W. I. DONALDSON.

MACHINE FOR PACKING EXPLOSIVE GELATIN DYNAMITE.

APPLICATION FILED MAR. 8, 1907.

914,396.

Patented Mar. 9, 1909.

2 SHEETS—SHEET 1.

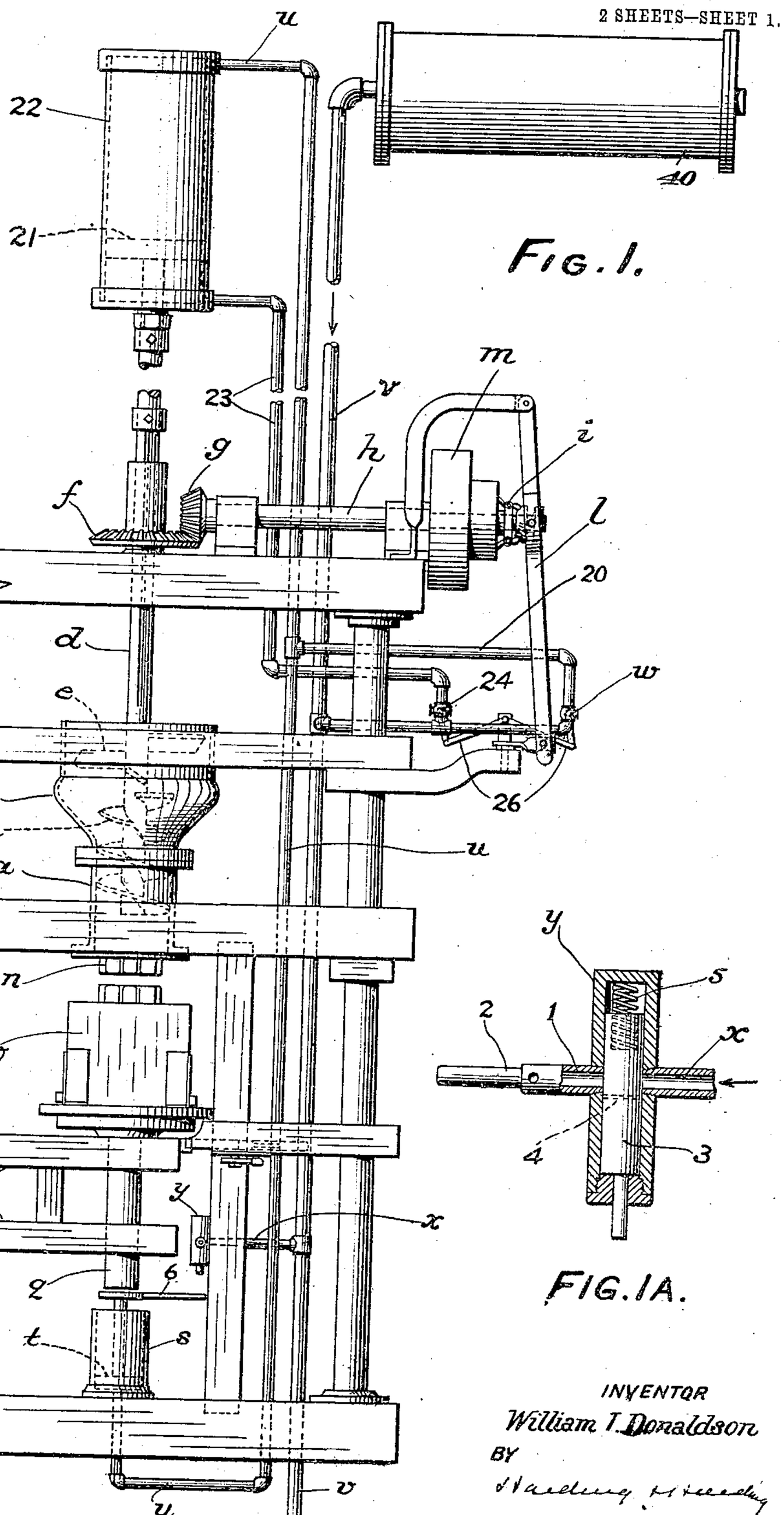


FIG. 1.

FIG. 1A.

WITNESSES:

Robt P. Kitchel

W. M. Hamilton

INVENTOR

William I. Donaldson

BY

Harding & Harding

ATTORNEYS.

W. I. DONALDSON.

MACHINE FOR PACKING EXPLOSIVE GELATIN DYNAMITE.

APPLICATION FILED MAR. 8, 1907.

914,396.

Patented Mar. 9, 1909.

2 SHEETS—SHEET 2.

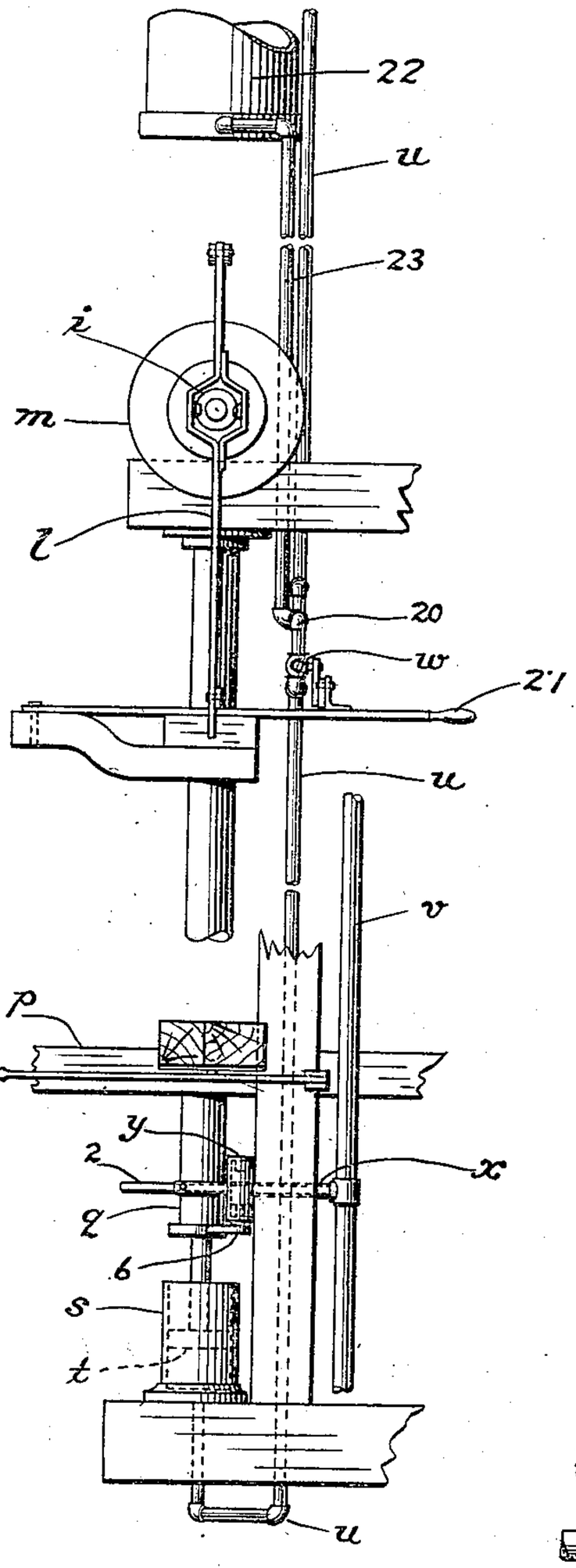


FIG. 2.

FIG. 3.

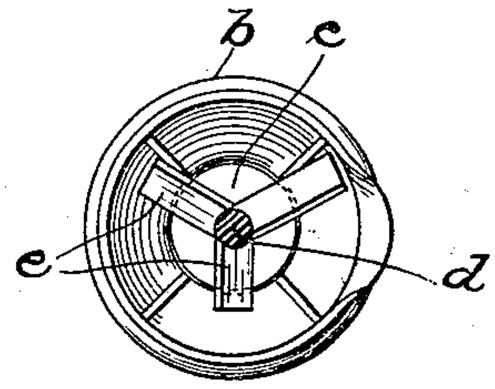
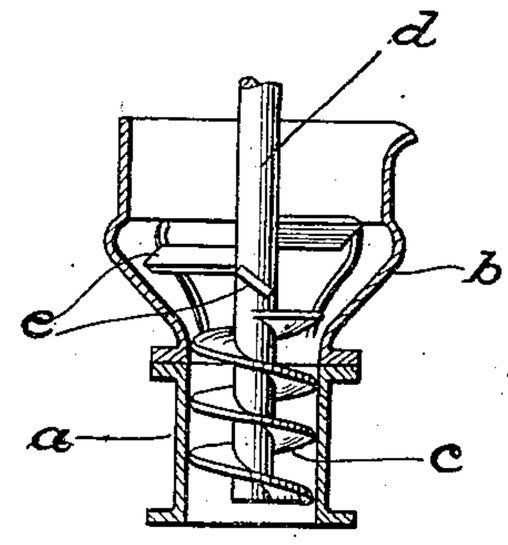


FIG. 4.



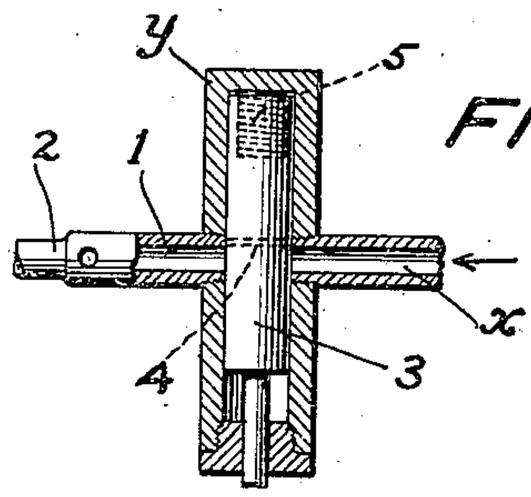


FIG. 2A.

WITNESSES:

Robt. P. Kitchel.

W. W. Hamilton

INVENTOR

William I. Donaldson

BY

Hardway & Hardway

ATTORNEYS.

UNITED STATES PATENT OFFICE.

WILLIAM I. DONALDSON, OF PAULSBORO, NEW JERSEY, ASSIGNOR TO THE E. I. DU PONT DE NEMOURS POWDER COMPANY, OF WILMINGTON, DELAWARE, A CORPORATION OF NEW JERSEY.

MACHINE FOR PACKING EXPLOSIVE GELATIN DYNAMITE.

No. 914,396. Specification of Letters Patent. Patented March 9, 1909.

Application filed March 8, 1907. Serial No. 361,259.

To all whom it may concern:

Be it known that I, WILLIAM I. DONALDSON, a citizen of the United States, residing at Paulsboro, county of Gloucester, and State of New Jersey, have invented a new and useful Improvement in Machines for Packing Explosive Gelatin Dynamite, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, which form a part of this specification.

The machine embodying my invention is, generally speaking, like that illustrated and described in an application filed by Thomas W. Bacchus, October 2d, 1906, Serial Number 337,109, and the machine need not, therefore, be herein specifically described.

The present invention relates to certain improvements upon that machine. In the machine of that application the explosive gelatin is fed from a cylindrical hopper, by means of a screw through openings provided with nozzles into the shells carried by a carrier, the nozzles projecting into the shells during the packing operation. In the construction of that machine, dependence for feeding was placed entirely upon the feeding screw, for, while there was a flaring top to the upper end of the cylindrical hopper, gravity was depended upon to carry the material from the enlarged portion to the cylindrical portion. I have improved this portion of the machine by placing upon the shaft, rotating the screw in the cylindrical hopper, and within the flared portion above the cylindrical hopper, a plurality of blades with their faces set at an angle, so that where there is substantially no resistance they will positively force the material into the cylindrical hopper; yet if there is a tendency to force more than the capacity of the screw, in the cylindrical hopper, to take care of, the blades will ride over the material, which will escape between them, and thus regulate the feed to the cylindrical hopper. Thus, the feed to the cylindrical portion of the hopper is constant, and regulated by the feed of the screw in the cylindrical hopper.

Again, it has been customary for the person who attends to the shell carriers to determine when the shells are filled with the material. In the improvement of this invention I provide means for accurately determining the time when the shell is filled. In the machine of previous application, as in this machine, the shell carrier, when being filled, is supported upon a piston in an air cylinder which descends during the filling of the shell. I have added an indicating device, which, when the shell carrier has descended to the point corresponding to a filled shell, is operated to give a signal. In the preferred form shown a trip is carried by the carrier, which, on its descent to a point, corresponding to the filled shell, opens a valve, admitting air to a whistle or indicating device.

I have further improved the machine by an arrangement whereby the opening of the valve to allow the shell carrier elevating mechanism to descend, simultaneously shifts the clutch to stop the rotation of the feed screw and operates the valve controlling the elevation of the feed screw, so that the feed screw is elevated out of operative relation to the hopper when the shell carrier descends, to be withdrawn, and vice versa.

I will now describe my invention as illustrated in the accompanying drawings, and then point out the invention in the claims.

Figure 1 is an elevation of part of the machine showing embodiment of my invention. Fig. 1[A] is a detail view, showing valve 3 and appurtenances in position of Fig. 1. Fig. 2 is a partial end view of Fig. 1. Fig. 2[A] is a view corresponding to Fig. 1[A], with valve in position of Fig. 2. Fig. 3 is a plan view of hopper. Fig. 4 is a detail sectional view of hopper with shaft screw and blades.

a is cylindrical hopper having the flared conical portion *b* at its upper end.

c is the screw within the hopper *a* and upon the shaft *d*. This shaft *d* extends upward through the flared conical portion *b*. Upon this shaft *d* and within the flared portion *b* are the blades *e*, the faces of which are inclined, as shown. Upon the shaft *d* is splined the bevel gear *f* meshing with the bevel gear *g* on the shaft *h*.

i is a clutch controlled by the lever *l*.

This clutch is used to engage the shaft *h* and the driving pulleys *m*. When connection is made the shaft *d* is rotated.

The bottom of the cylindrical hopper is formed by an orificed plate from the orifices of which project the nozzles *n*.

o is the shell carrier.

p is the table carrying the shell carrier, and by which it is rotated into and out of alinement with the hopper *a*. The carrier has, projecting from its lower portion, the pin *q*, which passes through an orifice in the table *p*.

s is a cylinder and *t* a piston in said cylinder. The cylinder is connected with the pipe *u*, which pipe *u* is by pipe 20 connected with the pipe *v* leading from a source of air pressure supply, as shown, the accumulator or pressure tank 40. Upon the pipe 20 is a valve *w*, adapted to connect pipe 20 with either the pipe *v* or the atmosphere.

x is a pipe connected with the pipe *v*. This pipe *x* opens into the valve cylinder *y* and opposite pipe *x* is a pipe 1 from the cylinder, leading to a whistle or other signal 2. In the cylinder *y* is the valve 3, having through it, the passage 4. In one position of the valve 3 this passage 4 connects the pipes *x* and 1 and air operates the whistle or signal 2. Between the upper face of the valve 3 and the cylinder *y* is a spring 5. Carried by the piston *t* is a projecting pin or lug 6 which, in the upward movement of the piston, strikes the stem of valve 3, forcing the valve 3 upward, compressing the spring 5. On the downward movement the spring 5 causes the valve 3 to follow downward. When the shell carrier *o*, with its shells, in the rotation of the table *p*, is brought in alinement with the nozzles *n* and the pin *q* in alinement with the piston *t*, the valve *w* is operated to admit air to pipe *u* and the piston *t* is elevated, elevating the carrier *o* and its shells until the nozzles *n* enter the shells. During this upward movement the passage 4 connects the pipes *x* and 1, but as the upward movement is quite rapid, there is no substantial action upon the whistle. When the shells are filled and further attempt to add thereto creates a pressure, causing the carrier to slowly descend, and in the descent, when the passage 4 connects pipes *x* and 1, the downward movement being slow, an appreciable signal is given. The relation of the passage 4, pipes *x* and 1, and lug 6 are such that this action takes place at the initial downward movement, and thus, practically, at the time the shell is filled. Thus, to the operator is automatically indicated when the shells are filled, and all necessity of manual action to determine this condition is avoided. When the whistle or indicator signals the operation of the feed screw is stopped and the valve *w* operated to connect pipe *u* and the atmosphere, and the piston descends rapidly to its initial position, enabling the table *p* to be rotated to remove the shell carrier to other points for other operations, and the bringing into action of another shell carrier to have its carried shells filled.

The shaft *d* is connected to the piston rod of a piston 21 in the cylinder 22. The pipe *u* connects with the upper portion of cylinder 22. The lower end of cylinder 22 is connected by pipe 23 with pipe *v*. On pipe 23 is a valve 24. The valves 24 and *w* have their operating levers connected by links 26, which links are connected to the main lever 27, to which main lever 27 is also connected the lever *l*. When the main lever 27 is operated in one direction valve *w* is opened to atmosphere, causing the air to exhaust from below piston *t* and from above piston 21, and the valve 24 opened to admit pressure to pipe 23 and to shift the clutch *i*, so that the carrier *o* descends, the shaft *d* is elevated and the rotation of the shaft *d* is stopped. In the opposite movement of the lever 27 the pipe 23 is opened to exhaust and pressure is admitted by pipe *u* to the top of cylinder 22, moving shaft *d* downward, and to the bottom of cylinder *s*, elevating piston *t* and carrier *o*, and the clutch is moved to cause engagement between shaft *h* and pulley *m* and the shaft *d* rotates.

Having now fully described my invention, what I claim and desire to protect by Letters Patent is—

1. In a machine of the character described, in combination, a cylindrical hopper and a conical hopper communicating with said cylindrical hopper, a conveying screw in said cylindrical hopper and blades, the operative faces of which are inclined, in the conical hopper, and means to rotate said screw and blades, said blades being supported so as to be vertically movable.

2. In a machine of the character described, in combination, a conical hopper, a cylindrical hopper in which said conical hopper terminates, blades, the operative faces of which are inclined, in said conical hopper, and a screw in the cylindrical hopper, and means to revolve said screw and blades, said blades being supported so as to be vertically movable.

3. In a machine of the character described, in combination, a cylindrical hopper, a conical hopper opening into said cylindrical hopper, a shaft extending through both hoppers, a screw on that portion of the shaft within the cylindrical hopper, and blades, the operative faces of which are inclined, on that portion of the shaft within the conical hopper, and means to rotate said screw, said shaft being vertically movable.

4. In a machine of the character described, the combination with the cylinder and the shell carrier lifting piston therein, the hopper and feeding screw shaft therein, the shaft cylinder and piston therein, and connection

between said piston and shaft, of a pipe to the lower portion of the shell carrier piston cylinder, a pipe to the upper portion of the shaft cylinder, a source of pressure supply and means to simultaneously connect said pipes with the pressure supply.

5. In a machine of the character described, the combination with the cylinder and the shell carrier lifting piston therein, the hopper and feeding screw shaft therein, the shaft cylinder and piston therein, and connection between said piston and shaft, of a pipe to the lower portion of the shell carrier piston cylinder, a pipe to the upper portion of the shaft cylinder, a source of pressure supply, an exhaust and means to simultaneously connect said pipes with either the air pressure or exhaust.

6. In a machine of the character described, the combination with the cylinder and the shell carrier lifting piston therein, the hopper and feeding screw shaft therein, the shaft cylinder and piston therein, and connection between said piston and shaft, of a pipe to the lower portion of the shell carrier piston cylinder, a pipe to the upper portion of the shaft cylinder, a source of pressure supply, clutch mechanism controlling the rotation of the feed shaft, and means to simultaneously connect said pipes with the air pressure supply and operate the clutch to engage the shaft.

7. In a machine of the character described, the combination with the cylinder and the shell carrier lifting piston therein, the hopper and feeding screw shaft therein, the shaft cylinder and piston therein, and connection between said piston and shaft, of a pipe to the lower portion of the shell carrier piston cylinder, a pipe to the upper portion of the shaft cylinder, a source of pressure supply, an exhaust, clutch mechanism controlling the rotation of the feed shaft, and means to simultaneously connect said pipes with either the air pressure or exhaust and either operate the clutch to engage or release the shaft.

8. In a machine of the character described, the combination with the cylinder and the shell carrier lifting piston therein, the hopper and feeding screw shaft therein, the shaft cylinder and piston therein, and connection between said piston and shaft, of a pipe to the lower portion of shell carrier piston cylinder, pipe to the upper portion of shaft cylinder, a pipe leading to lower portion of last mentioned cylinder, a source of pressure supply, an exhaust and means to simultaneously connect the first two mentioned pipes with exhaust, and the last mentioned pipe with the pressure supply.

9. In a machine of the character described, the combination with the cylinder and the shell carrier lifting piston therein, the hopper and feeding screw shaft therein, the shaft cylinder and piston therein, and connection between said shaft and piston, of a pipe to the lower portion of shell carrier piston cylinder, a pipe to the upper portion of shaft cylinder, and a pipe leading to lower portion of last mentioned cylinder, a source of pressure supply, an exhaust and means to simultaneously connect either the first two mentioned pipes with exhaust, and the last mentioned pipe with the pressure supply, or the first two mentioned pipes with the pressure supply and the last mentioned pipe with the exhaust.

10. In a machine of the character described, the combination with the cylinder and the shell carrier lifting piston therein, the hopper and feeding screw shaft therein, the shaft cylinder and piston therein, and connection between said shaft and piston, of a pipe to the lower portion of shell carrier piston cylinder, a pipe to the upper portion of shaft cylinder, a source of pressure supply, an exhaust a connection to the pressure supply common to both pipes, and a valve controlling said connection, adapted in its movement to either open said connection with the pressure supply or with the exhaust, clutch shifting mechanism for the screw feeding shaft and connection between said valve and clutch shifting mechanism whereby they operate simultaneously.

11. In a machine of the character described, the combination with the cylinder and the shell carrier lifting piston therein, the hopper and feeding screw shaft therein, the shaft cylinder and piston therein, and connection between said shaft and piston, of a pipe to the lower portion of shell carrier piston cylinder, a pipe to the upper portion of shaft cylinder, a source of pressure supply, an exhaust a connection to the pressure supply common to both pipes, and a valve controlling said connection, adapted in its movement to either open said connection with the pressure supply or with the exhaust, a pipe leading to the lower portion of the last mentioned cylinder, a connection between said pipe and the pressure supply, a valve on said connection, oppositely set to other mentioned valve, and adapted in its movement to connect the lower portion of shaft cylinder with exhaust or with source of pressure supply, clutch shifting mechanism for the screw feeding shaft and connection between said valve and clutch shifting mechanism whereby they operate simultaneously.

12. In a machine of the character described, the combination, with the shell carrier lifting piston, of a pressure supply pipe, a valve cylinder, a passage from said pressure supply pipe to said valve cylinder, an indicator, a passage from the valve cylinder to the indicator, a valve in said cylinder, a passage through said valve adapted in one position of

the valve to connect the passage from pressure supply pipe and passage to indicator, a spring between said valve and cylinder, and a projection from the shell carrier lifting piston adapted, in its movement in one direction, to move said valve, compressing the said spring.

In testimony of which invention, I have hereunto set my hand, at Paulsboro, on this 5th day of March, 1907.

WILLIAM I. DONALDSON.

Witnesses:
W. G. COWGILL,
E. E. WALL.