

No. 869,307.

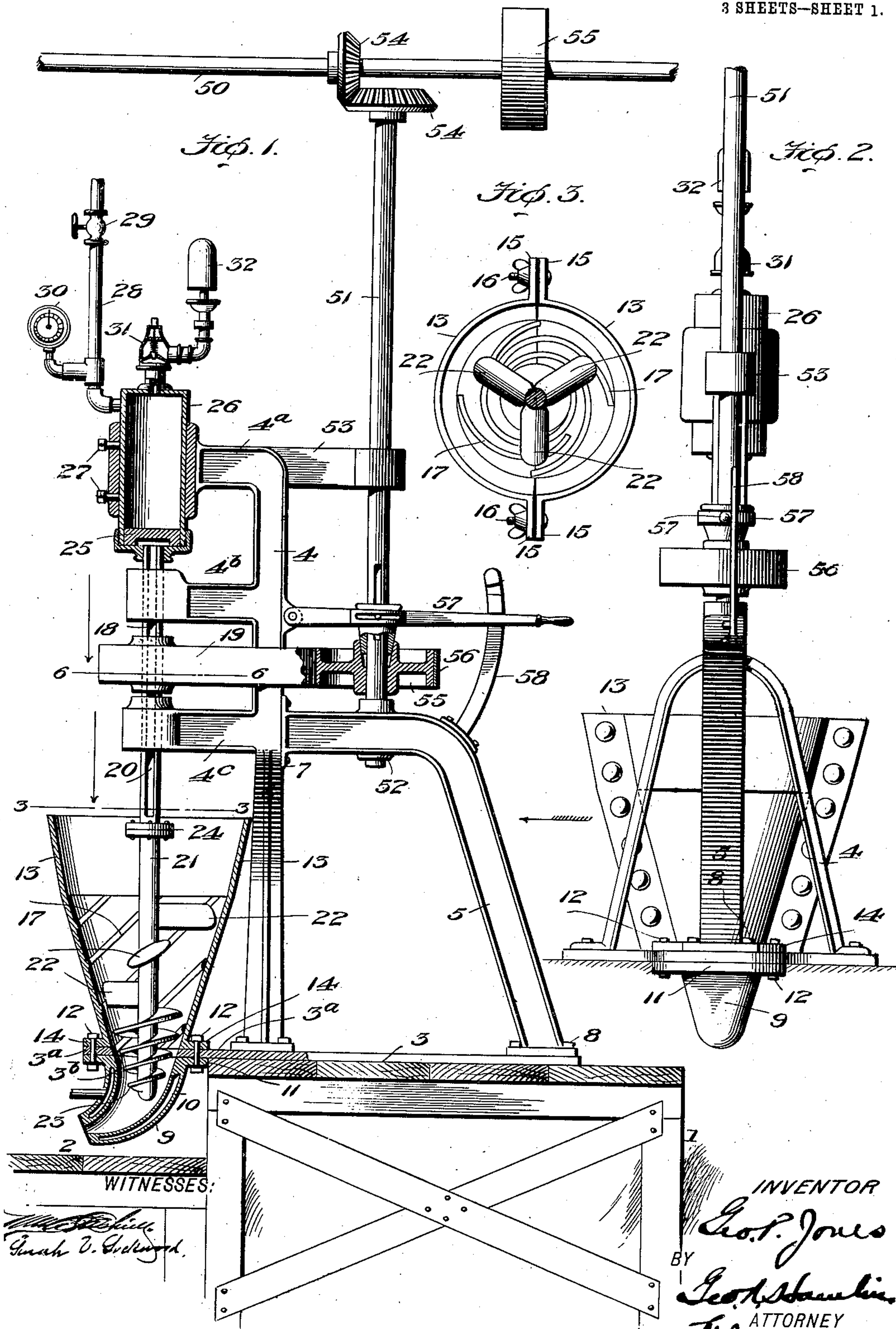
PATENTED OCT. 29, 1907.

G. P. JONES.

MACHINE FOR FORMING A CARTRIDGE FROM EXPLOSIVE GELATIN.

APPLICATION FILED FEB. 9, 1907.

3 SHEETS--SHEET 1.



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Fig. 4.

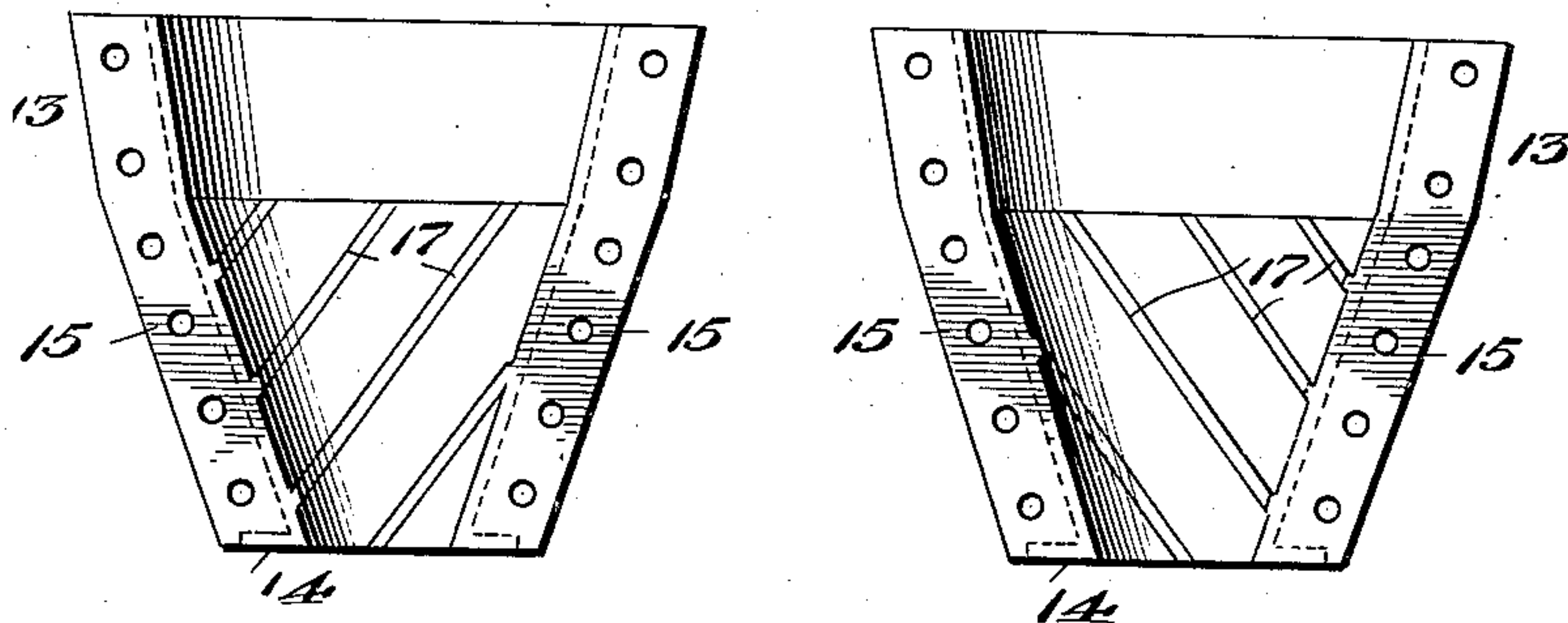


Fig. 5.

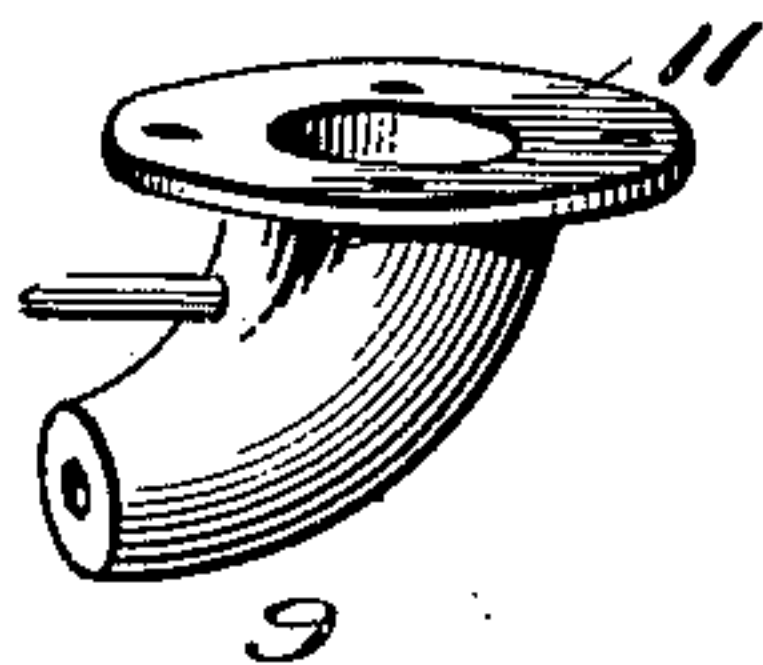
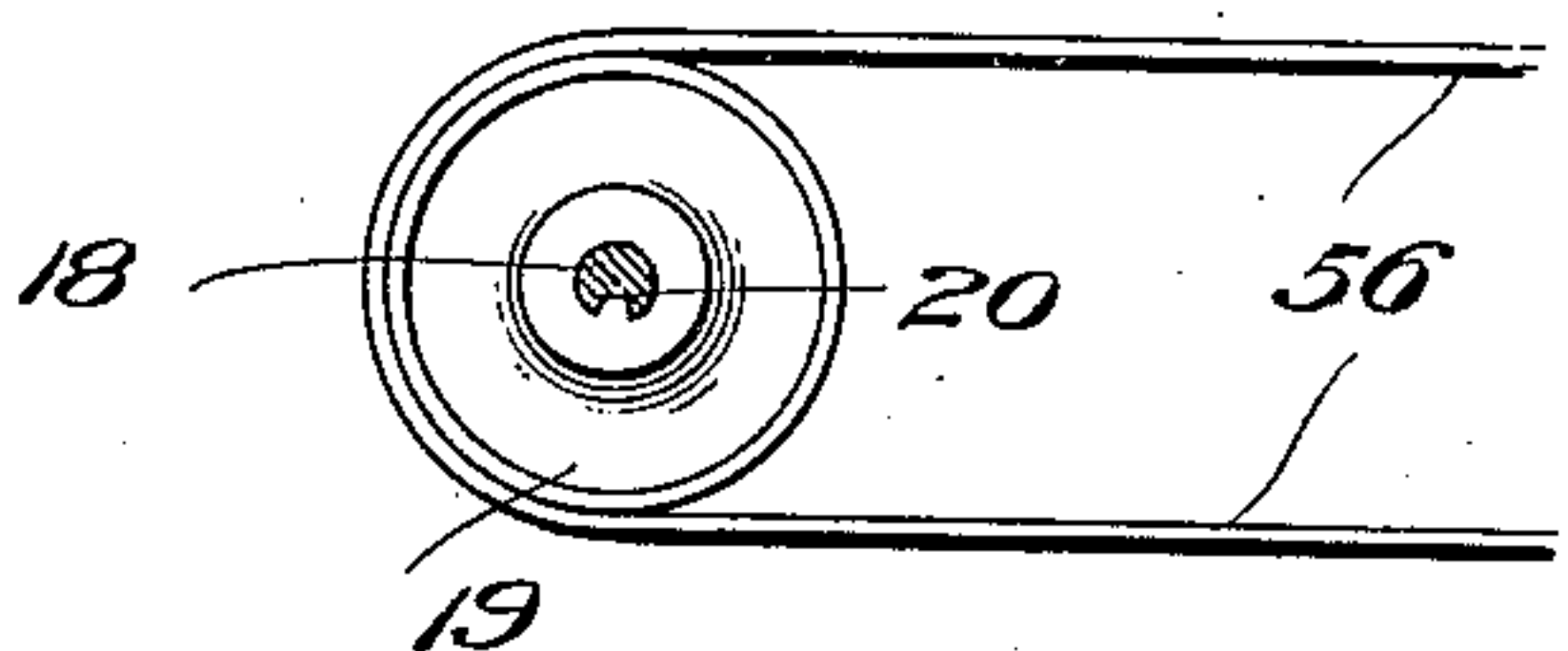


Fig. 6.



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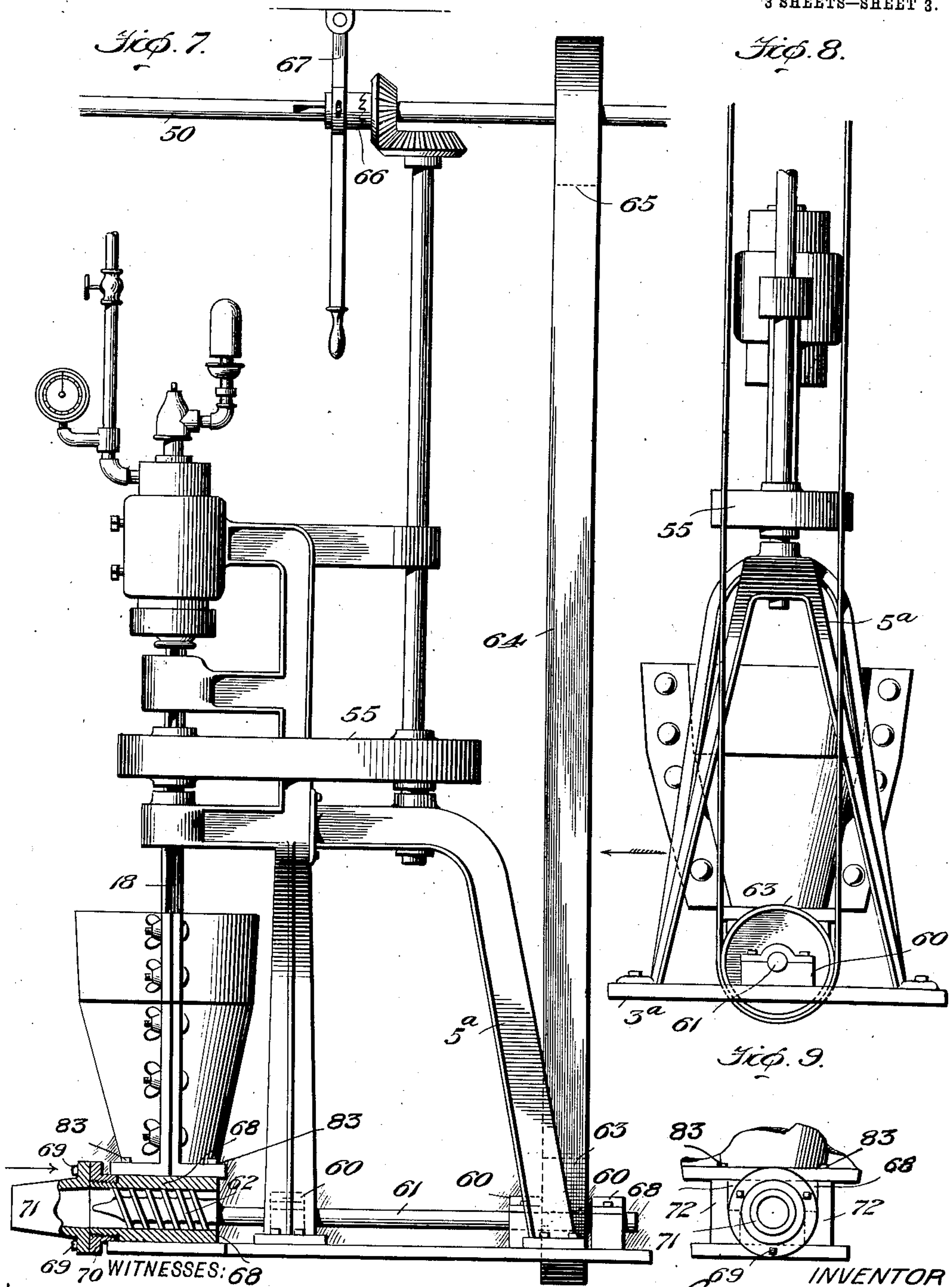
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3 SHEETS—SHEET 3.



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# UNITED STATES PATENT OFFICE.

GEORGE POOLE JONES, OF EMPORIUM, PENNSYLVANIA.

## MACHINE FOR FORMING A CARTRIDGE FROM EXPLOSIVE GELATIN.

No. 869,307.

Specification of Letters Patent.

Patented Oct. 29, 1907.

Application filed February 9, 1907. Serial No. 356,614.

*To all whom it may concern:*

Be it known that I, GEORGE POOLE JONES, a citizen of the United States, residing at Emporium, county of Cameron, and State of Pennsylvania, have invented  
5 certain new and useful Improvements in Machines for Forming a Cartridge from Explosive Gelatin, of which the following is a specification.

This invention relates to machines for forming a continuous cartridge from explosive gelatin.

10 The manufacture of cartridges from explosive gelatin, which is a plastic substance of a consistency depending upon various conditions, is generally carried on by forcing it, under pressure, through a nozzle from which the gelatin emerges as a continuous rope, the diameter  
15 of which may be from less than an inch to nearly two inches, this rope being cut into suitable lengths, usually about eight inches, after emergence from the nozzle, to thereby form the cartridges which are then suitably wrapped so as to be ready for commercial use.

20 Machines of the character set forth have usually employed a horizontal screw, termed by skilled workers in explosives, a "packing screw" for forcing the explosive gelatin through the nozzle, and associated with this packing screw means have been employed to feed  
25 the plastic gelatin to the screw. It has heretofore been proposed to employ a feeder for causing the gelatin to be fed to the packing screw, which will more or less automatically yield if the pressure of the feeder on the gelatin becomes so great that further augmentation  
30 would render continued operation of the machine dangerous on account of the subjection of the gelatin to too great pressure with incident heightening of the temperature of the mass and frictional action of the packing screw and nozzle thereon. A drawback inci-  
35 dent to the use of a horizontal packing screw or, indeed, any similar screw, is that the machine has more parts, and necessarily more gearing or driving means, and hence, greater opportunity for the explosive gelatin to reach rotating or moving machine elements and thus  
40 the danger factor is heightened; beside which, the cost of the manufacture and maintenance of the machine is heightened. In machines of this character, it is desirable to be able to quickly regulate the action of the feeding mechanism so that as explosive batches of the  
45 gelatin are introduced to the feeding mechanism, the conditions of feed may be readily varied according to the consistency of the gelatin and the observed action of the machine. So far as I am aware, rapid changes or variations in the feed in machines of this character  
50 have not heretofore been possible, and I have for one object of my invention the provision of a machine for forming a continuous cartridge from explosive gelatin which has novel means whereby the feeding of the gelatin automatically regulates itself according to require-  
55 ments of extrusion and whereby the action of the feeder on the gelatin may be rapidly and easily controlled by

the operator according to the consistency of the explosive mass or to desired conditions of feed.

Another object is to provide means whereby a signal will be operated when the pressure on the gelatin be- 60 comes so high as to be undesirable so that the operator will be apprised of the fact that such conditions exist.

Another object is the provision of a safety appliance which will prevent undesirable pressures being main- 65 tained on the explosive gelatin on which the machine is operating.

I have for a still further object the dispensing with gearing or such rotating parts as tend to make the machine more dangerous and aim to provide a generally 70 simplified and cheapened construction.

Another object of the invention is to so construct the parts that they may be readily detached or separated from each other to permit rapid and easy cleaning of the machine when desired.

A still further object is to provide a hopper and feeder 75 therein, in a machine of the class set forth, wherein novel means will be employed to prevent rotary motion of the gelatin in the hopper and to assist in the feed of the gelatin therefrom.

Another object of the present invention is to entirely 80 dispense with the horizontal packing or pressing screw which has heretofore been commonly employed, thereby rendering the machine safer in operation, beside dispensing with the additional moving parts incident to the use of such screw, but my feeder mechanism and 85 other improvements are adapted for use in connection with a horizontal packing screw if the user for any reason wishes to employ a horizontal packing screw, and I have set forth fully hereinafter and disclosed in the drawings a machine wherein a horizontal packing screw may be 90 employed in connection with my novel feeding and other mechanisms.

A further object of my invention is the provision of a machine for forming a continuous cartridge from ex- 95 plosive gelatin, wherein a hopper will be employed with novel feeding mechanism therein, and a nozzle of improved construction will be connected directly to the hopper and the gelatin forced from the hopper through said nozzle to issue therefrom in a continuous cartridge. 100

Other objects of the invention will more fully appear hereinafter.

The invention is set forth fully in the following specification, and the novel features thereof are recited in the 105 appended claims.

In the accompanying drawings:—Figure 1 is a side elevation, partly in section, showing the present in-  
vention; Fig. 2, an elevation taken at the right of Fig. 1  
looking in the direction of the arrow; Fig. 3, a view on  
line 3—3 of Fig. 1; Fig. 4, a detail view of the hopper 110  
with the parts thereof shown separated; Fig. 5, a detail  
view of the nozzle; Fig. 6, a detail view on line 6—6 of



Fig. 1; Fig. 7, a side elevation, partly in section, showing a modification employing a horizontal packing screw; Fig. 8, a view in elevation looking in the direction of the arrow of Fig. 7; and Fig. 9, a view of the left-hand side of the lower part of the machine shown in Fig. 7, looking in the direction of the arrow.

The machine may be supported in any desired fashion, a satisfactory arrangement being to place it upon a table 1 and to locate adjacent to said table, another table 2, whose top is located at a lower level.

The machine-frame comprises a bed-plate 3, a yoke-upright 4 and a brace 5. The yoke-upright 4 is bolted at 7 to the yoke-upright, and the foot of the brace is bolted at 8 to the bed-plate 3. This construction renders manufacture of the frame easy and relatively cheap and permits rapid and easy assembly or separation of the frame parts.

The base-plate 3 has an extension 3<sup>a</sup> which overhangs the table 2 and is provided with an opening 3<sup>b</sup> there-through.

The numeral 9 designates a nozzle, preferably water-jacketed at 10, which is curved so that it is adapted to deliver the gelatin cartridge issuing therefrom onto the table 2 in a substantially horizontal direction. This nozzle 9 is provided with a flange 11 which is held by bolts 12 to the under-side of the plate 3 so that the interior of the nozzle constitutes a continuation of the opening 3<sup>b</sup>.

Surmounting the base-plate 3 is a hopper composed of duplicate sections 13, each of which has a base-flange 14, said base-flanges 14 being held by the bolts 12 so that the lower part of the hopper interior communicates with, and forms a continuation, of the opening 3<sup>b</sup>. Each hopper section 13 is provided with flanges 15 on its opposite sides which are adapted to be frictionally clamped against the corresponding flanges on the other hopper section by the bolts and wing nuts 16 (Fig. 3); said flanges and nuts having rubber packing.

The foregoing construction permits rapid and easy detachment of the nozzle and hopper whenever it is desired that they be removed or the feeding mechanism inside of the hopper inspected or any of the parts cleaned.

The interiors of the hopper sections 13 are provided with spirally arranged ribs 17 which prevent the gelatin in the hopper from rotating with the feeding means and also assist the feeder in directing the gelatin to the opening 3<sup>b</sup> and into the nozzle 9.

The upper part of the yoke-upright 4 is provided with substantially parallel horizontal arms 4<sup>a</sup>, 4<sup>b</sup> and 4<sup>c</sup>.

Journalled in suitable bearings in the ends of the arms 4<sup>b</sup> and 4<sup>c</sup> is the feeder shaft 18 which has splined thereto in a loose fashion a belt-pulley 19 located between the arms 4<sup>b</sup> and 4<sup>c</sup>. The splined connection is shown at 20 and consists of a slot in the shaft 18 and a key or feather carried by the belt-pulley 19 and received loosely in said slot. This permits the shaft 18 to slip up and down through the belt-pulley without causing the belt-pulley to rise or fall, to insure rotation of the shaft by the belt-pulley at all times.

The feeder comprises a shaft 21 having horizontal blades or paddles 22 which are substantially elliptical in cross-section and are disposed with their faces at an angle to the length of the shaft 21, while formed on the lower end of the shaft is a screw 23 of tapered formation

which extends through the opening 3<sup>b</sup> and into the nozzle 9. The shafts 18 and 21 are detachably coupled together at 24, permitting rapid and easy removal of the feeder when desired.

The upper end of the shaft 18 is provided with a plunger or piston 25 and there is secured in a detachable manner to the arm 4<sup>a</sup>, a cylinder 26 in which the piston 25 plays. The engagement of the piston with the lower end of the cylinder 26 prevents the blades or paddles 22 and screw 23 from striking the sides of the hopper or nozzle or touching any of the ribs 17, and to make it possible to properly position the parts, suitable fastening screws 27 hold the cylinder 26 in the socket of arm 4<sup>a</sup> in such fashion that the cylinder may be raised or lowered.

Leading to the cylinder 26 is a pipe 28 having controlling valve 29 and pressure gage 30, which is put in communication with a source of compressed air so that the compressed air admitted to the cylinder 26 forms an elastic cushion for the upward movement of the piston 25. A casing containing pop-safety-valve 31 is secured to the cylinder 26 and this casing has attached thereto by suitable piping, a whistle 32.

The pop-safety valve 31 can be set to open at any given pressure, which will be the critical or maximum pressure, above which it is not desirable to subject the gelatin in the hopper so that any higher air pressure in the cylinder 26 will be relieved and will escape through and sound the whistle 32.

The machine is driven from a countershaft 50 by a vertical shaft 51 which is suitably journaled in bearings 52 and 53 on the machine-frame, bevel gears 54 communicating the rotation of shaft 50 to shaft 51, the latter shaft carrying a belt-pulley 55 which is belted direct by belt 56 to the pulley 19. A clutch and clutch-lever 57 having suitable means 58 for holding the clutch in released or locked disposition relative to the pulley 55, are employed to lock the pulley 55 to the shaft 51 or to release it from said shaft, thus affording a means convenient for the operator for starting or stopping the machine at will.

The explosive gelatin is introduced into the hopper 13, 13, and is fed downwardly by the rotation of the blades or paddles 22, the direction of rotation of the shaft 21 being such that the paddles move in the direction of their highest edges which causes the gelatin to be pressed downward in the hopper, this downward action being assisted by the spiral ribs 17 which also tend to retard any rotary motion of the mass of gelatin. The gelatin coming under the action of the screw 23 is forced into the nozzle 9; whence it issues as a continuous cartridge which is delivered in a substantial horizontal direction onto the table 2. The tapering form of the hopper, combined with the tapering screw 23 and the reduction in size of the nozzle toward its mouth, all tend to compress the gelatin so that it will be properly compacted as it is forced through the nozzle.

The continuous cartridge which is delivered on the table 2 is cut into proper lengths, usually eight inches, and afterward wrapped for commercial use.

If the feed of the gelatin or the pressure exerted thereon by the paddles or screw becomes too great, the entire feeder, comprising the shaft 21, paddles 22, and screw 23, together with the shaft 18, will rise, slip-



ping loosely through the belt-pulley 19, and thus automatically relieve the undesirable pressure, and in this rising action the plunger 25 is cushioned elastically by the compressed air contained in the cylinder 26 so that the yielding action is gentle and yet sufficiently rapid on this elastic cushion of air in the cylinder 26 to gently force down the feeder as the gelatin passes out of the nozzle 9. As the feeder rises, the compression of the air in the cylinder 26 becomes greater and the safety-valve 31 at once opens and relieves the extra pressure, while the air sounds the whistle 32 and notifies the operator. The safety-valve will open and the whistle will be sounded at any time when the air pressure introduced via pipe 28 into cylinder 26 becomes higher than it is desirable to have it, so that the action is entirely automatic under all conditions. It will be understood that the shafts 18 and 21 continue their rotation regardless of the vertical position of the feeder.

In the foregoing machine I dispense entirely with the horizontal packing screw, its case, and the means for causing rotation of said screw, all of which have heretofore been employed and by employing the combined feeder and pressure screw 23 as attached rigidly to the shaft 21 carrying paddles 22, the feed of and pressure upon the gelatin are regulated at the same time, and effects are obtained which are not possible where a horizontal and separate packing screw is employed.

The machine may be readily cleaned after the day's run, or at any time, by detaching the screws and nuts 16 and bolts 12, whereupon the hopper sections and nozzle may be completely removed, thus exposing the paddles and screw.

As some users of the machine may wish to employ the old form of horizontal packing screw and case in connection with my improved feeder and to dispense with the nozzle 9, I have illustrated in Figs. 7, 8 and 9, a machine wherein a horizontal packing screw is employed as a supplemental feature. In these figures it is unnecessary to describe the machine which has been heretofore set forth, and reference will only be made to the additional elements therein appearing. In the machine of Figs. 7, 8 and 9, the bed-plate 3' has bearings 60 in which is journaled the shaft 61 of packing screw 62, said shaft being provided with a belt-pulley 63 which is belted direct by belt 64 to a belt-pulley 65 on countershaft 50. If desired, the pulley 63 may be a clutch-pulley with a lever for throwing it into and out of action. The control of the rotation of belt-pulley 55 may be accomplished as heretofore set forth, or the gearing 54 may be provided with a clutch 66 thrown into and out of action by a lever 67. In this machine the brace 5<sup>a</sup> is split to properly accommodate the extra parts that are used. The packing screw 62 is received in a lignum-vitæ block 68 to the end of which is secured a collar 70, to which in turn is detachably fastened by bolts 69, a nozzle 71. The block 68 is seated in ways 72 which permit it to be slid longitudinally of the packing screw 62, entirely off of said packing screw to expose the latter so that it may be readily cleaned without requiring removal of the entire packing screw and its shaft 61 as has heretofore been necessary. The hopper sections 13, 13, are detachably secured by bolts 83 to the lignum-vitæ block, permitting detachment of said hopper sections from said block.

Except for the improved manner of sliding the lignum-vitæ block 68, collar 70, and nozzle 71 bodily off of the packing screw, the lower part of the machine does not materially differ from corresponding parts of machines of this class which have been in use for many years, but the remaining parts of the machine are my own invention. The action is the same as heretofore fully set forth except that the explosive gelatin, instead of being directly forced through a nozzle by the screw 23, is pressed from said screw to the packing screw 62 and thence forced through a nozzle (71).

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

1. In a machine for forming a cartridge from explosive gelatin, the combination with a shell or case having a delivery mouth from which the gelatin is adapted to issue, of means within the shell or case for forcing the gelatin through said mouth, and air cushion means adapted to yieldingly resist backward movement of the gelatin forcing means.

2. In a machine for forming a cartridge from explosive gelatin, the combination with a shell or case having a delivery mouth from which the gelatin is adapted to issue, of rotary means within the shell or case for forcing the gelatin through said mouth, and compressed-air-operated means adapted to yieldingly resist backward movement of the rotary gelatin forcing means.

3. In a machine for forming a cartridge from explosive gelatin, the combination with a shell or case having a delivery mouth from which the gelatin is adapted to issue, of rotary means within the shell or case for forcing the gelatin through said mouth, and a plunger and cylinder adapted to yieldingly resist backward movement of the rotary gelatin forcing means.

4. In a machine for forming a cartridge from explosive gelatin, the combination with a shell or case having a delivery mouth from which the gelatin is adapted to issue, of rotary means within the shell or case for forcing the gelatin through said mouth, a plunger and cylinder, and means for introducing compressed air to the cylinder adapted to yieldingly resist backward movement of the rotary gelatin forcing means.

5. In a machine for forming a cartridge from explosive gelatin, the combination with a shell or case having a delivery mouth from which the gelatin is adapted to issue, of rotary means within the shell or case for forcing the gelatin through said mouth, air cushion means adapted to yieldingly resist backward movement of the rotary gelatin forcing means, and a safety-valve for said air cushion means.

6. In a machine for forming a cartridge from explosive gelatin, the combination with a shell or case having a delivery mouth from which the gelatin is adapted to issue, of rotary means within the shell or case for forcing the gelatin through said mouth, air cushion means adapted to yieldingly resist backward movement of the rotary gelatin forcing means, and a safety-valve and signal controlled thereby for said air cushion means.

7. In a machine for forming a cartridge from explosive gelatin, the combination with a shell or case having a delivery mouth from which the gelatin is adapted to issue, of rotary means within the shell or case for forcing the gelatin through said mouth, compressed-air-operated means adapted to yieldingly resist backward movement of the rotary gelatin forcing means, and a safety-valve for relieving the air pressure from said compressed-air-operated means.

8. In a machine for forming a cartridge from explosive gelatin, the combination with an upright shell or case having an exit mouth for the delivery of the gelatin there-through, of an upright shaft carrying gelatin forcing means located in the shell or case, and an air cushion adapted to yieldingly resist upward movement of said shaft and gelatin forcing means.

9. In a machine for forming a cartridge from explosive gelatin, the combination with an upright shell or case having an exit mouth for the delivery of the gelatin there-through, of an upright shaft carrying gelatin forcing



means located in the shell or case, and compressed air means for yieldingly resisting upward movement of the shaft and rotary gelatin forcing means.

10. In a machine for forming a cartridge from explosive  
5 gelatin, the combination with an upright shell or case having an exit mouth for the delivery of the gelatin there-through, of an upright shaft carrying gelatin forcing means located in the shell or case, compressed air means for yieldingly resisting upward movement of the shaft and  
10 rotary gelatin forcing means comprising a plunger and cylinder, and automatic means for relieving the compressed air pressure when necessary.

11. In a machine for forming a cartridge from explosive gelatin, the combination with ways, and a hopper superposed thereon, of a hollow case slidably seated on the ways 15 under the hopper and adapted for slidable removal, and gelatin forcing means located within the hollow removable case.

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

GEORGE POOLE JONES.

Witnesses:

GRANT L. WILEY,  
J. C. JOHNSON.