F. R. HAMMITT & C. B. STANLEY.

FEEDING SHELLS TO THE SHUTTLE.

APPLICATION FILED OCT. 23, 1909.

989,778.

Patented Apr. 18, 1911.

3 SHEETS—SHEET 1.

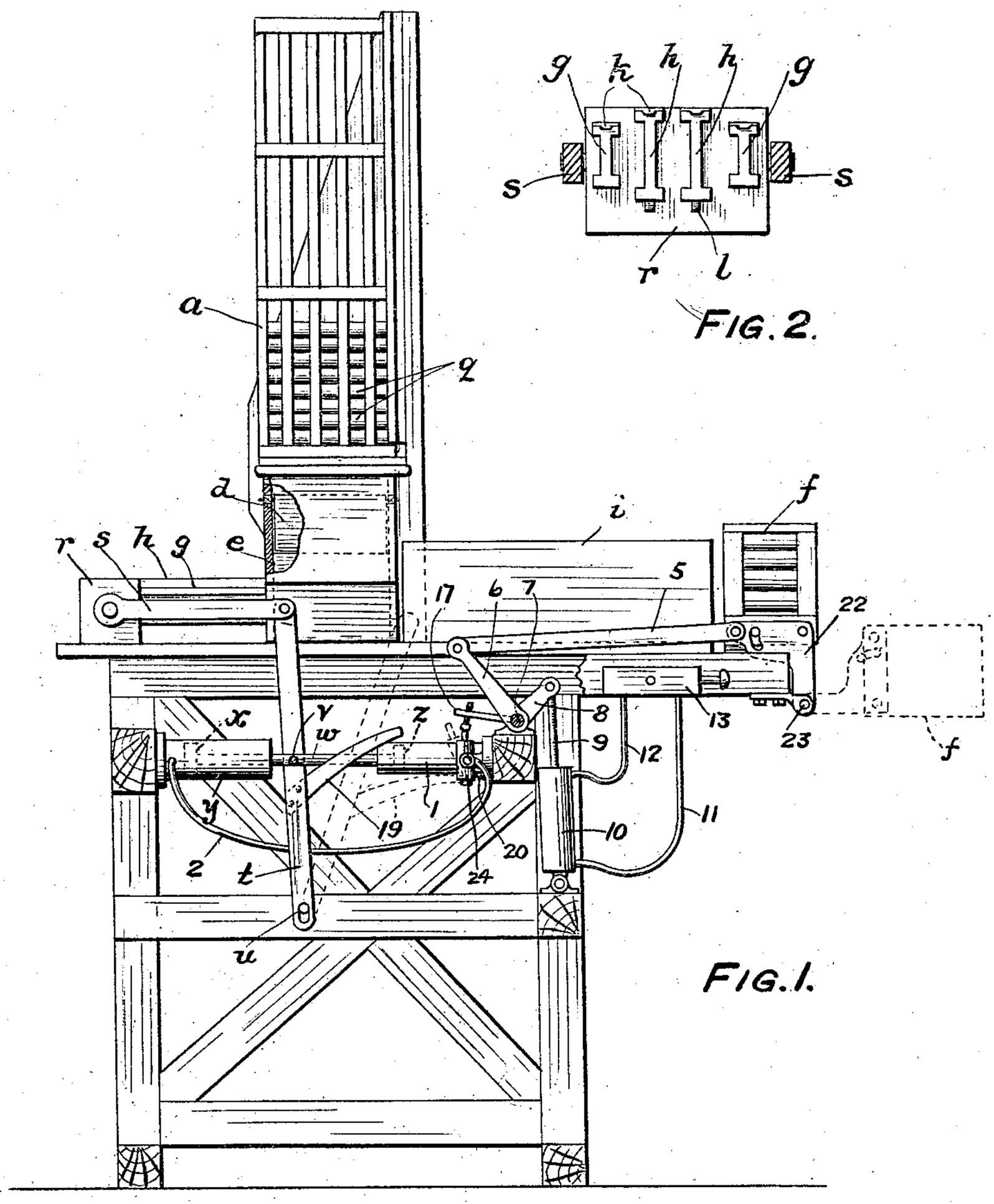

FIG. 1.

FIG. 2.

WITNESSES:

Robt. R. Kitchel.

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INVENTORS

Frank R. Hammitt

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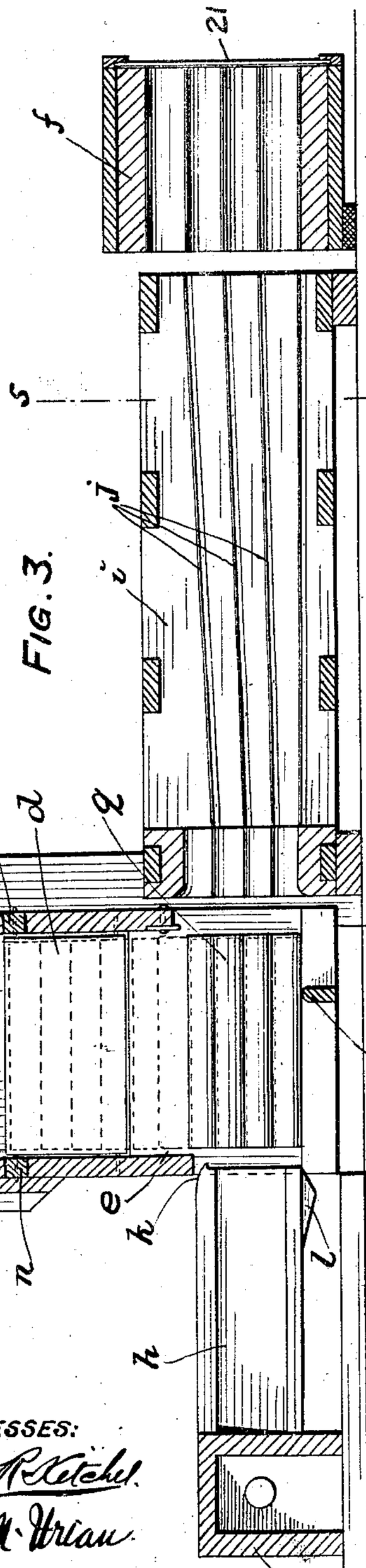

FIG. 3.

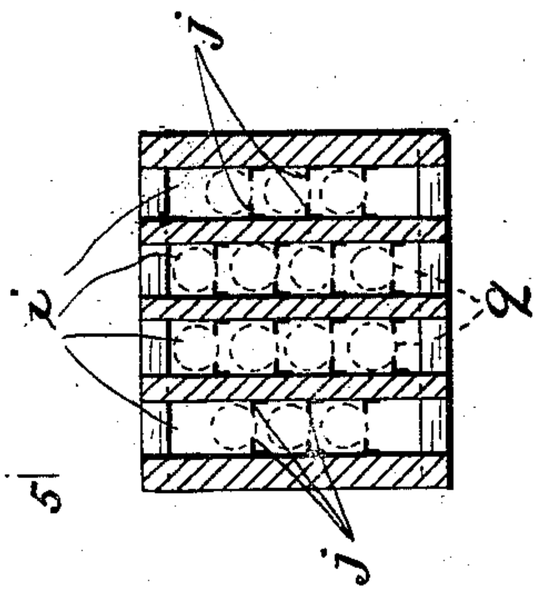

FIG. 5.

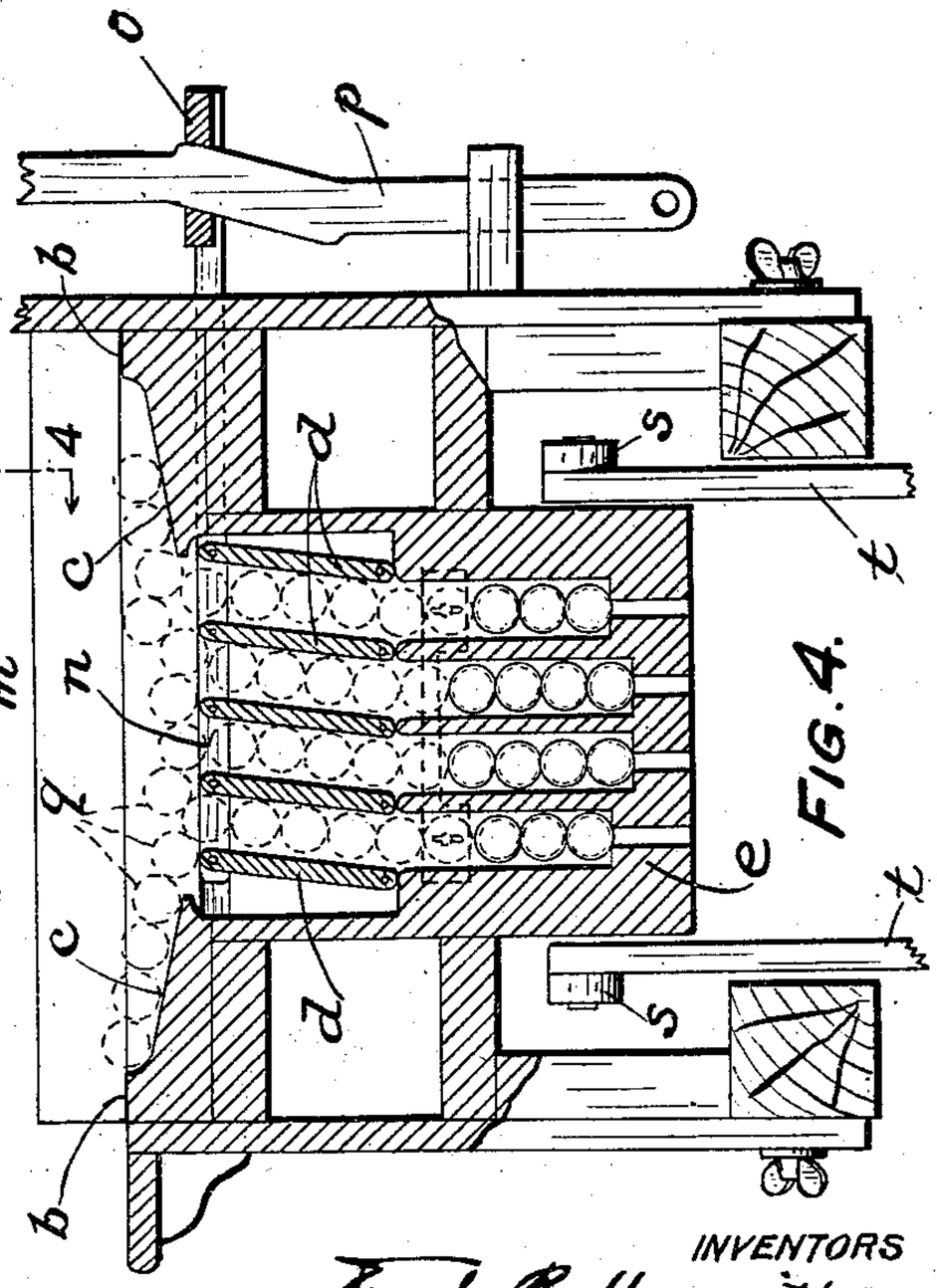

FIG. 4.

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3 SHEETS—SHEET 3.

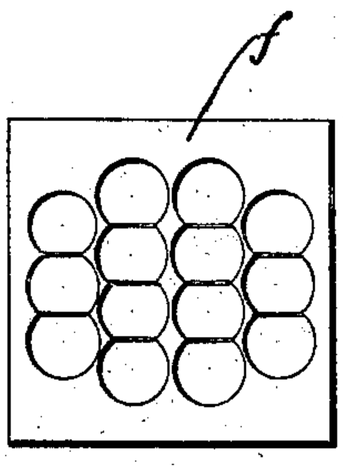

FIG. 6.

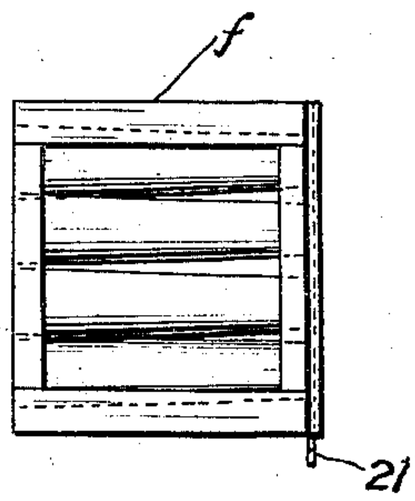

FIG. 7.

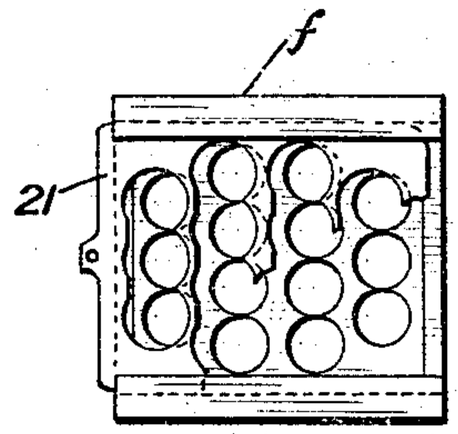

FIG. 8.

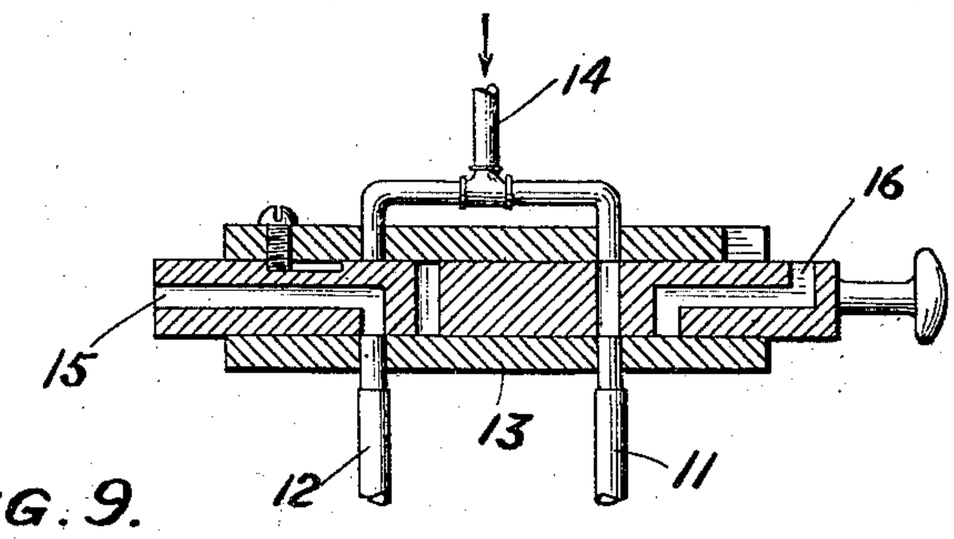

FIG. 9.

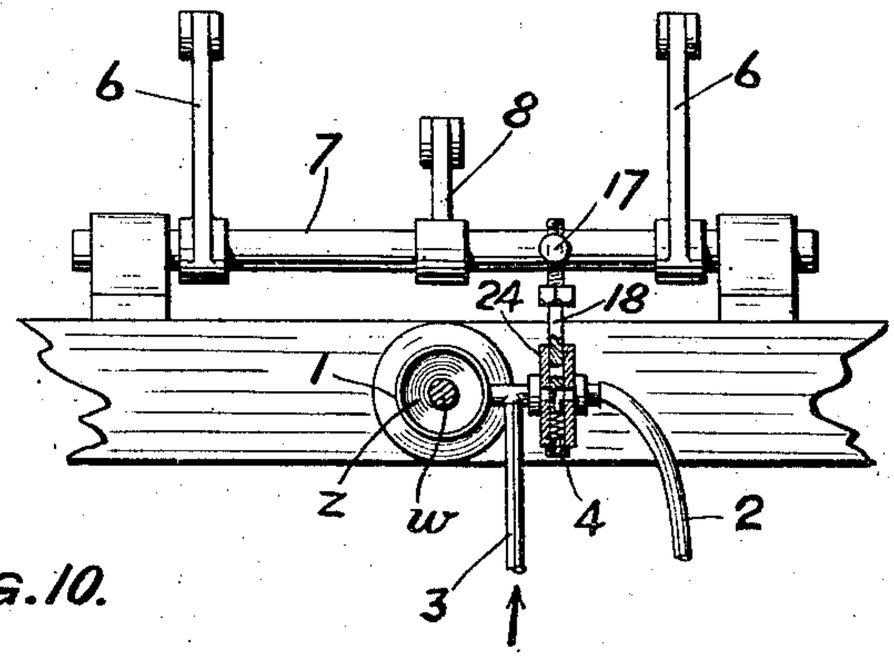

FIG. 10.

WITNESSES:

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UNITED STATES PATENT OFFICE.

FRANK R. HAMMITT AND CHARLES B. STANLEY, OF PAULSBORO, NEW JERSEY, ASSIGNORS TO E. I. DU PONT DE NEMOURS POWDER COMPANY, OF WILMINGTON, DELAWARE, A CORPORATION OF NEW JERSEY.

FEEDING SHELLS TO THE SHUTTLE.

989,778. Specification of Letters Patent. Patented Apr. 18, 1911.

Application filed October 23, 1909. Serial No. 524,099.

To all whom it may concern:

Be it known that we, FRANK R. HAMMITT and CHARLES B. STANLEY, citizens of the United States, both residing at Paulsboro, county of Gloucester, and State of New Jersey, have invented a new and useful Improvement in Feeding Shells to the Shuttle, 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.

Heretofore it has been the custom to feed the shells into the shuttle singly, the shells for any given orifice being fed independently of the shells for any other orifice.

It is the object of our invention to fill a shuttle simultaneously with the shells.

The shells are initially fed into a shell holder which is a permanent part of the machine, and which shell holder is pivoted so that it can be swung to deliver the shells into their corresponding shuttle. In our improved construction the shells are placed in a hopper from which they descend into a receiver which is adapted to hold the shells in numbers and position with reference to each other corresponding with that of the shuttle. Thus shells so received into the receiver are simultaneously forced from the receiver into the shell holder. By this arrangement in one operation a plurality of shells are simultaneously delivered from the receiver into the shell holder, which shell holder will deliver them into the shuttle.

We will now describe the embodiments of our invention as shown in the accompanying drawings, in which—

Figure 1 is a general side elevation of the machine. Fig. 2 is a detail end view of the plunger or plunger fingers. Fig. 3 is a longitudinal sectional view of the machine. Fig. 4 is a detail sectional view on the line 4—4, Fig. 3. Fig. 5 is a sectional view on line 5—5, Fig. 3. Fig. 6 is a view of the entrace end of a shell holder. Fig. 7 is a plan view of the shell holder. Fig. 8 is a view of the exit end of the shell holder. Fig. 9 is a detail view of the operating valve in section. Fig. 10 is an elevation of a detail of the machine.

a is a cage in which the shells to be placed in the shell holder, and thus into the shuttle, are held. The cage rests upon the ledge *b* of the machine, beneath or extending from which is the inclined bottom *c*. At the open end of this bottom are the pivoted divisions *d* which terminate in the receiver *e*. This receiver *e* has vertical divisions corresponding to the divisions in the shell holder *f*. The shell holder *f*, as shown, has four vertical compartments, the central ones of which are arranged to hold four shells each, and the outer ones three shells each. The receiving chamber *e* has open ends, one end being in line with the plunger or plunger-fingers and the other end in line with the channel leading to the shell holder. This opening is of such height that the two inner sections or divisions of the receiving chamber will deliver four shells and the two outer ones will deliver three shells. In line with the two outer divisions of this chamber are the plunger fingers *g* which are of depth equal to three shells, while the two inner plunger fingers *h*, which are in line with the central divisions of the shell receiver, are of depth sufficient to extend over four shells.

Leading from the open end of the shell receiver opposite to the plunger fingers are the channels *i*. These channels have the division walls as shown in section, Fig. 5. In each of these channels are inclined ledges or ways *j* corresponding in number to the shells that are to pass through the channels; thus the two outer channels have three inclined run-ways, while the two central ones have four inclined run-ways. These inclined run-ways are formed from metal sheets bent into angular sections and secured to the walls of the channels. The purpose of this is two-fold: one, to widen out and separate the various layers of shells and space them correctly for the shell holder, and further, to prevent them from abrading the shell holder.

The plunger fingers are caused to reciprocate, and in their reciprocation in one direction force the shells in the receiver out of the receiver into the channel, the length of the reciprocation being just sufficient to force the set of shells in the receiver out of the receiver and into the channel. When the piston is returned, a new set of shells will drop into the receiver. In order to insure with certainty that only the proper number

of shells will be forced out of the receiver, and that the shells above such shells will not be affected by the action of the fingers, the upper ends of the fingers are beveled slightly, as shown at *k*, in order to prevent their catching on the edges of the superimposed shells. This produces, however, a slight difficulty, in that at the forward end of the movement of the plunger a slight space will be formed, which might enable the inactive shells lying just above to descend at that point and be abraded or affected. In order to prevent this, we form on the lower portion of the fingers a cam *l* which, at the forward end of the stroke of these fingers, strikes the lug *m*, elevating the finger at that point and preventing this result. On the return of the fingers, as before described, a new set of shells will fall into the shell receiver or into the channels of the shell receiver. It should be here stated that the entrance into the channels *i* is slightly flared to insure proper entry of the shells. The continuance of this operation will gradually move the first mentioned set of shells forward along the channel until they are received into the shell receiver. Of course, the length of the channel between the shell receiver and the shell holder is such as to receive only a complete number of shells.

The pivoted divisions *d* are oscillated in the following manner. The upper ends of these divisons *d* are pivoted to bars *n* which in turn are connected by slide *o* with the cam-faced bar *p*, which passes through an orifice in the slide *o*. This bar *p* is given a reciprocating vertical movement by mechanism not shown, and which may be any appropriate mechanism, such, for instance, as shown in an application filed by Howard A. Stillwell March 19th, 1908, Serial No. 422,180. At the lower ends these divisions are pivoted to the frame, and by means of their oscillation the shells *q* are caused to be delivered from the hopper bottom *c* to the receiving chamber *e*.

The shell holder *f* is secured to brackets 22 which are pivoted to the frame of the machine at 23, so that it may assume a vertical position, as shown in full lines, Fig. 1, or a horizontal position as shown in dotted lines, Fig. 1. When the shell holder is in the position shown in the dotted lines, the shuttle corresponding to this shell holder is placed beneath it and the shells drop therein by gravity.

We will now describe the mechanism by which the fingers are reciprocated and the shell holder tilted or moved from a vertical to a horizontal position and the mechanism by which these operations are properly timed with respect to each other.

The fingers *g* and *h* are carried by the head *r*. At each side of the head are pivoted the rods *s*. Each of these rods is connected to a lever *t*. Each of these levers is loosely pivoted, as shown, at *u* to the frame of the machine. Midway of the length of lever *t* is a pin *v* which connects the two levers and also passes through the piston rod *w*. This piston rod has at one end a piston head *x* in the cylinder *y*, and at the other end a piston head *z* in the cylinder 1. The rear ends of these cylinders are connected with each other by pipe 2. The connection of this pipe with the cylinder *y* is through the medium of a valve 24. The casing of this valve has an air inlet 3 and an exhaust 4. The area of the piston head *x* is larger than the area of the piston head *z*, so that when air pressure is admitted to both pistons the rod *w* will be moved to the right, actuating the plunger to push shells from the shell receiver. On the other hand, when the valve is turned so that the pipe 2 connects with the exhaust, the piston head *z*, being always connected with the air pressure, becomes effective and returns the fingers.

The shell holder is tilted in the following manner. The brackets 22, to which it is connected and by which it is pivoted, are connected with the rods 5 which are connected to lever 6 on the shaft 7. Upon this same shaft is an arm 8 connected to the piston rod 9 operated by the piston in the cylinder 10. 11 is a pipe leading to one end of the cylinder 10, and 12 is a pipe leading to the other end of the cylinder. 13 is a valve-box controlling the admission of air or exhaust to the pipes 11 and 12. 14 is the air inlet, 15 is the exhaust from pipe 12, and 16 the exhaust from pipe 11. When the valve is in the position shown in Fig. 9, air will enter through pipe 11 to the lower portion of cylinder 10, elevating the rod and bringing the shell holder to the position shown in Fig. 1. The air in pipe 12 under these conditions exhausts out at 15. When the valve is reversed, the air enters the pipe 12 and exhausts from pipe 11 through the opening 16. Under these conditions, the piston in the cylinder 10 moves in the opposite direction, tilting the shell holder to the position shown in dotted lines.

The correlation of the parts so that the fingers shall not be reciprocated except the shell holder be in the proper position to receive the shells from the channels, is accomplished by the following mechanism. On the shaft 7 is the arm 17 which, in its movement, is in line with the plunger 18 of the valve 24. When this shaft 7 is in the position shown in full lines, Fig. 1, the arm 17 will strike the plunger 18 and depress it, opening the pipe 2 to the air pressure, and the fingers, through the medium of the piston *x* will be moved forward to force the shells from the receiver. When the valve controlling the cylinder 10 is operated to

tilt the shell holder, in dotted line position, the arm 17 will move away from the plunger 18, and the spring in the valve elevates the plunger 18 to its upper position, relieving pressure from piston *x*, and the constant pressure on piston *z* will force the fingers to and hold them in their retracted position. Connected to one of the arms *t* is a projection 19 which, in the movement of the arm, will strike the valve 24, tilting it and moving the plunger 18 from under the arm 17. This occurs at the end of the travel of the arm, and therefore the end of the movement of the fingers. When this occurs the plunger 18 will move upward, exhausting the air from the pipe 2 and thereby relieving the pressure in the cylinder *y*, and the piston *z* will act to return the fingers. In this return movement a spring 20 will cause the valve 24 to tend to return to its initial position, and if the shell holder has not been moved, it will be caught by the arm 17 and the fingers will no longer act until the shell holder is operated. If, on the other hand, the valve-box 13 has been operated or is operated to tilt the shell holder, the arm 17 will move upward which will allow the valve to return to its initial position, and upon the return of the shell holder to its vertical position the arm 17 will force the plunger down, again admitting pressure to the cylinder *y*. By this construction, as may be seen, the fingers can only move forward after the shell holder has been tilted to a horizontal position and returned, and thereby it is impossible to force more shells in the shell holder on its return.

On the outer side of the shell holder is a shutter 21 which is slid to close the mouth of the orifices or channels during the tilting operation.

Having now fully described our invention, what we claim and desire to protect by Letters Patent is:—

1. In an apparatus of the character described, in combination, a shell holder having divisions, a receiver having a plurality of divisions, arranged correspondingly to their position in the shell holder, channels equal in number to the divisions in the shell holder directly connecting the divisions in the receiver and holder, and means to simultaneously force the shell from all the divisions in the receiver into the channels.

2. In an apparatus of the character described, in combination, a shell holder having divisions, a receiver having a plurality of divisions, arranged correspondingly to their position in the shell holder, channels equal in number to the divisions in the shell holder directly connecting the divisions in the receiver and holder, fingers corresponding to all the divisions in the receiver, and means to simultaneously reciprocate all of said fingers.

3. In an apparatus of the character described, in combination, a shell holder having divisions, a receiver having a plurality of divisions, arranged correspondingly to their position in the shell holder, channels equal in number to the divisions in the shell holder directly connecting the divisions in the receiver and holder, a cage above said receiver, means to feed a set of shells, corresponding to the divisions in the receiver, from said cage into said receiver, and means to simultaneously force the shells from all the divisions in the receiver into the channels.

4. In an apparatus of the character described, in combination, a shell holder having divisions, a receiver having a plurality of divisions, arranged correspondingly to their position in the shell holder, channels equal in number to the divisions in the shell holder directly connecting the divisions in the receiver and holder, a cage above said receiver, means to feed a set of shells, corresponding to the divisions in the receiver, from said cage into said receiver, means to simultaneously force the shells from all the divisions in the receiver into the channels, and feed another set of shells to proper position in the receiver.

5. In an apparatus of the character described, in combination, a shell holder having divisions, a receiver having a plurality of divisions, arranged correspondingly to their position in the shell holder, channels equal in number to the divisions in the shell holder directly connecting the divisions in the receiver and holder, fingers of different lengths, and means to simultaneously reciprocate said fingers through said receiver between said divisions.

6. In an apparatus of the character described, in combination, a shell holder having divisions, a receiver having a plurality of divisions, arranged correspondingly to their position in the shell holder, channels equal in number to the divisions in the shell holder directly connecting the divisions in the receiver and holder, a cage above said receiver, means to feed a set of shells, corresponding to the divisions in the receiver, from said cage into said receiver, fingers of different lengths, and means to simultaneously reciprocate said fingers through said receiver between said divisions.

7. In an apparatus of the character described, in combination, a shell holder having divisions, a receiver having a plurality of divisions, arranged correspondingly to their position in the shell holder, channels equal in number to the divisions in the shell holder directly connecting the divisions in the receiver and holder, the movement of said fingers in one direction forcing all of the shells in the receiver from the receiver into the channels and in the other direction

allowing a set of shells to pass from the cage to the receiver.

8. In an apparatus of the character described, the combination with the cage, the receiver, the shell holder and channels connecting the receiver and shell holder, of fingers for forcing the shells from the receiver into the channels, said fingers having beveled upper ends and means to elevate the forward end of the fingers in the forward movement of said fingers.

9. In an apparatus of the character described, the combination with the cage, the receiver, the shell holder and channels connecting the receiver and shell holder, of fingers for forcing the shells from the receiver into the channels, said fingers having beveled upper ends and a cam on their lower portion and a lug adapted to be struck by said cam, at the channel end of said receiver, elevating said fingers.

10. In an apparatus of the character described, the combination with the cage, the receiver, the shell holder and channels connecting the receiver and shell holder, each channel having inclined ways, and means to force the shells from the receiver into the channels.

11. In an apparatus of the character described, the combination with the cage, the receiver, the shell holder and channels connecting the receiver and shell holder, each channel having inclined ways, said ways being formed of angular metallic sections secured to the walls of the channel.

12. The combination with the receiver, a hinged shell holder and channels connecting the receiver and holder and fingers for simultaneously forcing a set of shells from the receiver into the channels, of means to reciprocate the fingers, means to tilt the shell holder, and controlling mechanism to hold the fingers in their retracted position during the swinging of the shell holder.

13. The combination with the receiver, a hinged shell holder and channels connecting the receiver and holder and fingers for forcing the shells from the receiver into the channels, a piston, and connection between said piston and the shell holder for tilting the shell holder, a valve for controlling the admission of pressure to and exhaust from opposite sides of said piston, two pistons of different area, a constant source of pressure to the piston of smaller area and a valve controlling the admission of pressure to and exhaust from the piston of larger area, and means to maintain said last mentioned valve in position to connect the piston with the exhaust during the tilting of the shell holder and connected with the pressure when the shell holder is in receptive position.

14. The combination with the receiver, a hinged shell holder and channels connecting the receiver and holder and fingers for forcing the shells from the receiver into the channels, a piston, and connection between said piston and the shell holder for tilting the shell holder, a valve for controlling the admission of pressure to and exhaust from opposite sides of said piston, two pistons of different area, a constant source of pressure to the piston of smaller area and a valve controlling the admission of pressure to and exhaust from the piston of larger area, a spring acting to hold said last mentioned valve to connect the piston with the exhaust, an arm movable with the shell holder tilting mechanism and adapted to strike said valve and move it against said spring when said shell holder is in receptive position.

15. The combination with the receiver, a hinged shell holder and channels connecting the receiver and holder and fingers for forcing the shells from the receiver into the channels, a piston, and connection between said piston and the shell holder for tilting the shell holder, a valve for controlling the admission of pressure to and exhaust from opposite sides of said piston, two pistons of different area, a constant source of pressure to the piston of smaller area and a tilting valve controlling the admission of pressure to and exhaust from the piston of larger area, a spring normally holding said tilting valve in vertical position, a spring acting to hold said valve to connect the piston with the exhaust, an arm movable with the shell holder tilting mechanism and adapted to strike said valve and move it against said spring when said shell holder is in receptive psoition, an arm connected to said finger reciprocating mechanism adapted, in the forward movement of said mechanism, to strike and tilt said valve to move it away from said arm movable with the shell holder tilting mechanism.

16. In an apparatus of the character described, the combination with the receiver and shell holder having compartments, correspondingly arranged, and channels directly connecting the compartments of the receiver and shell holder, of means to simultaneously force the shells from all of the compartments in the receiver into the channels.

17. In an apparatus of the character described, the combination with the receiver and shell holder having compartments, correspondingly arranged, and channels directly connecting the compartments of the receiver and shell holder, of reciprocating means to simultaneously force the shells from all the compartments in the receiver into the channels.

18. In an apparatus of the character described, the combination with the receiver and shell holder having compartments, correspondingly arranged, and channels directly connecting the compartments of the

receiver and shell holder, fingers corresponding in length to the receiver compartments, and means to reciprocate said fingers to simultaneously force the shells from all of the compartments in the receiver into the channels.

In testimony of which invention, we have hereunto set our hands, at Paulsboro, on this 19th day of October, 1909.

FRANK R. HAMMITT.
CHARLES B. STANLEY.

Witnesses:
W. G. COWGILL,
EDWARD S. MAYERS.