H. TALLEY.

MACHINE FOR FILLING SHELLS WITH EXPLOSIVES.

APPLICATION FILED JUNE 15, 1909.

995,045. Patented June 13, 1911.

5 SHEETS—SHEET 1.

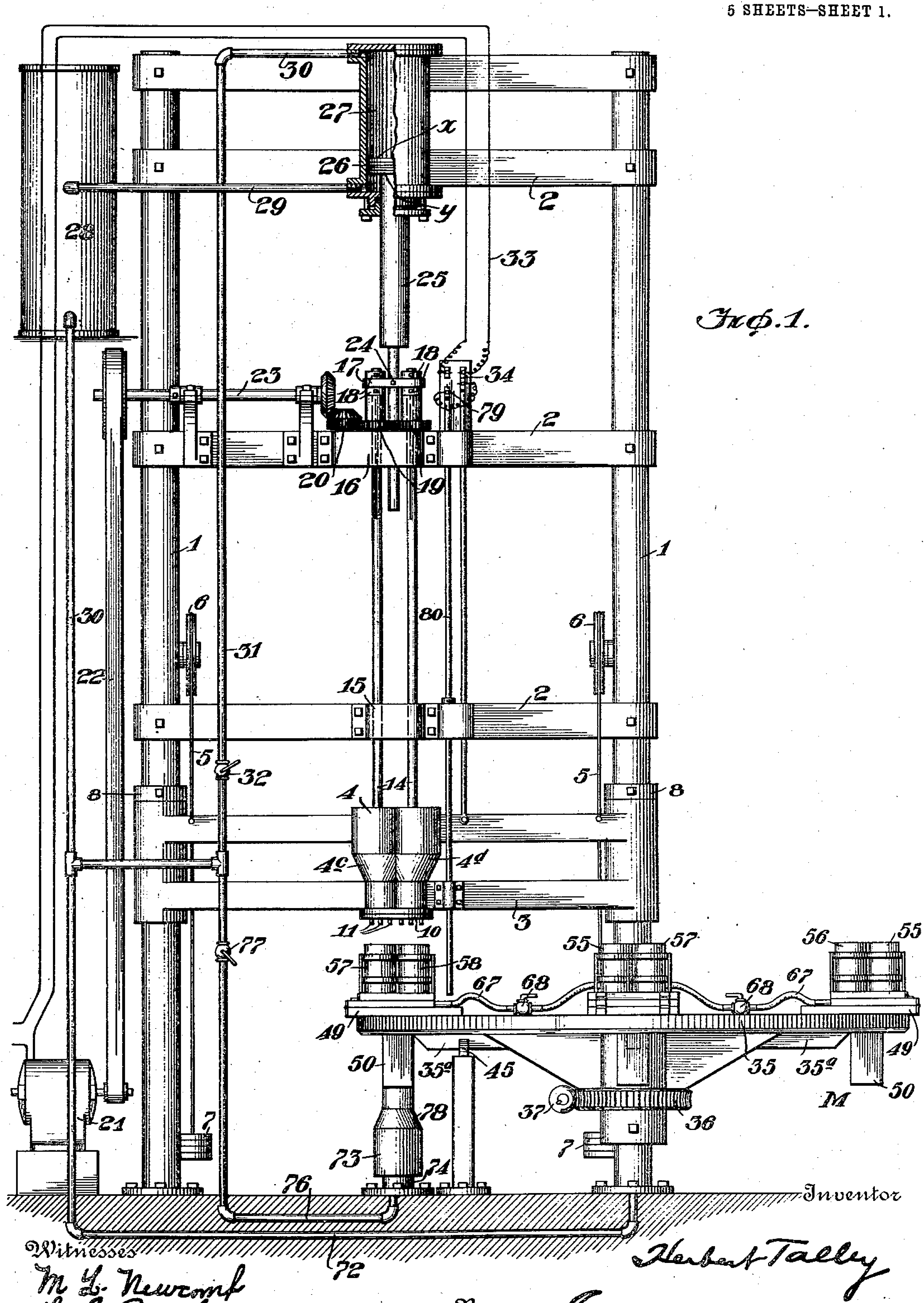

Fig. 1.

Witnesses
M. L. Newcomb
L. S. Buchner.

Inventor
Herbert Talley

By
Geo. [signature]
his Attorney

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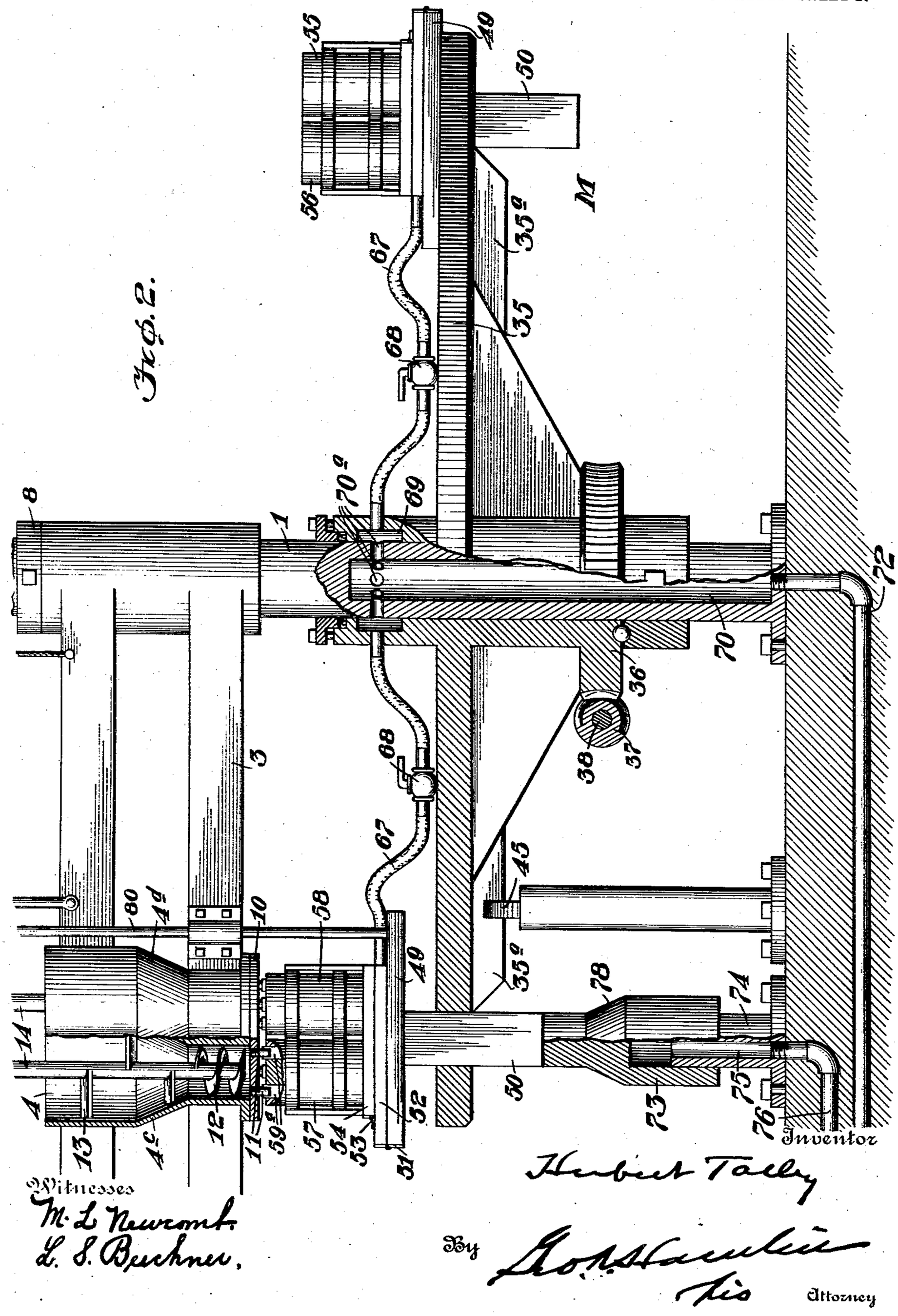
5 SHEETS—SHEET 2.

Fig. 2.



Witnesses

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L. S. Buchner.

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Herbert Talley

By Geo. H. Graves

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5 SHEETS—SHEET 3.

Fig. 3.

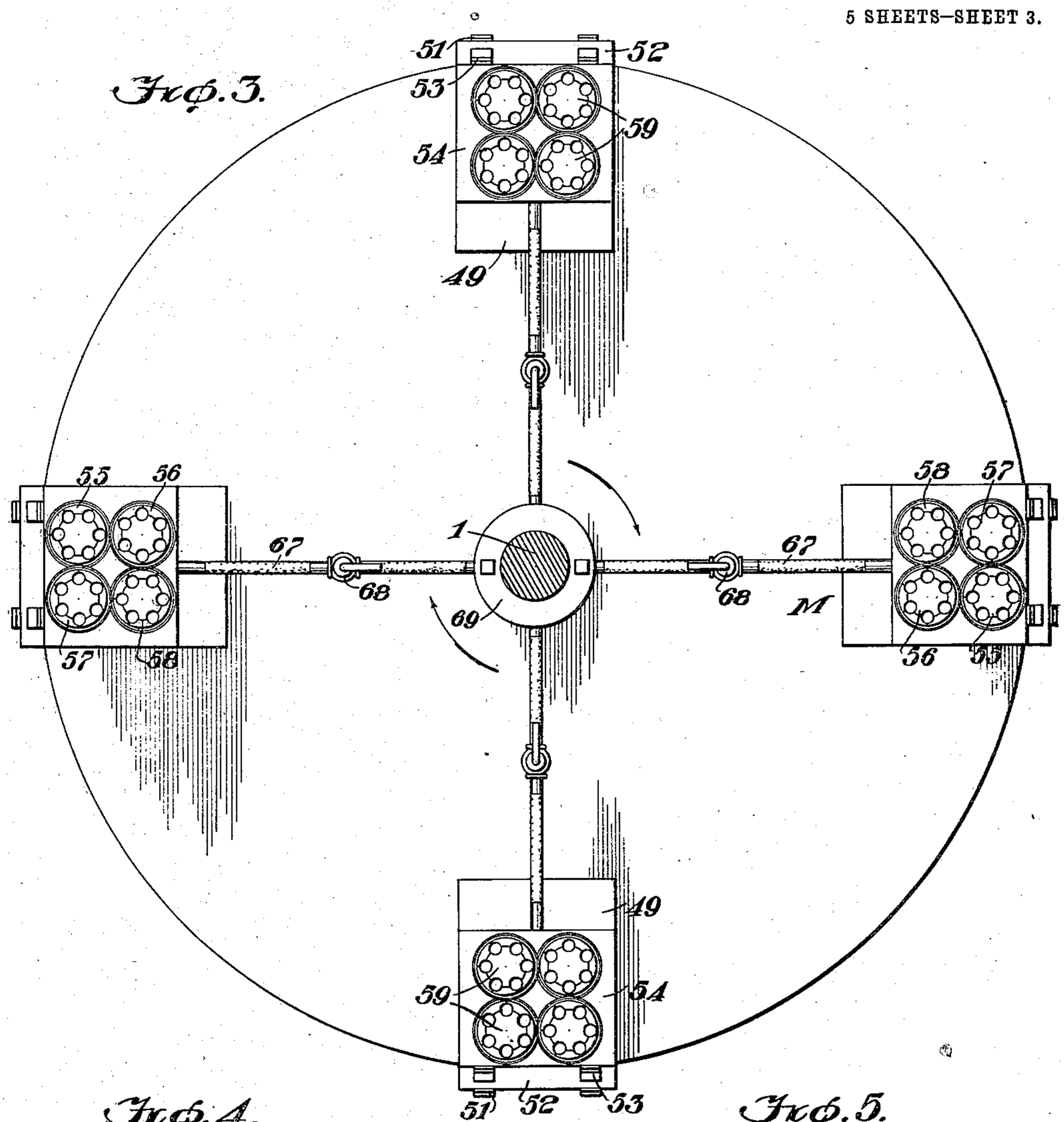


Fig. 4.

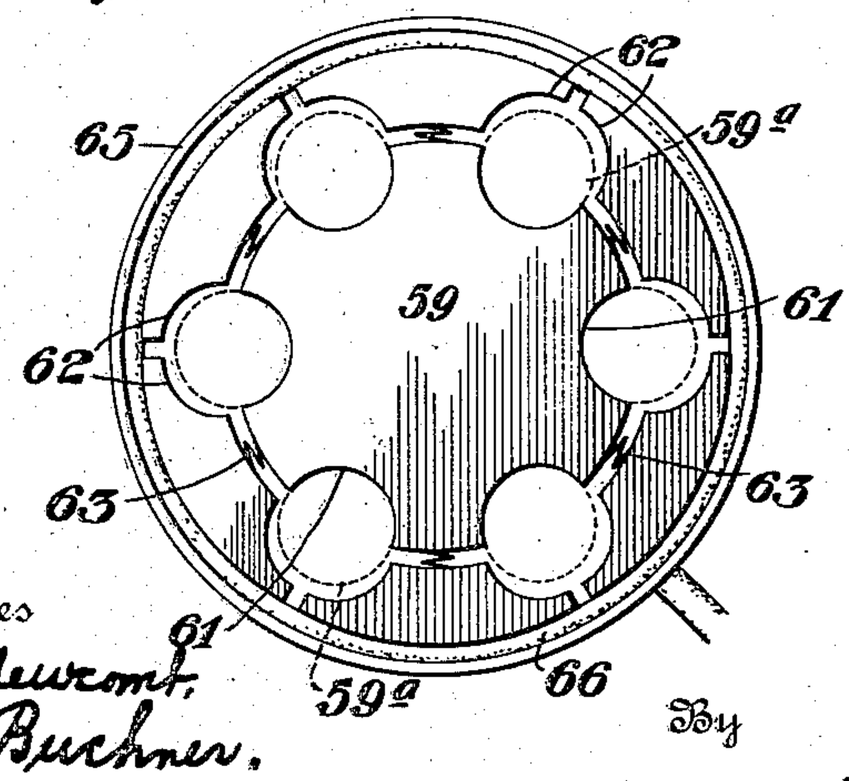
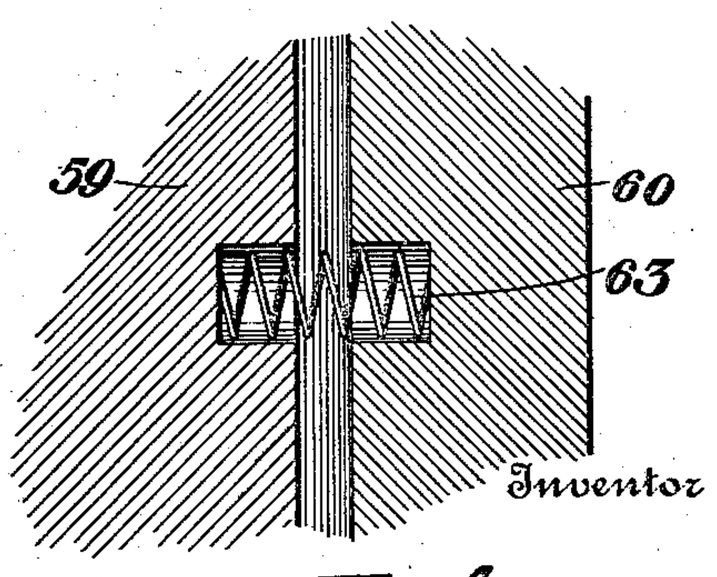


Fig. 5.



Witnesses
W. L. Newcomb.
L. L. Buchner.

Inventor
Herbert Talley

By
Geo. H. Graves
his
Attorney

H. TALLEY.

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5 SHEETS—SHEET 4.

Fig. 6.

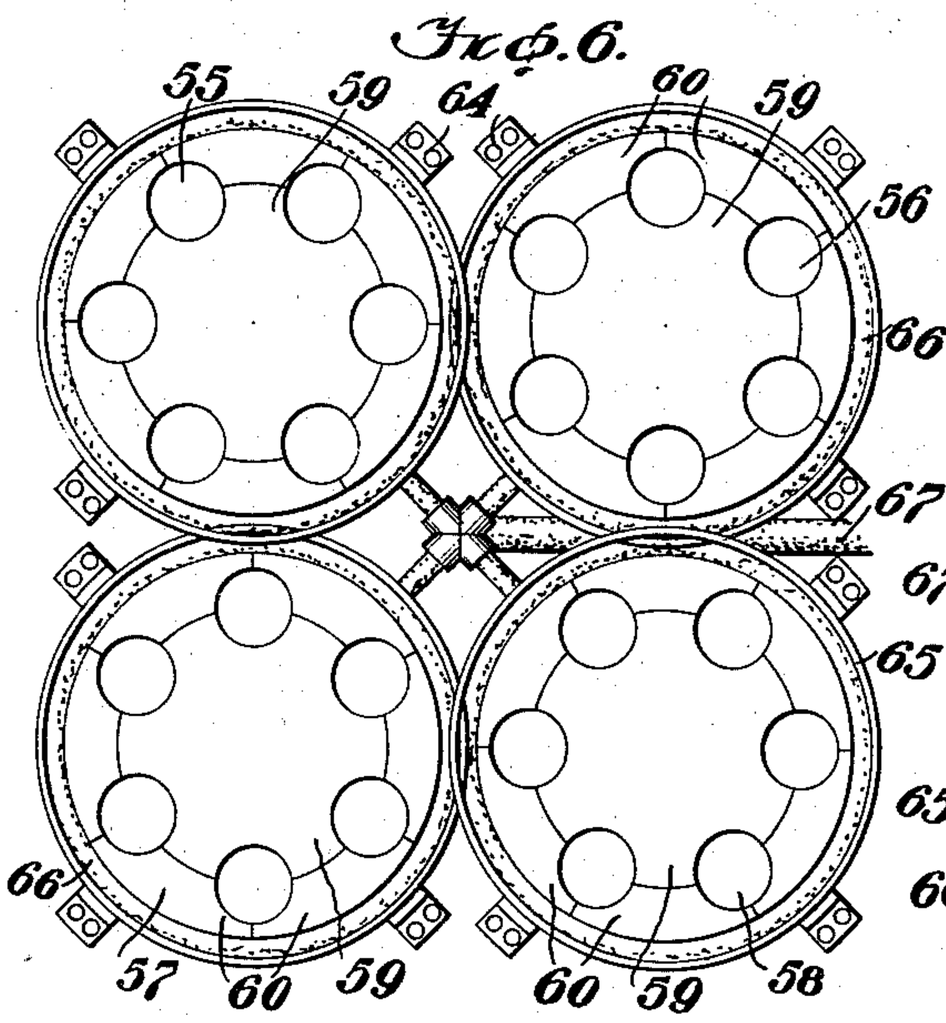


Fig. 7.

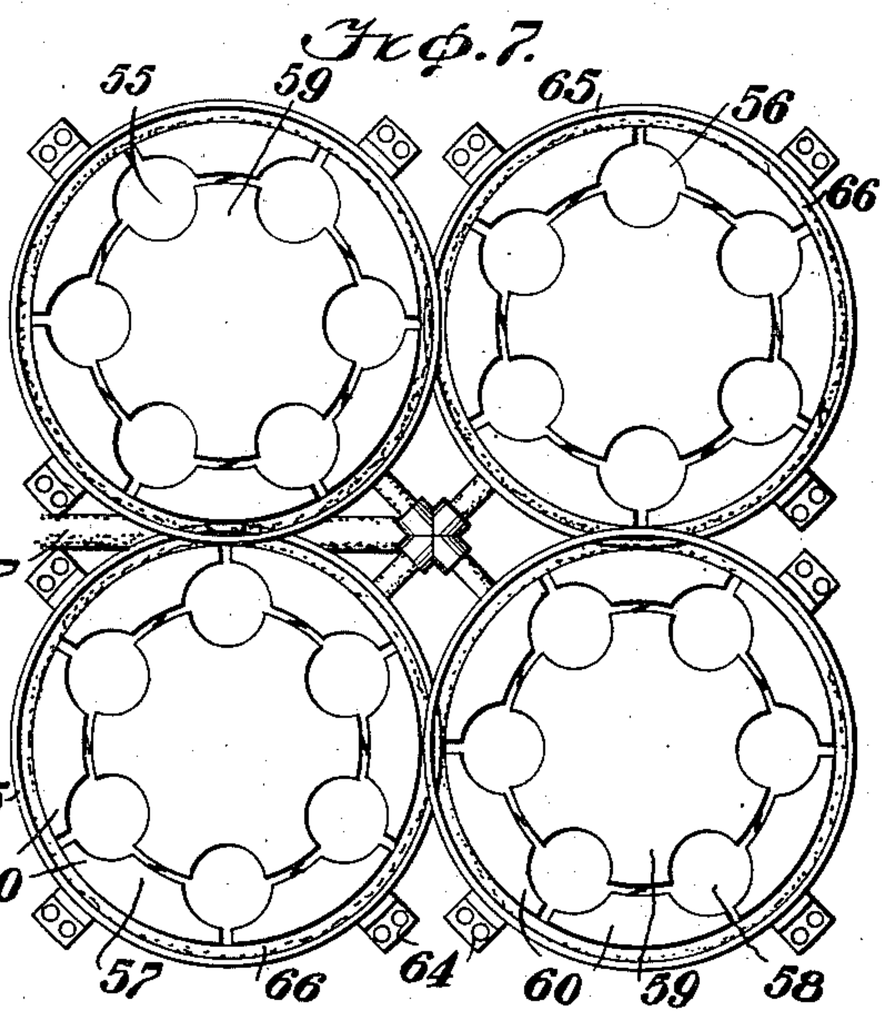


Fig. 8.

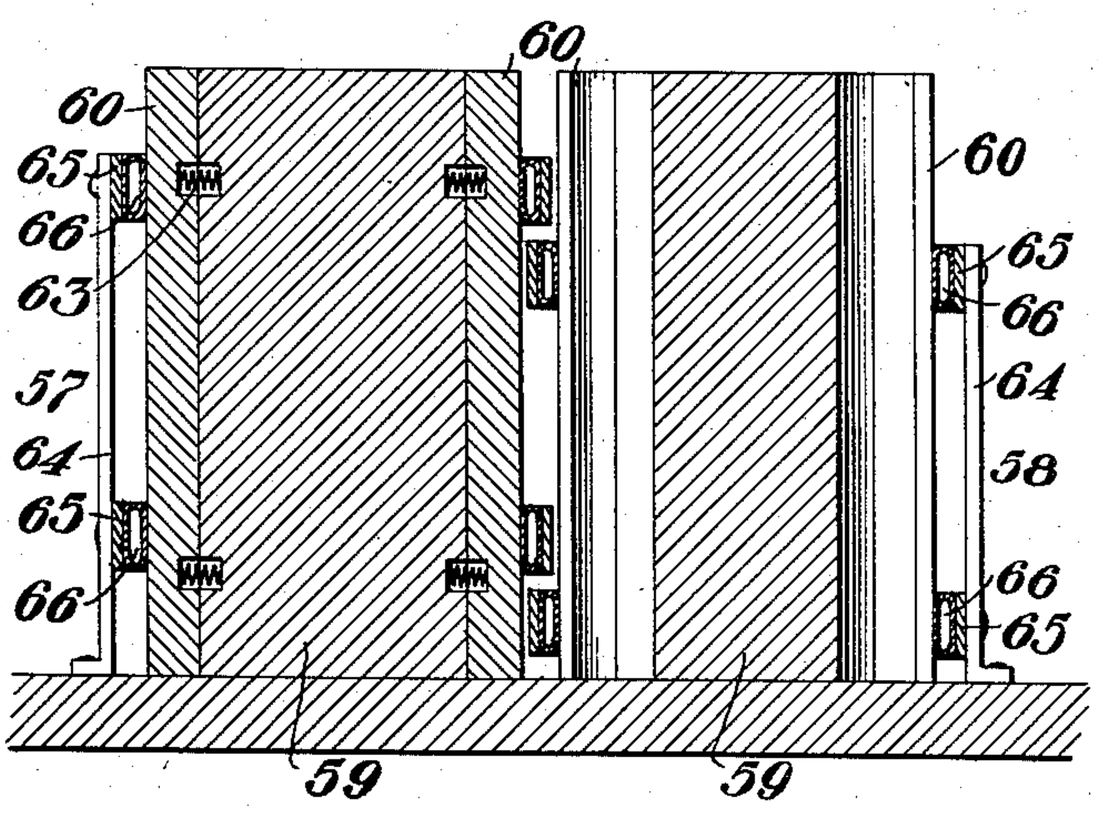
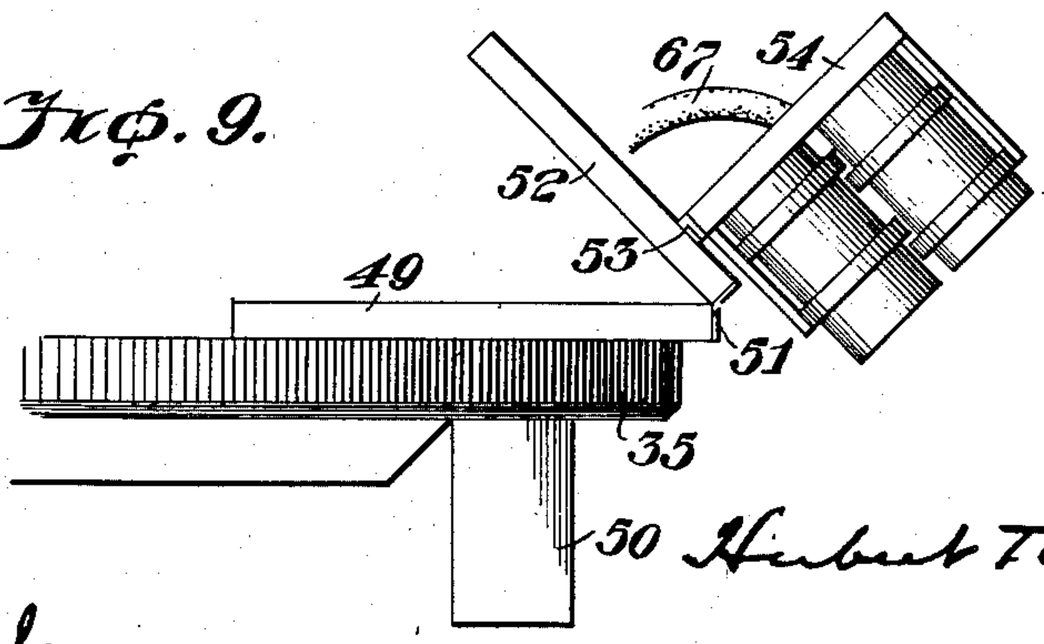


Fig. 9.



Witnesses
M. L. Newcomb.
L. S. Beechner.

Inventor
Hubert Talley

By Geo. H. Strong
His Attorney

H. TALLEY.

MACHINE FOR FILLING SHELLS WITH EXPLOSIVES.

APPLICATION FILED JUNE 15, 1909.

995,045.

Patented June 13, 1911.

5 SHEETS—SHEET 5.

Fig. 10.

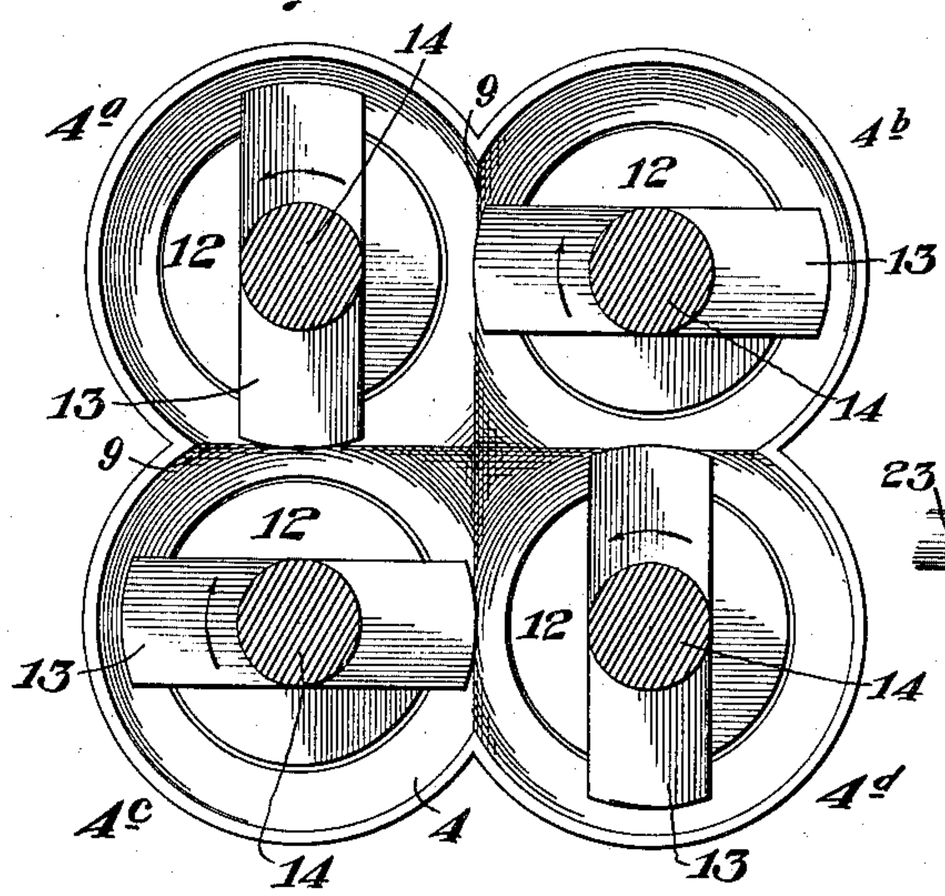


Fig. 11.

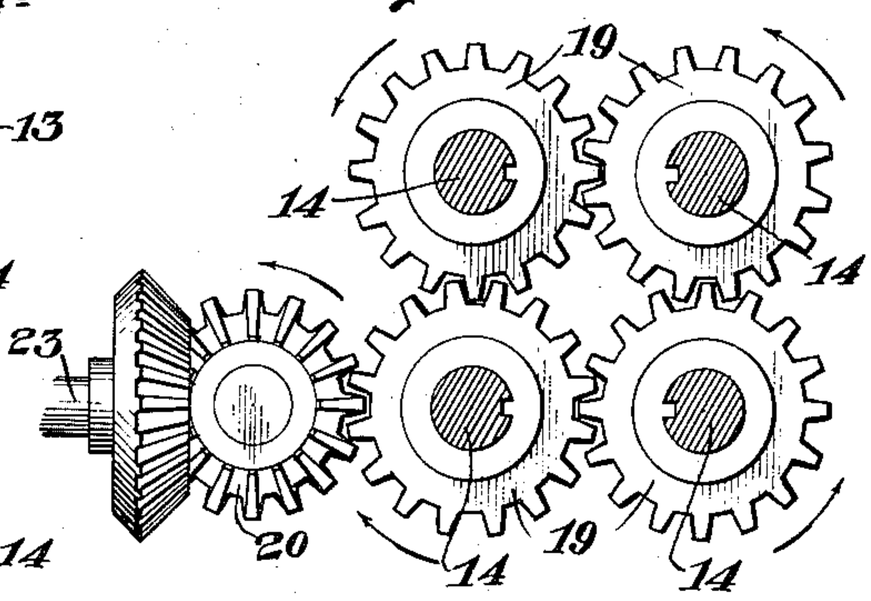


Fig. 12.

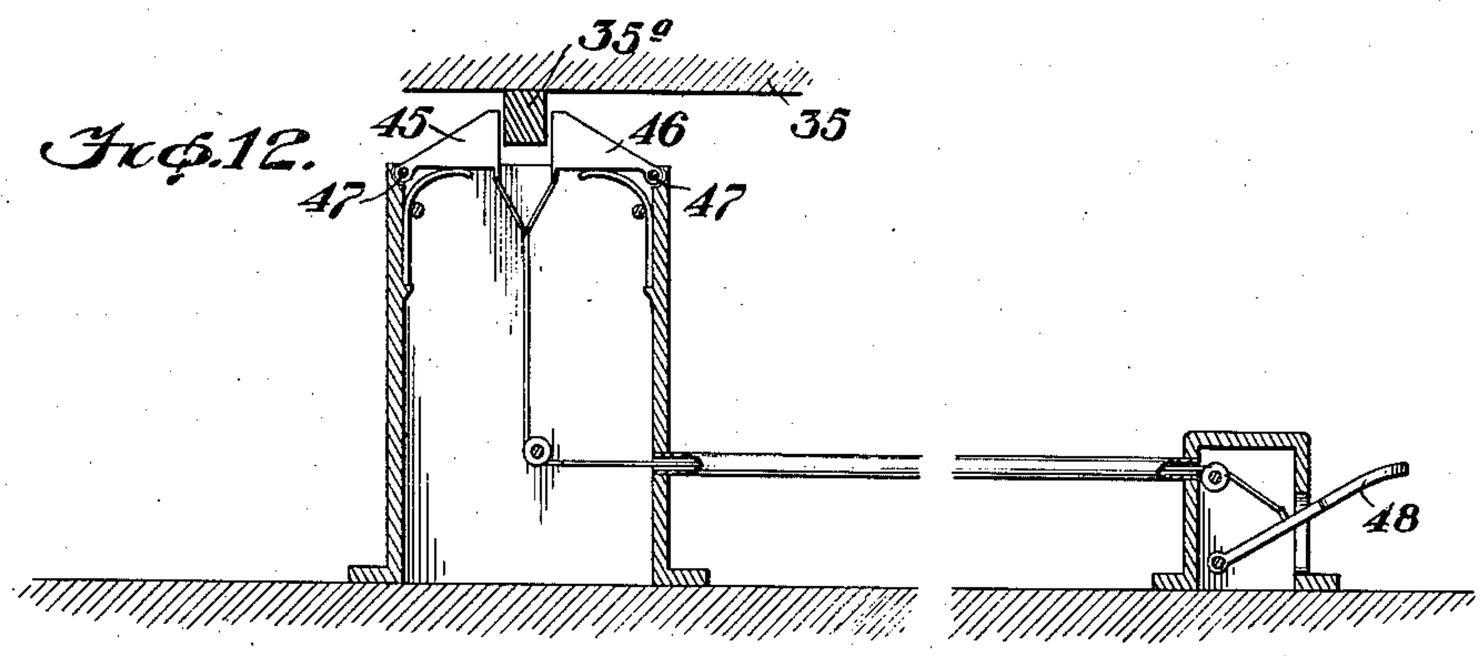


Fig. 13.

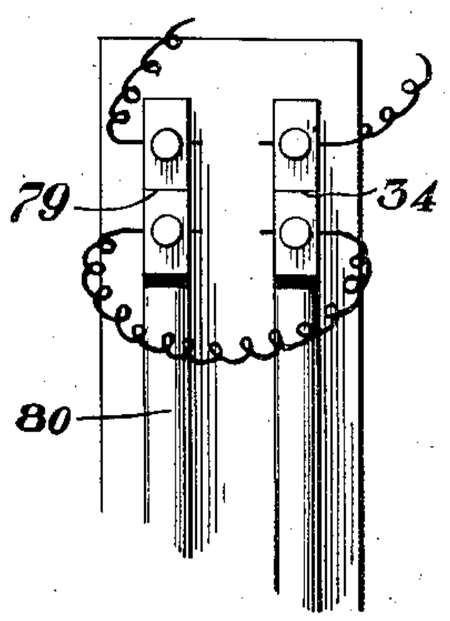
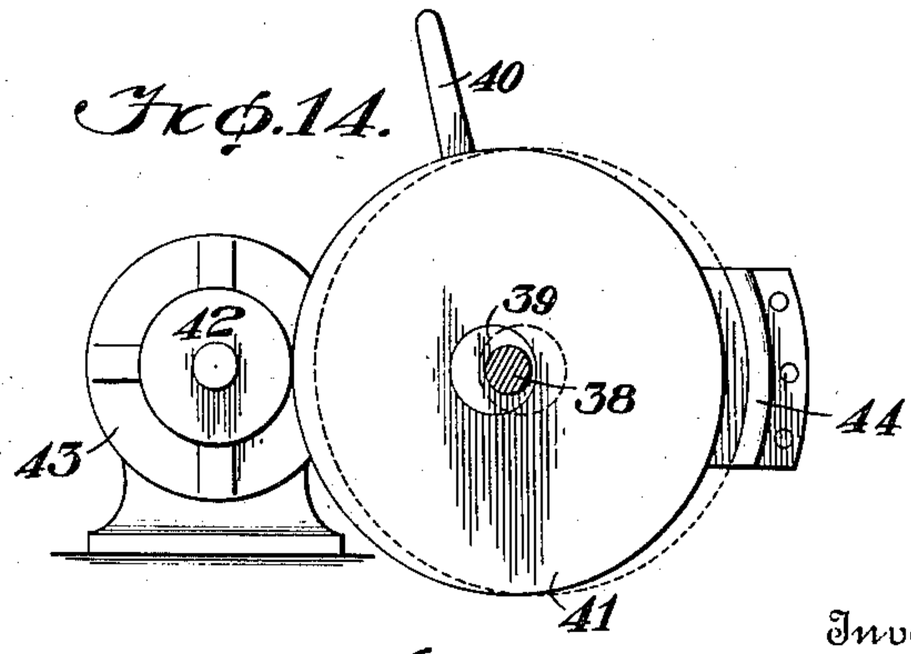


Fig. 14.



Witnesses
M. L. Newcomb.
L. S. Brechner.

Inventor
Herbert Talley

By Geo. H. Knudsen
Its Attorney

UNITED STATES PATENT OFFICE.

HERBERT TALLEY, OF JOPLIN, MISSOURI, ASSIGNOR TO INDEPENDENT POWDER CO. OF MISSOURI, OF JOPLIN, MISSOURI, A CORPORATION OF MISSOURI.

MACHINE FOR FILLING SHELLS WITH EXPLOSIVES.

995,045. Specification of Letters Patent. Patented June 13, 1911.

Application filed June 15, 1909. Serial No. 502,392.

To all whom it may concern:

Be it known that I, HERBERT TALLEY, a citizen of the United States, residing at Joplin, county of Jasper, and State of Missouri, have invented certain new and useful Improvements in Machines for Filling Shells with Explosives, of which the following is a specification.

This invention relates to machines for filling shells with explosives.

Explosive gelatin and dynamites are inclosed in cartridges or shells of paper of convenient size for use, and the present invention has for its object the provision of a machine of novel construction which will carry out this filling operation rapidly and safely in an automatic manner, under the control of an operator, whereby very large numbers of the shells or cartridges may be packed or filled in a short time as compared with methods heretofore employed for this purpose.

To carry out the foregoing object, I have devised a machine having novel means for holding the shells or cartridges; novel means for successively bringing the shell carriers or holding means into filling position and removing them therefrom; a new hopper construction and forcing means for pressing the explosive therefrom to the shells, together with novel means acting upon the completion of the filling operation or when undue pressure is exerted by the feeder on the explosive to instantly stop the operation of the machine in an automatic manner, whereby the machine is rendered entirely safe even if neglected by the operator; new devices for shifting the shell carrier and the feeder, and other novel instrumentalities, the construction of which will more fully appear hereinafter and the novel features and combinations whereof being set forth in the appended claims.

In the accompanying drawings;—Figure 1 is a front elevation; Fig. 2, an enlarged, partly sectional view, of the table and hoppers, showing a group of shell carriers in filling position; Fig. 3, a detail plan view of the table; Fig. 4, a detail plan view of one of the shell carriers in open position; Fig. 5, a detail section showing the shell carriers are expanded; Fig. 6, a detail plan view of a group of shell carriers in closed condition; Fig. 7, a similar view of them when in open position; Fig. 8, a vertical detail section of a pair of shell carriers, certain parts being removed; Fig. 9, a detail view showing a group of shell carriers in discharging position; Fig. 10, a partly sectional detail plan of the hoppers; Fig. 11, a detail of the gearing for driving the feeders; Fig. 12, a sectional detail of the locking means for the shell carrier table; Fig. 13, a detail view of the electrical switch mechanism in more or less diagrammatic disclosure; and Fig. 14, a detail of the driving and checking means for the table.

The uprights 1 of the machine frame are braced by cross-pieces 2 and are preferably positioned sufficiently far apart to prevent the access of any of the explosive thereto. Slidable on the uprights 1 is the cross-head 3 carrying the multi-hopper 4. The cross-head 3 and the hopper 4 are normally held in the position shown in Fig. 1 by cables 5 running over sheaves 6 and provided with counter-weights 7 which may be disposed in any convenient position, preferably where they would not be located above any part of the machine and hence incapable of causing an explosion should they become detached. In its normal position the cross-head 3 rests against collars 8.

The hopper 4 is composed of a plurality of hoppers 4^a, 4^b, 4^c, 4^d, the upper parts of each of which are enlarged, thence tapering, and the lower parts being cylindrical. Where the hoppers adjoin, the lines or ridges 9 of demarcation exist and thus while the whole constitutes one large hopper, it is composed of a plurality of hoppers, the tubular lower parts of which are open at their lower ends, a single nozzle plate 10 being detachably fastened to the same and having circular series of nozzles 11. By this grouping of the hoppers, instead of employing a single large hopper, I am enabled to employ a plurality of shell carriers which are adapted to be readily opened and closed in a novel manner and a large number of shells may be simultaneously packed or filled, as will presently appear.

Contained within each of the hoppers, 4^a, 4^b, 4^c, 4^d, is a feeder or forcing device for pressing the explosive out through the nozzles 11, consisting of a worm, spiral, or auger 12 located in the tubular lower part of the hopper and paddles or blades 13 disposed in the upper part of the hopper and arranged angularly to their planes of rota-

tion, both being carried by a shaft 14, of which there are four, which extend upwardly, being journaled in boxes 15 and 16 and rotatably supported by a plate 17, on both sides of which said shafts are provided with collars 18 which prevent the shafts from rising when in rotation during operation of the forcing devices. Loosely splined to the respective shafts 14 above the upper cross-brace 2, are the gears 19 which are intermeshed. Journaled on the cross-piece 2 is a gear 20 which meshes with one of the gears 19, thereby simultaneously rotating them and their shafts 14. The driving means may consist of a suitable electric motor 21 placed at any convenient point and connected by a belt 22 to a shaft 23 which drives the gear 20.

During operation of the machine, the forcing devices 12, 13, are designed to have no vertical movement up or down, but in order that they may be raised out of the multi-hopper for purposes of cleaning or at any other time, I provide means for lifting them. Secured to the plate 17 by a suitable device 24 is the stem 25 of a plunger whose piston 26 operates in a motive-fluid pressure cylinder 27 secured to the frame 1. A motive-fluid pressure source of supply 28 has a pipe 29 leading to one end of the cylinder 27 and a pipe 30 which is connected to a pipe 31 leading to the other end of the cylinder 27. A three-way valve 32 is conveniently disposed so that it may be operated by the workman. The superficial area on the side x of the piston 26 being greater than the side y, and the valve 32 being in position to admit the pressure through pipe 31, the pressure in the upper part of the cylinder will hold the piston 25 and the shafts 14 and their forcing devices 12, 13, down during operation of the machine, which is the normal condition of the parts, any undue pressure of the forcing devices 12, 13, upon the explosive in the hopper being compensated for and automatically taken care of by virtue of the movement of which the hopper and cross-head 3 are capable against the retracting tendency of the cables 5 and counterweights, but in order to render the machine absolutely safe, there is interposed in the circuit 33 of the motor 21 any suitable form of switch or circuit breaker 34 operated from the cross-head 3 which instantly opens the circuit and causes stoppage of the motor and consequent instant relief of the forcing operation on the explosive when there is any undue pressure of the forcing devices 12, 13, on the explosive and when the shells have been filled.

When the valve 32 is manipulated to cut off the pressure from pipe 30 to pipe 31 and to exhaust the pressure in pipe 31 to the atmosphere the motive-fluid pressure acting on the face y of the piston 26, immediately lifts it and the feeders 12, 13, the shafts 14 slipping upwardly through the gears 19.

The shell carrier table 35 may be mounted for rotation in different ways, but is preferably mounted to turn on the lower part of one of the uprights 1, being provided with a worm-wheel 36 turned by a worm 37 on a shaft 38 which is mounted in an eccentric box 39, adapted to be shifted by a suitable lever 40. A friction wheel 41 is secured to the shaft 38 and, by operating the lever 40, brought into engagement with a driving friction pulley 42 on a shaft of a suitable motor 43, or, thrown into engagement with a brake shoe 44 to instantly stop the rotation of the table 35. The purpose of this mechanism is to stop the rotation of the table 35 when the group of shell carriers has been positioned where they will be filled. To lock the table 35 with the shell carriers in such position, I may provide a pair of spring-actuated latches 45 and 46, suitably mounted at 47 so that one of the members 35^a of the table 35 will, after riding on the latch 45, be engaged by both of said latches which will be the proper position for filling of the shells. Suitable means, such as a foot-treadle 48 will be used for depressing the latches 45 and 46 after the shells have been filled and it is desired to rotate the table 35 to bring another group of shells into filling position.

The table 35 may carry any desired number of shell holding devices, four being shown in the present instance. The shell carriers each have a table 49 carried by a vertically movable stem 50. Hinged at 51 to the table 49 is a supplemental table 52 to which is hinged at 53 the bottom-piece 54 for the given group of shell carriers, of which there are a number corresponding to the hoppers 4^a, 4^b, 4^c, 4^d, as shown at 55, 56, 57, 58. Each shell carrier consists of a central core 59 which is secured to the bottom 54, and a plurality of sectors or sectoral members 60. The core 59, in each instance, has a plurality of shell receptacles 61 in the form of grooves extending from top to bottom thereof and the sectoral members 60 are provided at their adjacent edges with shell receptacles 62 which, in connection with the receptacles 61 constitute complete shell receptacles or holding devices. By providing these receptacles 62, a more nearly perfect circular shell receptacle is obtained than if it were made of but two complementary grooves. The shell receptacles correspond in number and position to the nozzles 11. Interposed between the core 59 and the sectoral members 60 are expansion coil springs or other suitable springs 63 which tend to open the shell carriers, that is, force the sections 60 away from the core in order that the shells may be readily inserted.

Rising from the bottom 54 are arms 64 to

which are connected circular abutments 65 which surround the respective shell carriers 55, 56, 57 and 58. Interposed between said circular abutments 65 and the shell carriers and surrounding the sectoral members 63 circularly of the shell carriers are distendable tubes 66 which may be secured to the abutments 65. The various distendable tubes 66 are coupled to a trunk tube 67, of which there are four, or a number corresponding to the groups of shell carriers, in which is interposed a three-way valve 68. The trunk tubes 67 are connected to a packed collar 69 whose interior is in communication with apertures 70ª in the upright 1, said apertures communicating with the conduit 70 within the upright, said conduit being connected by a pipe 72 to the pipe 30.

When the valve 68 is opened to the atmosphere, the motive-fluid pressure in the trunk 67 and all of the tubes 66 exhausts, the springs 63 opening up the shell carrier, permitting filling thereof with the paper shells 59 which are to be packed with the explosive. At that time the shell carrier is in suitable position for filling and after the shells have been inserted in the receptacles 61, 62, the operator then turns valve 68 controlling the given group of shell carriers and the motive-fluid pressure from the source of supply 28 having access to the tubes 66, these tubes are distended and instantly close all of the sectoral members 63 of the given group of shell carriers simultaneously and the shells are securely held and retained while being filled, after which the valve 68 may be opened by hand on further rotation of the table 35, or, a trip device may be employed to automatically open the valve at the proper time to release the shells as, for instance, after they have been crimped at their open ends by any suitable mechanism and brought to the position M for dumping.

When in dumping position the table 52 may be first tilted and then the bottom 54 swung around into the position shown, whereupon the loaded shells will slide out onto a table or other suitable support. The table 52 and bottom 54 may then be lowered and the shell carriers re-filled.

When the shell carriers are in position for filling the cartridges, the stem 50 is located immediately over a cylinder 73 which telescopes over a piston 74, stationarily mounted and provided with a conduit 75 opening at its upper end which is fed with motive-fluid pressure by a pipe 76 coupled to pipe 30 and provided with a three-way valve 77. The cylinder 73 is provided with an inclined or tapered part 78 and on account of being uppermost and telescoping over the piston 74, there is no danger of any of the explosive lodging between the cylinder and the piston as would be the case if the cylinder were lowermost. On turning the valve 77 to admit the pressure into the pipe 76, the cylinder 73 is raised and contacts with the stem 50, lifting the shell carrier and causing the nozzles 11 to enter the mouths of the shells 59, remaining in this position until the shells have been filled.

When the shells have been filled with the explosive fed thereto by the devices 12 and 13, the reactionary pressure causes the shell carrier to descend, but in order that the slightest downward movement of the shell carrier, by reason of undue pressure caused by filling the shells, or too great pressure in the hopper, may effect stoppage of the machine, I provide in the circuit 33 of the motor 21 a switch or circuit breaker 79 operated by a rod 80 from the table 49 so that the circuit will be open and the motor instantly stop on such descent of the shell carrier. The motor having stopped, the operator opens valves 32 and 77 to the atmosphere. The shell carrier then descends and the hopper and feeders rise. The table 35 can be again set in rotation to bring another group of shell carriers and shells into position for elevation by the cylinder 73 and filling.

If the valve 32 be left undisturbed at the end of a filling operation, there will be no escape of the explosive through the nozzles 11 because the motor is immediately stopped on the descent of the shell carrier or on any undue pressure in the hopper.

The valves 32 and 77 being independent, the feeders may be raised or lowered independently of the raising and lowering of the shell carrier.

I am aware that the motor might be controlled in other ways than those described and that control of the motor could be had by either the movement of the hopper or of the shell carrier, also, that motive-fluid pressure could be utilized in other ways than I have described for the operation of the shell carriers in their opening and closing movements, as well as other changes resorted to in carrying out the invention, without departing from the spirit and scope thereof.

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

1. In a machine for feeding explosives, the combination with a movable hopper having a delivery opening, and means for retracting said hopper, of a feeding or forcing device adapted to operate within the hopper, said hopper being adapted to automatically move or yield when undue pressure is exerted on the explosive therein by the feeding or forcing device.

2. In a machine for feeding explosives, the combination with a movable hopper having a delivery opening, and means for retracting said hopper, of a feeding or forcing device adapted to operate within the hop-

per, said hopper being adapted to automatically move or yield when undue pressure is exerted on the explosive therein by the feeding or forcing device, means for operating the feeder, and means for controlling the operation of the feeder by the movement of the hopper.

3 In a machine for feeding explosives, the combination with a movable hopper having a delivery opening, and means for retracting said hopper, of a feeding or forcing device adapted to operate within the hopper, said hopper being adapted to automatically move or yield when undue pressure is exerted on the explosive therein by the feeding or forcing device, an electric motor for operating the feeding device, and means for controlling the motor circuit by the movement of the hopper.

4. In a machine for feeding explosives, the combination with a hopper and a feeding or forcing device adapted to operate therein, said hopper and feeding or forcing device being relatively movable, an electric motor for operating the feeding device, and means for controlling the motor circuit by the relative movement of the hopper and feeder.

5. In a machine for feeding explosives, the combination with a hopper having a delivery opening, of a feeding or forcing device adapted to operate within the hopper, a movable carrier adapted to receive the explosive fed from the hopper, an electric motor, and means for controlling the circuit of the motor which is operated by the movement of the movable carrier.

6. In a machine for feeding explosives, the combination with a hopper having a delivery opening, a feeding or forcing device adapted to operate therein, said hopper and feeding device being relatively movable, means for operating the feeding or forcing device, a movable carrier adapted to receive the explosive fed from the hopper, means controlling the operating means aforesaid, and means for actuating said controlling means from both the movable carrier and by the relative movement of the hopper and feeding device.

7. In a machine for feeding explosives, the combination with a movable hopper having a delivery opening, and means for retracting said hopper, of a feeding or forcing device adapted to operate within the hopper, and a movable carrier adapted to receive the explosive fed from the hopper and to coöperatively move with the hopper.

8. In a machine for feeding explosives, the combination with a movable hopper having a delivery opening, and means for retracting said hopper, of a feeding or forcing device adapted to operate within the hopper, and a movable carrier adapted to receive the explosive fed from the hopper and to coöperatively move with the hopper, and means for moving said carrier independently of the movement of the hopper aforesaid.

9. In a machine for feeding explosives, the combination with a movable hopper having a delivery opening, of a feeding or forcing device adapted to operate within the hopper, a movable carrier adapted to receive the explosive fed from the hopper, an electric motor, and means for controlling the circuit of the motor which is operated from both the movable hopper and the movable carrier.

10. In a machine for feeding explosives, the combination with a hopper having a delivery opening, of a feeding or forcing device adapted to operate therein, motive-fluid operated means for shifting the feeding device aforesaid, a movable carrier adapted to receive the explosive from the hopper, motive-fluid operated means for moving the carrier, and independently operated devices for controlling the respective motive-fluid operated means aforesaid, whereby the carrier and the feeder are adapted for independent control.

11. In a machine for feeding explosives, the combination with a hopper, of a feeding device adapted to operate therein, a movable carrier adapted to receive the explosive fed from the hopper, and motive-fluid operated means for moving the carrier comprising an inverted cylinder, a piston over which said cylinder telescopes, and a controlled source of motive-fluid pressure leading to the interior of the cylinder.

12. In a machine for feeding explosives, the combination with a plurality of grouped hoppers each having a plurality of nozzles, and a plurality of independent feeding devices respectively operating in said hoppers, of a plurality of grouped shell carriers each provided with means for holding shells corresponding in number to the nozzles of the respective hoppers and adapted to be positioned adjacent thereto for filling of the shells.

13. In a machine for feeding explosives, a shell carrier composed of a core, and a plurality of circularly arranged members between which and the core the shells are held.

14. In a machine for feeding explosives, a shell carrier comprising a central core, and a plurality of members grouped about said core and between which and the core the shells are held.

15. In a machine for feeding explosives, a shell carrier composed of a central circular core, and a plurality of sectoral members encircling the core and between which and the core the shells are adapted to be held.

16. In a machine for feeding explosives, a shell carrier comprising a plurality of members arranged circularly and adapted for

holding a plurality of shells in circular arrangement therebetween, in combination with motive-fluid operated means adapted for simultaneously operating said members.

17. In a machine for feeding explosives, a shell carrier composed of concentrically arranged relatively movable members between which the shells are adapted to be held, in combination with motive-fluid operated means for operating said members.

18. In a machine for feeding explosives, a shell carrier composed of substantially concentric relatively movable members, in combination with a distendable tube arranged substantially concentric thereto for relatively moving the said members.

19. In a machine for feeding explosives, a shell carrier comprising shell holding members arranged for relative expansion and contraction, in combination with a distendable tube embracing said members, whereby they may be relatively moved.

20. In a machine for feeding explosives, a shell carrier comprising shell holding members arranged for relative expansion and contraction, in combination with a distendable tube embracing said members, whereby they may be relatively moved in one direction, and springs for moving the members in the opposite direction.

21. In a machine for feeding explosives, a shell carrier table, a plurality of shell carriers located at different points thereof, motive-fluid operated means for the respective shell carriers, and means for independently controlling the respective motive-fluid operated means.

22. In a machine for feeding explosives, a shell carrier comprising means for holding the shells, a bottom or end piece therefor, and a hinged platform to which the said bottom or end piece is hinged.

23. A shell carrier for cartridge filling machines, having relatively movable members adapted to hold shells therebetween, in combination with a controllable motive fluid operated motor coöperating with said members and adapted to relatively move them.

In testimony whereof, I hereunto affix my signature in presence of two witnesses.

HERBERT TALLEY.

Witnesses:

LOUIS DU HADWAY,

P. C. TALLEY.