No. 881,365. PATENTED MAR. 10, 1908.

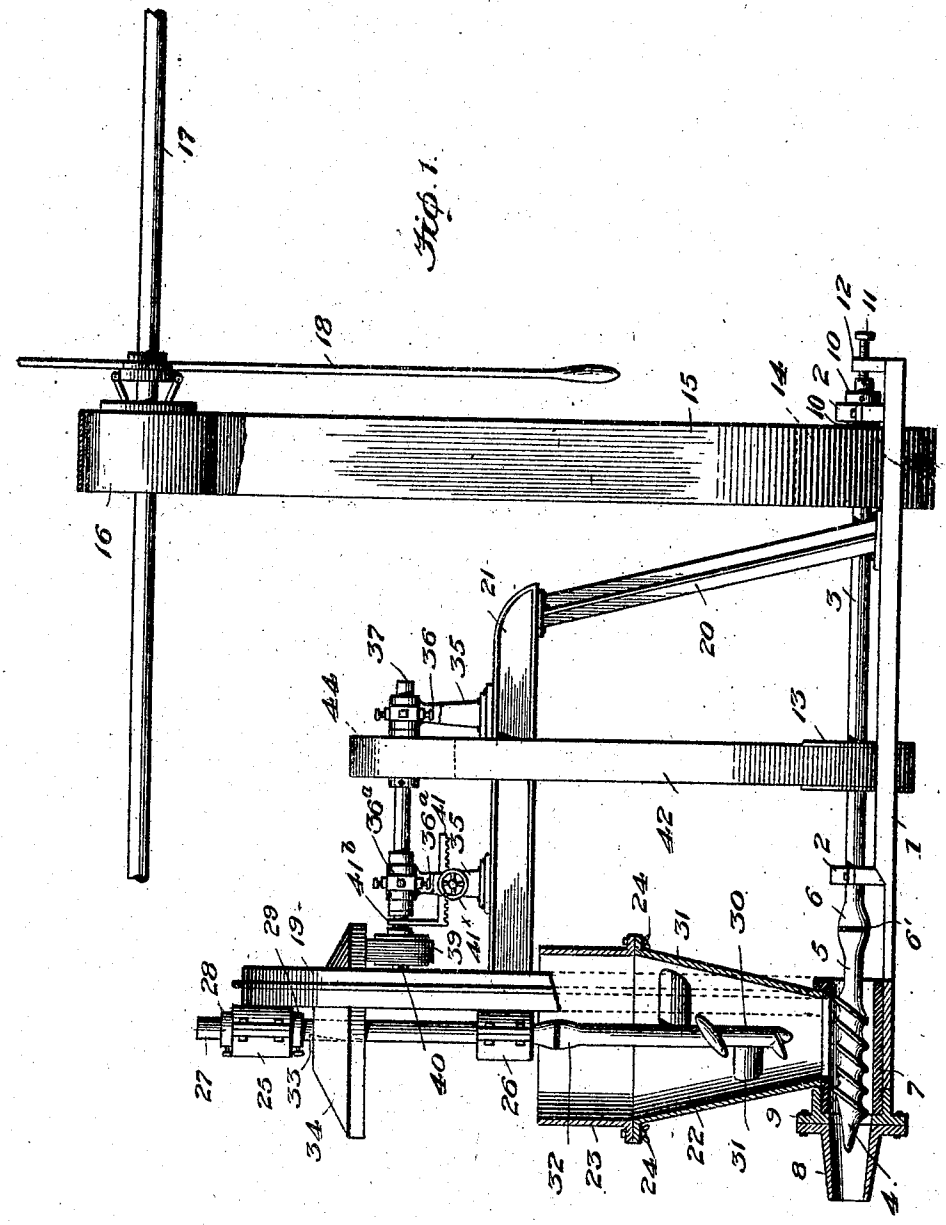
H. AUCHU.

MACHINE FOR FORMING A CARTRIDGE ROPE FROM EXPLOSIVE GELATIN.

APPLICATION FILED MAY 23, 1907.

5 SHEETS—SHEET 1.

Fig. 1.



Witnesses

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Inventor

Henry Auchu

By Geo. H. Hamilton

His Attorney

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5 SHEETS—SHEET 2.

Fig. 3

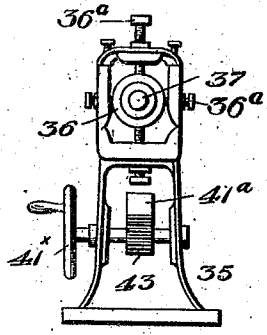


Fig. 2.

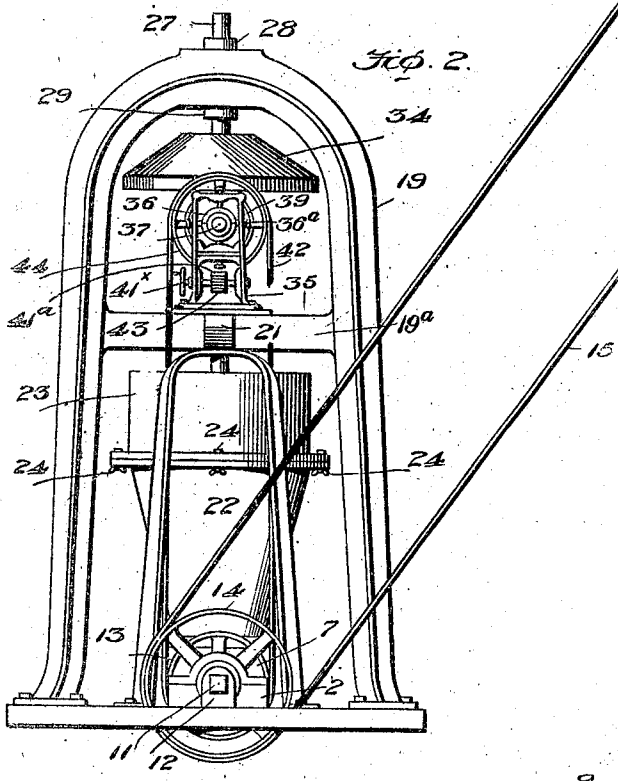


Fig. 4.

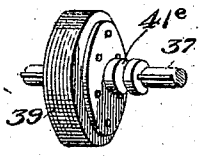


Fig. 7.

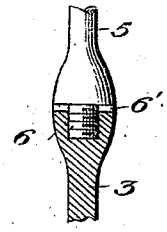


Fig. 5.

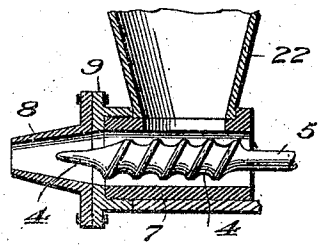
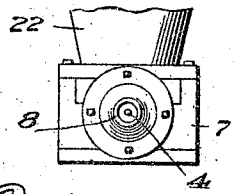


Fig. 6.



Witnesses

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No. 881,365. PATENTED MAR. 10, 1908.

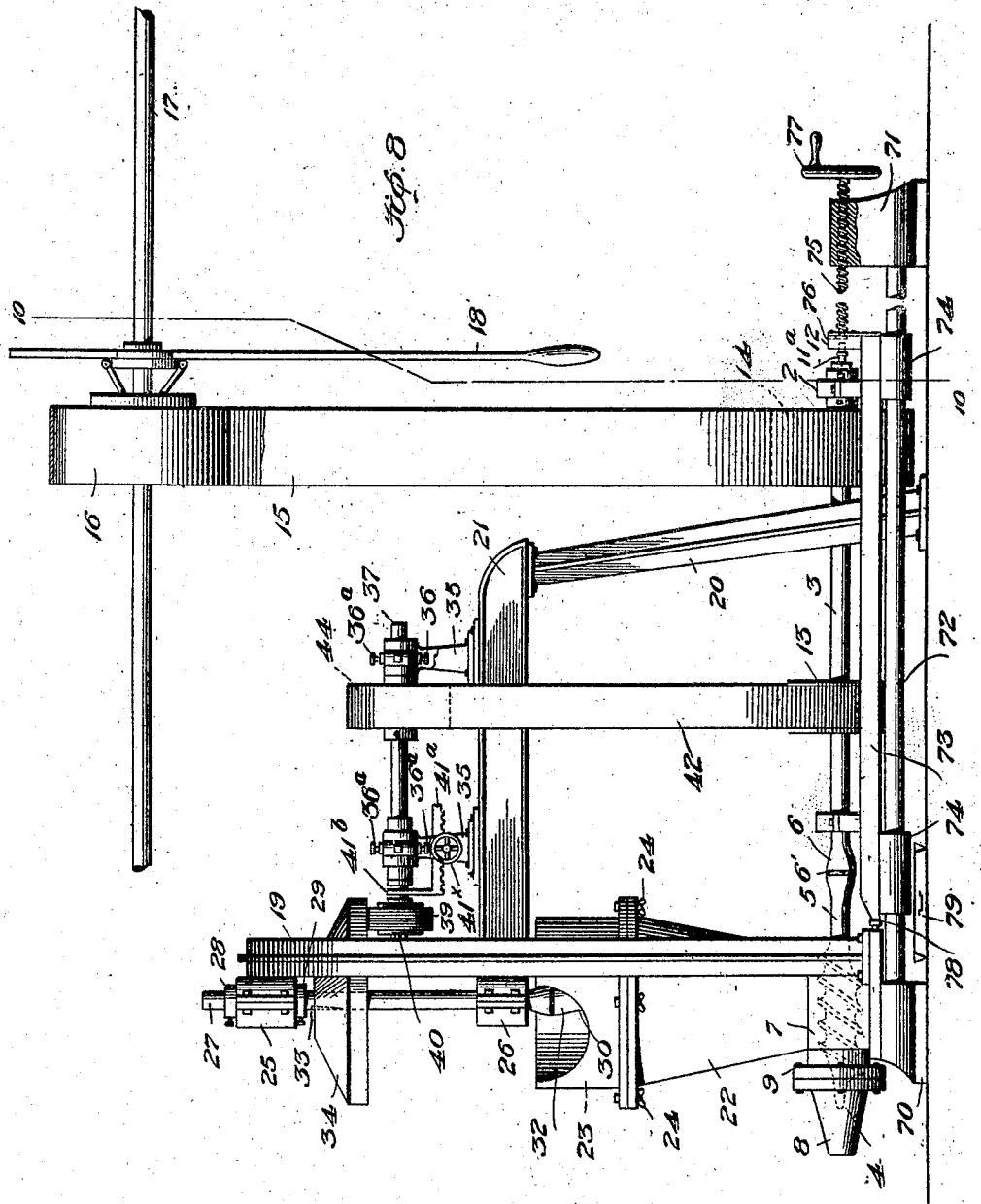
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5 SHEETS—SHEET 3.

Fig. 8



Inventor

Witnesses

By: Attorney

No. 881,365. PATENTED MAR. 10, 1908.

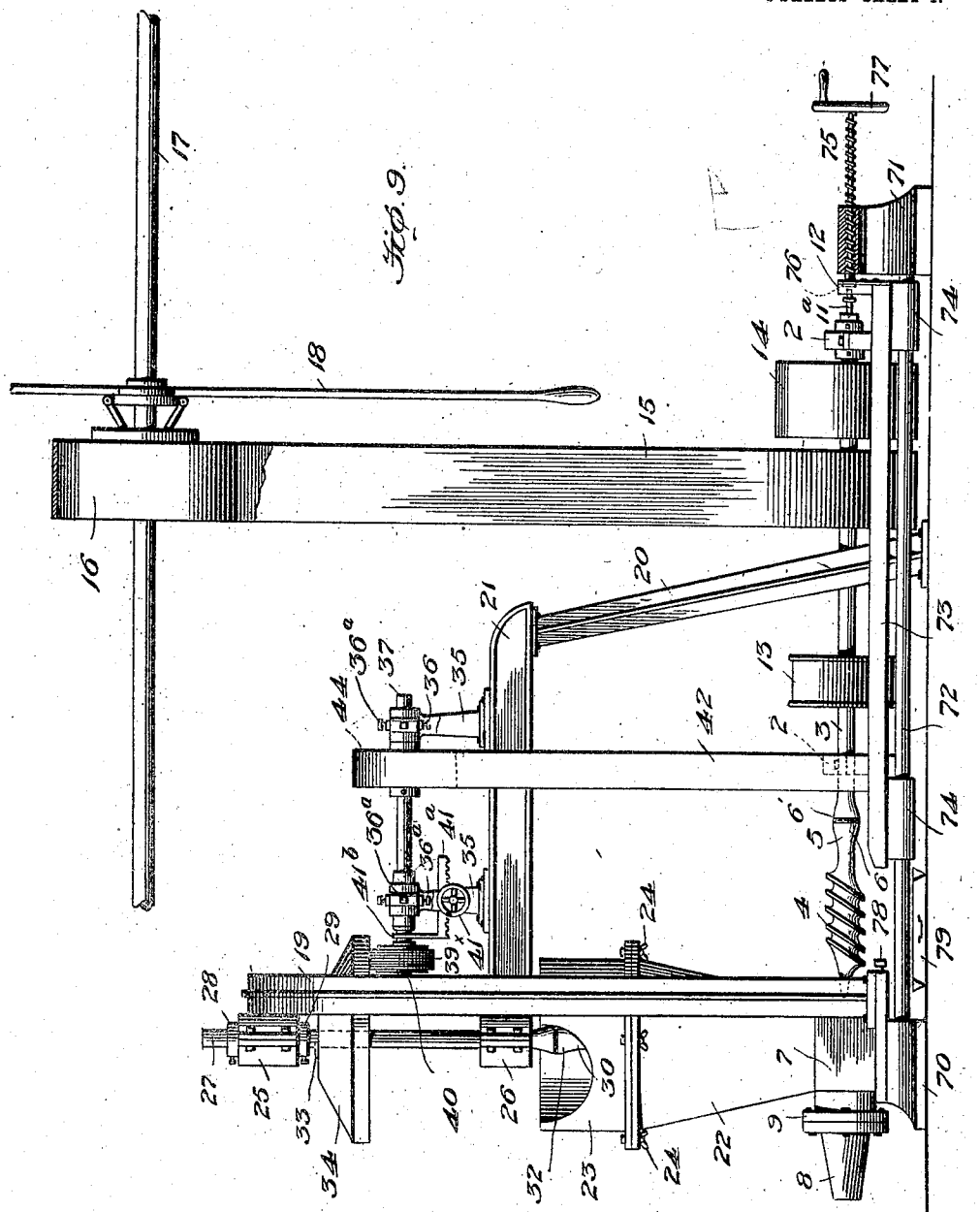
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MACHINE FOR FORMING A CARTRIDGE ROPE FROM EXPLOSIVE GELATIN.

APPLICATION FILED MAY 23, 1907.

5 SHEETS—SHEET 4.

Fig. 9.



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No. 881,365. PATENTED MAR. 10, 1908.

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MACHINE FOR FORMING A CARTRIDGE ROPE FROM EXPLOSIVE GELATIN.

APPLICATION FILED MAY 23, 1907.

5 SHEETS—SHEET 5.

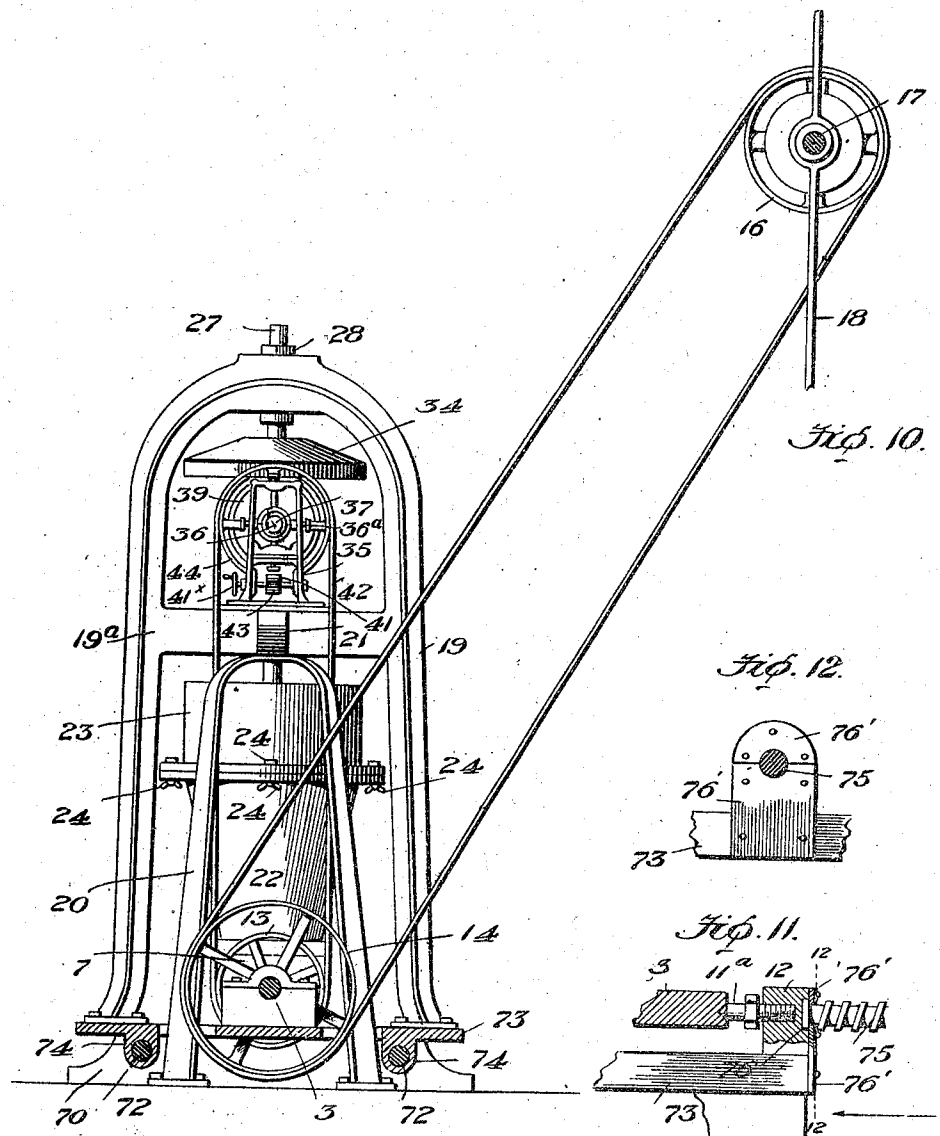


Fig. 10.

Fig. 12.

Fig. 11.

Witnesses

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UNITED STATES PATENT OFFICE.

HENRY AUCHU, OF EMPORIUM, PENNSYLVANIA.

MACHINE FOR FORMING A CARTRIDGE-ROPE FROM EXPLOSIVE GELATIN.

No. 881,365. Specification of Letters Patent. Patented March 10, 1908.

Application filed May 23, 1907. Serial No. 375,296.

To all whom it may concern:

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

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

The manufacture of cartridges from explosive gelatin, which is a plastic substance of a consistancy 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 of which may be from less than an inch to upwards of 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.

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 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 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. In machines of this character, it is desirable to be able to quickly regulate the action of the feeding mechanism so that as batches of the explosive 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 have not heretofore been possible, and I have for one object of my invention the provision of a machine for forming a cartridge rope from explosive gelatin which has novel means whereby the feeding of the gelatin automatically regulates itself according to requirements 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.

The mechanism which I provide for controlling or regulating the feeding of the gelatin is capable of both automatic and hand regulation, in both aspects of which it is, so far as I am aware, entirely novel over anything heretofore employed. This mechanism is so constructed and arranged that the feeder itself will automatically stop whenever the pressure upon the gelatin becomes too great, rather than merely ease up or lessen the feeding action, as has heretofore been proposed to be accomplished, and this function is obtained by the use of a novel form of friction gearing, the gears of which become instantly disengaged on the slightest endwise movement of the feeder shaft, such endwise movement being very small in magnitude and is permitted by having the feeder shaft adapted for only such endwise movement as is usual in shafting to prevent any binding action at the shaft bearings.

The action of the feeder of the present invention is also easily and rapidly regulated by the employment of novel means for changing the relative positions of the friction gears so that the feeder may be driven faster or slower to increase or diminish the feed of the gelatin by hand control, the operator being enabled to instantly change the feed as he watches it so that successive batches of the explosive gelatin may be fed faster or slower according to their consistency and the requirements of operation.

Another object of my invention is the provision of a novel form of feed hopper having a removable upper part permitting rapid and easy removal of the feeder within the hopper when it is desired o clean said parts and I also provide an improved construction permitting removal of the feeder shaft whenever desirable.

A still further object of the invention is the provision of a novel construction and arrangement of the packing screw, which is used for pressing the gelatin through the nozzle, mounted so that it may be shifted in relation to its case or box and the nozzle, to permit cleaning of these parts at the end of the day's run or at other times. This rela-

tive shiftability of the parts may be accomplished in a very satisfactory manner by employing a movable carriage having bearings in which the packing screw shaft is mounted, and also in using means for shifting this carriage according as it is desired to position the packing screw within its case or box or to withdraw it therefrom.

In connection with the present invention I employ various accessories, the construction and relation of which, as well as a full disclosure of the invention which carries out the objects heretofore set forth, will be given hereinafter, while the novel features of the invention are recited in the appended claims.

In the accompanying drawings: Figure 1 is a side elevation with certain parts in section; Fig. 2 is a rear elevation; Fig. 3 is a detail rear elevation of the shifter for the driving friction wheel; Fig. 4 is a detail view of the shiftable friction-wheel showing its manner of connection to its operating shaft; Fig. 5 is a detail vertical section through the hopper, packing screw case and adjacent parts; Fig. 6 is a detail view looking toward the left of Fig. 5; Fig. 7 is a detail section showing the detachable coupling used for both the packing screw and the feeder; Figs. 8 and 9 are side elevations showing a modified construction of the lower part of the machine; Fig. 10 is a section on the line 10—10 of Fig. 8; Fig. 11 is a detail view showing the adjusting means for the carriage and packing screw shaft of the machine of Figs. 8, 9 and 10; and Fig. 12 is a detail section on line 12—12 of Fig. 11.

The metal base 1 of the machine is provided with bearings or boxes 2 in which is journaled the packing screw shaft 3, which is of steel, while the packing screw itself 4 has a short shaft-section 5, the shafts 5 and 3 being connected by a screw coupling 6, the threads of which are so arranged that rotation of the packing screw and the shaft tends to tighten the joint 6.

In machines for packing explosive gelatin, it has been usual to form the packing screw and its complete shaft from a single piece of bronze, as this material, when in contact with the gelatin, is not adapted to cause danger by friction, but bronze and other expensive alloys increase the cost of the machine and so to cheapen such cost, as well as to permit ready detachment of the packing screw and its short shaft, I have provided the union or coupling 6. It is desirable to employ a rubber or paper washer 6′ between the parts of the coupling to insure a tight joint.

To prevent too far entry of the packing screw in its lead or Babbitt metal case 7 and nozzle 8, the collar 9 being also employed, there is provided a set collar 10 on shaft 3, but in order to adjust the packing screw 4 in its case 7 to bring its tip as near as possible to the inside of the nozzle without touching the latter, I provide an adjusting screw 11 threaded through an extension or lug 12 on base 1 and bearing against the rear end of shaft 3. When working on small sized cartridges, it is advisable to have the packing screw penetrate as close to the inside of the nozzle as possible without touching it, as the gelatin will then be forced through the nozzle with greater facility, and the pressure which would otherwise arise, be relieved.

The nozzle 8 and collar 9 are bolted together and the collar 9 is also detachably connected to packing screw case 7, permitting separation of these parts for purposes of cleaning.

Secured by splining, or otherwise, to shaft 3 are belt-pulleys 13 and 14, the latter being connected by belt 15 to a clutch-pulley 16 on a line or counter-shaft 17, a hand lever 18 being provided for throwing the clutch-pulley 16 into and out of operative engagement with shaft 17, whereby the machine may be started or stopped.

Rising from base 1 and suitably bolted thereto is a yoke-upright 19 to which is bolted a horizontal frame-piece 21. This construction affords a rigid bracing for the yoke-upright 19 and also a support for certain parts described presently. Bolted to the top of the packing screw case 7 is a conical hopper 22 whose upper part 23 is in the form of a cylindrical ring which is detachably connected to the lower part thereof by the flanges and bolts 24, permitting removal of the upper part for purposes of cleaning. The ring 23 is cut out at one side to facilitate introduction of the gelatin into the hopper.

Detachable shaft-boxes or bearings 25 and 26 are provided on cross-piece 19ª and apex of yoke-upright 19, the said boxes being vertically alined in the vertical axis of the hopper.

The numeral 27 designates the feeder shaft, which is journaled in the boxes or bearings 25 and 26, said shaft carrying collars 28 and 29 above and below the bearing 25, the collar 28 suspending or sustaining the feeder shaft and the feeder, and the collar 29 holding the feeder shaft against vertical movement except such slight or minimum endwise play of said shaft as is usual in any shafting to prevent binding where collars are employed. These collars are held to the shaft by suitable set screws and turn with said shaft.

The feeder is made of bronze and comprises a shaft 30 having horizontal blades or paddles 31 which are substantially elliptical in cross-section and are disposed with their faces at an angle to the length of the shaft 30, said shaft 30 having the detachable screw-threaded coupling 32 with the lower end of shaft 27, this coupling being in all respects similar to the coupling 6 and having the rub-

ber or paper gasket or washer between its parts. The detachability of the ring 23, together with the detachability of the feeder from shaft 27, makes it possible to remove the feeder or to gain access thereto or to the hopper at any time.

The collar 28 so suspends the feeder within the hopper that the feeder does not touch the sides of the hopper, but may be adjusted to work nearer to or farther from the hopper walls, according to the wish of the operator, this being accomplished by shifting the collars 28 and 29 and re-clamping them in the desired position.

Rigidly secured to shaft 27 by the key 33 is a friction-wheel 34, the lower face of which is by preference perfectly flat.

Mounted upon and connected to the frame-piece 21 are bearing standards 35 which have horizontally and vertically adjustable bearings 36, made so by the four screws 36^a, mounted in which is a horizontal shaft 37. Splined upon the projecting end of shaft 37 by a feather 40 carried by the shaft, is a friction wheel 39 which may, owing to said splined connection 40, be slid lengthwise of the shaft by a racked shifter 41^a having a yoke 41^b engaging a groove 41^e in the hub of wheel 39. A hand wheel 41^x, on the same shaft with a pinion 43, engaged with the rack, affords means for shifting the wheel 39 on shaft 37. The friction-wheel 39 bears against the flat under face of the friction-wheel 34 and, as the shaft 37 is in the same plane as shaft 27, the friction-wheel 34 will be driven faster or slower according as the friction-wheel 39 is moved toward or away from shaft 27. The shifting of friction-wheel 39 may be instantly accomplished by the operator, who thus has the rate of rotation of the feeder under absolute control so that if the operator finds that the feeder is crowding the packing screw by feeding too much gelatin to it, or if the consistency of the gelatin demands a different rate of feed, the operator can at once change the feed as his experience may dictate is advisable.

A belt 42 connects pulley 13 with a pulley 44 on shaft 37.

In the operation of the machine the feeder within the hopper 22—23, forces the gelatin to the packing screw 4, which in turn, presses the gelatin out through the nozzle 8 in the form of a continuous cartridge rope, which is severed into marketable lengths of about eight inches and afterward wrapped.

As previously explained, the shaft 27 is capable of a very slight endwise movement which is no greater in magnitude than is common in any shaft having collars to limit its endwise or lengthwise thrust as some play is necessary in shafts thus held, in order to prevent binding of the collars on the bearing. This slight play, which is only a very small fraction of an inch, is sufficient, however, to cause the face of friction-wheel 34 to lift clear of engagement with friction-wheel 39, when the pressure of the feeder upon the gelatin in the hopper becomes so great that the reactionary effect overcomes the combined weight of the feeder, feeder shaft, friction-wheel, etc., and hence the feeder will automatically stop rotating by reason of the disengagement of the friction-wheels 34 and 39 when the feed becomes too great. Immediately the pressure on the gelatin is relieved somewhat, the friction-wheel 34 drops slightly and again bears on friction-wheel 39 and the feeder then resumes its rotation. This action is entirely automatic and is radically distinct from any feeding mechanism which merely slows down as has been the case heretofore.

Referring now to Figs. 8, 9, and 10, the machine therein shown is in all respects similar to the machine heretofore described as regards the feeding mechanism and allied devices, but the lower part of the machine embodies certain different constructions permitting relative shifting of the packing screw and its case to facilitate cleaning. The base of the machine consists of a base part 70, which supports the packing screw case 7 and is bolted thereto, and a tail base-piece 71, the parts 70 and 71 being rigidly connected by parallel guide-rods 72. The sub-base 73 has sleeves 74, which slide on the guide-rods 72, this sub-base carrying bearings 2 in which the packing screw shaft 3 is journaled and coupled at 6, as heretofore set forth. A screw 11^a serves the purpose of the screw 11, but is a little differently arranged as the head and the tip are on the same side of the lug 12 instead of being on opposite sides thereof. To shift the sub-base, which may be termed a carriage 73 back and forth on the rods or guides 72, a screw 75 is employed, the same being threaded through the tail-piece 71 and having a head 76 swiveled in lug 12 by detachable plates 76′ so that the carriage or sub-base may be retreated as well as advanced. A suitable hand-wheel 77, carried by the screw, is used for advancing or retreating the carriage. To prevent too far insertion of screw 4 in case 7, an adjustable screw 78 is employed constituting an adjustable abutment against which the sub-base or carriage 73 will strike when the packing screw is sufficiently far advanced in its case. A removable pan 79 may be set underneath the place where the packing screw will be positioned when retreated from its case so that any loose pieces of gelatin will be caught and not allowed to drop around and get on the parts.

As will be seen from Fig. 9, when the packing screw is retreated from its case, it is exposed and both it and the interior of the packing screw may be readily cleaned. In shifting the sub-base 73, the belts 15 and 42 are unshipped from the pulleys 14 and 13.

The engagement of the wheels 34 and 39 prevents the paddles of the feeder from ever dropping and touching the inner sides of the hopper or the packing screw and supplements the suspending functions of the collar 28.

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 rope from explosive gelatin, the combination with a shell or case having a delivery mouth from which the gelatin is adapted to issue, of means for forcing the gelatin through said mouth, continuously operating driving means, and driven means for said gelatin forcing means which is automatically thrown out of action by the reactionary pressure of the gelatin when said pressure becomes too great.

2. In a machine for forming a cartridge rope from explosive gelatin, the combination with a shell or case having a delivery mouth from which the gelatin is adapted to issue, of means for forcing the gelatin through said mouth, and mechanical driving means comprising driving and driven elements, the latter adapted for operation of the gelatin forcing means and arranged to become inactive when the pressure on the gelatin becomes too great.

3. In a machine for forming a cartridge rope from explosive gelatin, the combination with a shell or case having a delivery mouth from which the gelatin is adapted to issue, of means for forcing the gelatin through said mouth, and operating means for said gelatin forcing means comprising a driving member and a driven member, the latter being adapted for operating the said forcing means, said driving and driven members being adapted for disengagement to stop the operation of the forcing means when the reactionary pressure of the gelatin becomes too great.

4. In a machine for forming a cartridge rope from explosive gelatin, the combination with a shell or case having a delivery mouth from which the gelatin is adapted to issue, of a rotary device for forcing the gelatin through said delivery mouth, a wheel rotating with said forcing device, said forcing device and wheel being adapted for shifting, and a driving wheel normally engaged with the first-named wheel, whereby when the pressure of the forcing device on the gelatin becomes too great the reactionary pressure will shift the forcing device and its wheel and throw the said wheels out of operative engagement.

5. In a machine for forming a cartridge rope from explosive gelatin, the combination with a shell or case having a delivery mouth from which the gelatin is adapted to issue, of a rotary device for forcing the gelatin through said delivery mouth, a friction wheel rotating with said forcing device, said forcing device and friction wheel being adapted for shifting, and a driving friction wheel normally engaged with the first-named wheel whereby when the pressure of th device on the gelatin becomes too great, the reactionary pressure will shift the forcing device and its friction wheel and throw the said friction wheel out of operative engagement.

6. In a machine for forming a cartridge rope from explosive gelatin, the combination with a shell or case having a delivery mouth from which the gelatin is adapted to issue, of means for forcing the gelatin through said mouth, and variable speed operating means for said forcing means comprising, in part, a shiftable controller wheel, whereby the rate of operation of the gelatin forcing means may be varied.

7. In a machine for forming a cartridge rope from explosive gelatin, the combination with a shell or case having a delivery mouth from which the gelatin is adapted to issue, of a rotary device for forcing the gelatin through said delivery mouth, a wheel rotating with said forcing device, a driving wheel shiftable so as to engage the wheel aforesaid at different distances from the axis of rotation of said driven wheel to thereby vary the speed of rotation of the gelatin forcing device, and means for shifting said driving wheel.

8. In a machine for forming a cartridge rope from explosive gelatin, the combination with a shell or case having a delivery mouth from which the gelatin is adapted to issue, of a rotary device for forcing the gelatin through said delivery mouth, a friction wheel rotating with said forcing device, a driving friction wheel shiftable so as to engage the friction wheel aforesaid at different distances from the axis of rotation of said driven friction wheel to thereby vary the speed of rotation of the gelatin forcing device, and means for shifting said driving friction wheel.

9. In a machine for forming a cartridge rope from explosive gelatin, the combination with a shell or case having a delivery mouth from which the gelatin is adapted to issue, of a rotary device for forcing the gelatin through said delivery mouth, a friction wheel rotating with said gelatin forcing device, a driving shaft, a driving friction wheel shiftable longitudinally on said shaft and connected thereto so as to rotate therewith which is adapted for contact with the first-named friction wheel at different distances from the center of rotation thereof, and means for shifting said driving friction wheel lengthwise of its shaft.

10. In a machine for forming a cartridge rope from explosive gelatin, the combination with a shell or case having a delivery mouth from which the gelatin is adapted to issue, of a rotary device for forcing the gelatin

through said delivery mouth, a friction wheel rotating with said gelatin forcing device, a driving shaft, a driving friction wheel shiftable longitudinally on said shaft and connected thereto so as to rotate therewith which is adapted for contact with the first-named friction wheel at different distances from the center of rotation thereof, and means for shifting said driving friction wheel lengthwise of its shaft, said rotary gelatin forcing device and the friction wheel carried therewith being adapted for shifting under the reactionary pressure of the gelatin to cause disengagement of said friction wheels.

11. In a machine for forming a cartridge rope from explosive gelatin, the combination with an upright shell or case having a delivery mouth from which the gelatin is adapted to issue, of a rotary device for forcing the gelatin through said delivery mouth, an upright shaft connected to the gelatin forcing device, a bearing in which said shaft turns, means for holding the shaft and gelatin forcing device suspended, a wheel secured to the shaft, and a driving wheel bearing against the wheel aforesaid, said gelatin forcing device and wheel carried therewith being shiftable to cause disengagement of the aforesaid wheels.

12. In a machine for forming a cartridge rope from explosive gelatin, the combination with an upright shell or case having a delivery mouth from which the gelatin is adapted to issue, of a rotary device for forcing the gelatin through said delivery mouth, an upright shaft connected to the gelatin forcing device, a bearing in which said shaft turns, means for holding the shaft and gelatin forcing device suspended, a wheel secured to the shaft, and a driving wheel bearing against the wheel aforesaid, said driving wheel being adapted for shifting to engage with the first-named wheel at different distances from the center of rotation of the latter to vary the speed of rotation of the gelatin forcing device, said gelatin forcing device and wheel carried therewith being shiftable to cause disengagement of the aforesaid wheels.

13. In a machine for forming a cartridge rope from explosive gelatin, the combination with a packing screw case adapted to receive the gelatin and having an opening at one end for the extrusion of the gelatin and being open at the opposite end, of a packing screw removable bodily through the said opposite end of the packing screw case and adapted to remain positioned outside of said case.

14. In a machine for forming a cartridge rope from explosive gelatin, the combination with a packing screw case adapted to receive the gelatin and having an opening for the extrusion of the gelatin, of a packing screw positioned within said case, and means for adjusting said packing screw to different positions within said case and maintaining it where adjusted.

15. In a machine for forming a cartridge rope from explosive gelatin, the combination with a substantially horizontal packing screw case adapted to receive the gelatin and having an opening for the extrusion of the gelatin, of a movable carriage having bearings, and a packing screw having a shaft journaled in said bearings, said packing screw being adapted for insertion in or removal from the packing screw case by shifting the movable carriage.

16. In a machine for forming a cartridge rope from explosive gelatin, the combination with a substantially horizontal packing screw case adapted to receive the gelatin and having an opening for the extrusion of the gelatin, of a movable carriage having bearings, a packing screw having a shaft journaled in said bearings, said packing screw being adapted for insertion in or removal from the packing screw case by shifting the movable carriage, and means for shifting said carriage to different desired positions.

17. In a machine for forming a cartridge rope from explosive gelatin, the combination with a substantially horizontal packing screw case adapted to receive the gelatin and having an opening for the extrusion of the gelatin, of a guide, a carriage slidable on said guide toward and away from the packing screw case and provided with bearings, and a packing screw having a shaft journaled in said bearings and positioned for entrance into or removal from the packing screw case by sliding the carriage.

18. In a machine for forming a cartridge rope from explosive gelatin, the combination with a packing screw case adapted to receive the gelatin and having an opening for the extrusion of the gelatin, of a movable carriage having bearings, a packing screw having a shaft journaled in said bearings, and adapted for positioning within the packing screw case or for removal therefrom by shifting the carriage, means for adjusting the packing screw relative to the carriage, and means for moving the carriage.

19. In a machine for forming a cartridge rope from explosive gelatin, the combination with a rotary shaft, of a detachable rotary gelatin forcing device, and a screw-threaded coupling connecting said shaft and gelatin forcing device.

20. In a machine for forming a cartridge rope from explosive gelatin, the combination with a rotary shaft, of a detachable rotary gelatin forcing device, and a screw-threaded coupling connecting said shaft and gelatin forcing device which has its threads arranged so that rotation of the shaft and gelatin forcing device in the usual direction tends to tighten said coupling.

21. In a machine for forming a cartridge

rope from explosive gelatin, the combination with a packing screw case adapted to receive the gelatin and having an opening for the extrusion of the gelatin and being also open at the opposite end, of a rotary shaft, a packing screw received in the case, and a detachable coupling between the rotary shaft and the packing screw.

22. In a machine for forming a cartridge rope from explosive gelatin, the combination with a shell or case having a delivery mouth from which the gelatin is adapted to issue, of a rotary device for forcing the gelatin through said delivery mouth, a wheel rotating with said forcing device, said forcing device and wheel being adapted for bodily shifting, and a driving wheel engaged with the wheel aforesaid and located between said wheel and the rotary forcing device and acting as a limiting abutment to prevent too far entry of the gelatin forcing device into the shell or case.

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

HENRY AUCHU.

Witnesses:

GEO. P. JONES,

C. T. LOGAN.