively the under edges of the curved arms of spider 19, and as pitman 6 swings in a greater arc than said arms the bolt moves inward under the latter while being raised from the position indicated in Fig. 1 to that shown in Fig. 2, with the result that the spider, and with it the plunger-carrying head, is given a one-eighth turn. The under horizontal side 22′ of bolt 22 is beveled, so as to be automatically pressed back by the next succeeding arm and engage its under edge when the pitman is lowering to position shown in Fig. 1, as when pressing or molding an article. While bolt 22 is active in turning spider 19, bolt 23, similarly mounted in cuff 24, secured to pitman 7, is being brought to operative position with relation to spider 20 in order to complete the one-quarter turn. This bolt is beveled on its rear vertical side at 23′ to readily slip over successively the extremities of the curved arms of spider 20, so as to engage their convex edges, as seen in Fig. 3. Thus with the pitman advancing toward the center of the spider and at the same time moving downward the spider is turned sufficiently to complete the one-quarter turn and bring to position indicated in Figs. 1 and 4. Thus it will be seen that the turning mechanism at the left hand of the machine is active during the upward movement of the pitmen, while at the right-hand side it is active during the downward movement of the same. Curved guards 20′, standing out from the edges of the spider-arms, hold bolt 23 positively thereto and prevent the pressing mechanism from rotating too far. As an additional precaution spider 19 might be provided with similar guards; but I deem it sufficient to positively guide said mechanism during the latter part only of its movement, as this insures accurate positioning of the plungers. The spider-arms are notched at 19′ to facilitate the beveled bolts slipping thereover in moving in engagement therewith.

Adjustable vertically in head 5 is tube 25, the same being held in proper position by nuts 26, and extended therethrough is bolt 27, adjustably secured at its upper end by nuts 27′ and at its lower end carrying cup 28. Cross-head 29, slidable on guides 4, is interposed between the cup and spring 30, the latter at its upper end engaging the lower end of tube 25. By this means the cup is yieldable vertically and at the same time held normally depressed.

When the downwardly-disposed plunger 18 is in operative position, as seen in Fig. 4, the upright plunger is engaged by cup 28, whereby downward pressure is imparted to the plungers. When in this position, plates 14 are in their lowermost adjustment, the extremities thereof riding on the short sides of cams 17, as clearly shown in said figure. As soon, however, as pitmen 6 and 7 begin to rise plates 14, and with them the pressing mechanism, are raised, the plates being in engagement with surfaces 17′ of the eccentrics, said surfaces being concentric with the wrist-pin connections of the pitmen. This upward movement of the plates and pressing mechanism is only sufficient to draw the plunger from the mold, and when this has been accomplished surfaces 17ᵇ of the eccentrics are brought in contact with plates 14, and these surfaces being concentric with disks 8 the upward movement of the plates ceases; but the upward movement of the pitmen and head 5 continues in order to release cup 28 from its plunger and leave the plunger-carrying shaft free to turn. It may be stated that the uppermost plunger is released before the pitmen and head 5 reach the limit of their upward movement, as ample time is afforded the shaft to turn the next succeeding plunger to operative position before cup 28 is brought down to the then uppermost plunger. As surfaces 17ᵇ pass from under plates 14 the plunger mechanism and the pressing mechanism—that is, the pitmen and head 5—are rigidly connected and have unitary downward movement as the plunger enters the mold.

The mold-carrier is centrally mounted on an extension of base 1, and consists of a series of spokes carrying at their outer ends the large circular gear-wheel 32 and within said wheel circular strip 33. Molds 34 are trunnioned on opposite sides, where they are journaled to wheel 32 and band 33, and between which they are adapted to freely swing. The molds are passed successively beneath and in line with the pressing mechanism and an intermittent motion being imparted to the carrier by mechanism presently to be described each mold remains in such position sufficiently long to execute the molding and pressing operations. Support 35, notched on its upper end at 36, is arranged to support the carrier directly beneath the mold when receiving the plungers, so that the carrier is relieved of all strain. Secured to and rotatable with the inner trunnion of each mold is a disk 27, flat on its upper side at 38, and as the molds approach the press disks 37 pass beneath upwardly-yieldable strips 39 and roll until flats 38 are brought to engagement therewith, when the molds will pass in upright position to the glass feeding and cutting mechanism, presently to be explained, and to the press. After the molds carrying the molded articles pass from the press they are free to rotate, and when disk 37 meets downwardly-yieldable strip 40, arranged beneath the plane of the carrier, the mold is inverted, so as to discharge the molded article. Ejecting-pin 41 in the bottom of each mold drops against the article and forces out the same, and should it show any inclination to stick the pin may be tapped lightly with a hammer or other implement.

The carrier is afforded an intermittent rotary movement by gear 42 engaging cog-wheel 32, said gear being loosely mounted upon shaft 43. Secured to the upper end of said

shaft over gear 42 is arm 44, connected at its outer end by link 45 to crank 46 on upright shaft 47, said shaft being connected by bevel-gearing 48 to power-shaft 11. Vertically-moving spring-actuated dog 49, carried by arm 44, is adapted to engage one of depressions 50 in gear 42 and impart to the gear a quarter-turn, a movement sufficient to remove one mold from beneath the plunger and to move the next succeeding mold from beneath the cut-off, presently to be described, to position for pressing. Each depression 50 is inclined at one end, and dog 49 slips freely therefrom when arm 44 is retracted, as when securing a new hold.

For locking gear 42 and the carrier in fixed position, with adjacent molds in position beneath the press and cut-off, respectively, the vertically-movable two-part bolt 51 is provided, adapted to engage one of openings 52 in gear 42. The bolt is elevated by spider 54 on shaft 43, said spider engaging the lower hooked end of the bolt and moving it upward against the pressure of spring 53 until alined with one of openings 52, into which the upper section of the bolt is forced, this occurring at the completion of the movement of gear 42. The spider is turned backward by shaft 43 and arm 44 when the latter is moving to position for a new hold on gear 42, thus retracting bolt 51 from gear 42 against the pressure of spring 53 until alined with one of the openings 52, into which the upper section of the bolt is forced, this occurring at the completion of movement of gear 42. The spider is turned backward by shaft 43 and arm 44 when the latter is moving to position for a new hold on gear 42, thus retracting bolt 51 from gear 42 against the pressure of the spring, leaving the gear free for its next partial rotation.

Each plunger carries a mold-cover 55, yieldably held by rods 56 and springs 57. The inner ends of said rods are secured to head 58, adjustable on plunger-stem 59, and by this means the position of the mold-cover may be varied as required.

While the machine here shown and described is provided with four plungers and with mechanism for securing a one-quarter turn of the plunger-shaft for each operation, it will be understood that a greater or less number of plungers may be provided, with rotating mechanism varied as may be necessary to adapt it to the number used.

I will now proceed to describe the molten-glass feeding and cut-off mechanism for supplying to each mold a predetermined quota of molten glass just prior to being positioned for the pressing operation. The hopper is narrow and elongated, and its sides 60 are hollowed at 61 to provide space for the circulation of cold water in order that the hopper may be kept at a uniform temperature. The opposite ends of the hopper are closed by feeding-wheels 62, mounted on shafts 63, said shafts having secured to their projecting ends gear-wheels 64. Secured to one of shafts 63 is ratchet-arm 65, connected by pitman 66 to wheel 67 at the end of shaft 68, said shaft at its opposite end carrying gear 69, meshing with gear 70 of power-shaft 11. Pitman 66 has an adjustable wrist-pin connection with slotted wheel 67, as indicated at 71, Fig. 21, so that a greater or less movement may be imparted to the feeding-wheels, as may be necessary. Wheels 62 are open at one side, and extending through the peripheries thereof are pins 72, which at their inner ends loosely embrace cam-flanges 73 on the inner surface of one of the hopper sides 60. Each of these cams is so disposed that the pins are held projected while turning downward toward the centrally-arranged box 74, but are retracted thereby, so as to be flush with the wheel-periphery when passing said box, so as not to catch thereon. By this means the molten glass, which is supplied to the hopper in usual form, is drawn downward and forced through box 74, and said drawing mechanism as soon as its function is performed is retracted so as to free itself from the molten glass and be entirely out of the way. Beneath box 74 are oppositely-reciprocating knives 75, provided with suitable dovetailed slideways and carrying depending pins 76, which are embraced by eccentric grooves 77 of wheels 78. Short shafts 79 are geared to these wheels and to shaft 68 for imparting proper motion to wheels 78 for actuating the knives.

When the machine is in operation, the hopper is kept filled with molten glass, and the consistency of the same is such that it will pass downward through box 74 and to the cut-off only when feed-wheels 62 and pins 72 draw downward the same. The motion of the wheels and pins is so regulated and capable of such adjustment that only a given or predetermined quota will be fed at each intermittent movement thereof, so that the molten glass is discharged into the molds with accuracy as to amount and at regular and proper intervals.

From the foregoing description it will be understood that the operations of the plunger and cut-off are simultaneous and that said parts are at rest during the positioning of the molds by movement of the carrier. In other words, there is an intermitting alternating movement of the mechanisms mentioned, whereby the work is accomplished in a quick and effectual manner. At the same time they all receive their motion from a common source, so that the whole operation is mechanically accurate.

Claims specific to the coöperation of the pressing mechanism, the molten-glass cut-off *per se*, and the mold-carrier are not included herein, as such subject-matter is claimed in the original application.

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

1. In a machine for the manufacture of glassware, alined plungers adapted to be moved, successively, in and out of operative position, means for so moving the plungers, and depressing mechanism operatively engaging an inactive plunger for actuating the alined active plunger.

2. In a machine for the manufacture of glassware, pressing mechanism including a revoluble shaft, pressing-plungers arranged radially thereon with each plunger alining with another plunger through the shaft and adapted, successively, to move to operative position, and mechanism for longitudinally pressing one plunger for actuating the alined active plunger.

3. In a machine for the manufacture of glassware, a movable series of plungers, the plungers being arranged in pairs, cam members movable with the plunger series, and actuating mechanism adapted to engage one plunger of a pair for actuating the other plunger, the actuating mechanism also imparting movement to the cam members for bringing the plungers, successively, to operative position.

4. In a machine for the manufacture of glassware, pressing mechanism including a revoluble series of reciprocating plungers, and plunger-reciprocating mechanism operatively connected to the plunger series for rotating the same.

5. In a machine for the manufacture of glassware, pressing mechanism including a revoluble shaft, pressing-plungers thereon adapted, successively, to move to operative position, and plunger-reciprocating mechanism operatively connected to the shaft for imparting thereto intermittent rotary movement.

6. In a machine for the manufacture of glassware, an intermittently-revoluble vertically-reciprocating shaft, pressing-plungers arranged radially on the shaft, each plunger alining with another plunger through the shaft, the plungers becoming successively active, and reciprocating mechanism adapted to engage the plunger alining with the active plunger.

7. In a machine for the manufacture of glassware, pressing mechanism including a shaft, pressing-plungers thereon, spiders on the shaft, and plunger-reciprocating mechanism operatively connected with the spiders for intermittently rotating the shaft.

8. In a machine for the manufacture of glassware, pressing mechanism including rotatable pressing-plungers, spiders rotatable therewith, and plunger-reciprocating mechanism operatively connecting with the spiders for intermittently rotating the plungers.

9. In a machine for the manufacture of glassware, pressing mechanism including rotatable plungers, spiders rotatable therewith having curved arms, plunger-reciprocating pitmen, and bolts on the pitmen operatively engaging the curved spider-arms for intermittently rotating the plungers.

10. In a machine for the manufacture of glassware, pressing mechanism including rotatable plungers, spiders rotatable therewith having curved arms, plunger-reciprocating pitmen, spring-actuated bolts on the pitmen operatively engaging the spider-arms for intermittently rotating the plungers, and means for automatically engaging and disengaging the bolts from the spiders.

11. In a machine for the manufacture of glassware, pressing mechanism including rotatable plungers, and two spiders rotatable therewith, two plunger-reciprocating pitmen, one adjacent each spider and operatively connected thereto to alternately partially rotate the spiders and plungers.

12. In a machine for the manufacture of glassware, pressing mechanism including rotatable vertically-reciprocating plungers, plunger-depressing mechanism, and reciprocating means for the plungers and the depressing mechanism adapted to impart longer upward movement to the latter than to the plungers so as to free the plungers for rotation.

13. In a machine for the manufacture of glassware, pressing mechanism including rotatable plungers, vertically-reciprocating supports therefor, and eccentrics beneath the supports for reciprocating them and the plungers.

14. In a machine for the manufacture of glassware, pressing mechanism including rotatable plungers, reciprocating supports in which the same rotate, a plunger-depressor and actuating mechanism therefor, rotatable eccentrics for reciprocating the supports, and plunger-rotating mechanism.

15. In a machine for the manufacture of glassware, pressing mechanism including rotatable plungers, vertically-reciprocating supports in which the plungers rotate, a depressor adapted to engage an inactive plunger for actuating another plunger, actuating-wheels, pitmen connecting the wheels and the depressor, and eccentrics rotatable with the wheels for reciprocating the supports.

16. In a machine for the manufacture of glassware, pressing mechanism including a series of radially-arranged rotatable plungers, a head carrying a plunger-depressor, reciprocating mechanism for the plungers, head-reciprocating mechanism adapted to raise the depressor clear of the plungers for the purpose described, and plunger-turning means.

17. In a machine for the manufacture of glassware, a series of rotatable plungers and means for rotating the plungers, reciprocating supports in which the plungers rotate, a plunger-depressor, actuating mechanism operatively connected to the depressor and plungers, and support-reciprocating eccentrics.

18. The combination of a carrier, molds mounted to swing therein, members adapted

to swing the molds and having straight surfaces extending at right angles to the mold-axes, and guides adapted to engage said straight surfaces for holding the molds against swinging.

19. The combination of a carrier, molds mounted therein to swing vertically, and mechanism for righting the molds and holding them upright as they are presented to the pressing-machine.

20. The combination of a carrier, molds rotatable therein, disks rotatable with the molds and flattened on one edge, and guides which the flats of the disks are adapted to engage for holding the molds in fixed position.

21. The combination of a carrier, molds revoluble therein, disks revoluble with the molds and flattened on a line parallel with the mold-top, and guides out of the plane of the mold-axes but in line with the disks, the flats of the latter engaging the guides and holding the molds fixed.

22. The combination of a carrier, molds revoluble therein, disks turnable with the molds and flattened on one edge, and vertically-yieldable guides in line with the disks and adapted to hold the molds as described.

23. The combination of a mold-carrier, wheel 42 geared thereto, a vertically-movable locking-bolt adapted to engage the wheel, and actuating mechanism common to the wheel and bolt.

24. The combination of a mold-carrier geared to wheel 42, a wheel-locking bolt, and mechanism actuating simultaneously the wheel and bolt.

25. The combination of a mold-carrier geared to intermittently-rotating wheel 42, a locking-bolt for the wheel, and vibrating cam 54 for actuating the bolt.

26. The combination of a mold-carrier geared to wheel 42, a shaft, an arm adapted to vibrate the shaft, a dog on the arm engaging and intermittently rotating the wheel, cam-spider 54 secured to the vibratory shaft, and a locking-bolt for the wheel actuated by the cam-spider.

27. The combination of a mold-carrier, a wheel geared thereto formed with beveled depressions in one face, a vibratory arm, means for vibrating the arm, and a spring-actuated bolt carried by the arm and adapted automatically to successively engage the wheel depressions.

28. Molten-glass-feeding mechanism, consisting of oppositely-revoluble wheels, a feeding-box between the wheels, pins revoluble with and projecting beyond the wheel-peripheries, and means for retracting the pins so as to pass the feeding-box.

29. Molten-glass-feeding mechanism, including knives, and cam-wheels operatively connected to the knives for actuating the same.

30. Molten-glass-feeding mechanism, including knives having projecting pins, and wheels formed with cam-grooves into which the pins project for actuating the knives when the wheels are set in motion.

31. Molten-glass-feeding mechanism, including feeding-wheels, intermeshing gears on the wheel-journals, shaft 68 operatively connected to the gears, knives beneath the wheels, and actuating mechanism for the knives operatively connected to the said shaft.

32. Molten-glass-feeding mechanism, including intermittently-rotating wheels, cut-off knives beneath the wheels, and actuating mechanism common to the wheels and knives.

33. In a machine for the manufacture of glassware, pressing mechanism, molten-glass-feeding mechanism, a mold-carrier, molds on the carrier, and means for intermittently moving the carrier so as to pass the molds, successively, from the feeding mechanism to the pressing mechanism.

34. In a machine for the manufacture of glassware, pressing mechanism, molten-glass-feeding mechanism, a mold-carrier, molds on the carrier, and actuating mechanism common to the pressing mechanism, the feeding mechanism and the carrier, and adapted to intermittently move the carrier to pass the molds from the feeding mechanism to the pressing mechanism.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

FRANK O'NEILL.

Witnesses:
OTTO JAEGER,
L. N. LOVELAND.