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Patented Sept. 10, 1901.

J. C. SCHRADER.

MACHINE FOR PACKING EXPLOSIVE GELATIN.

(Application filed July 28, 1900.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 1.

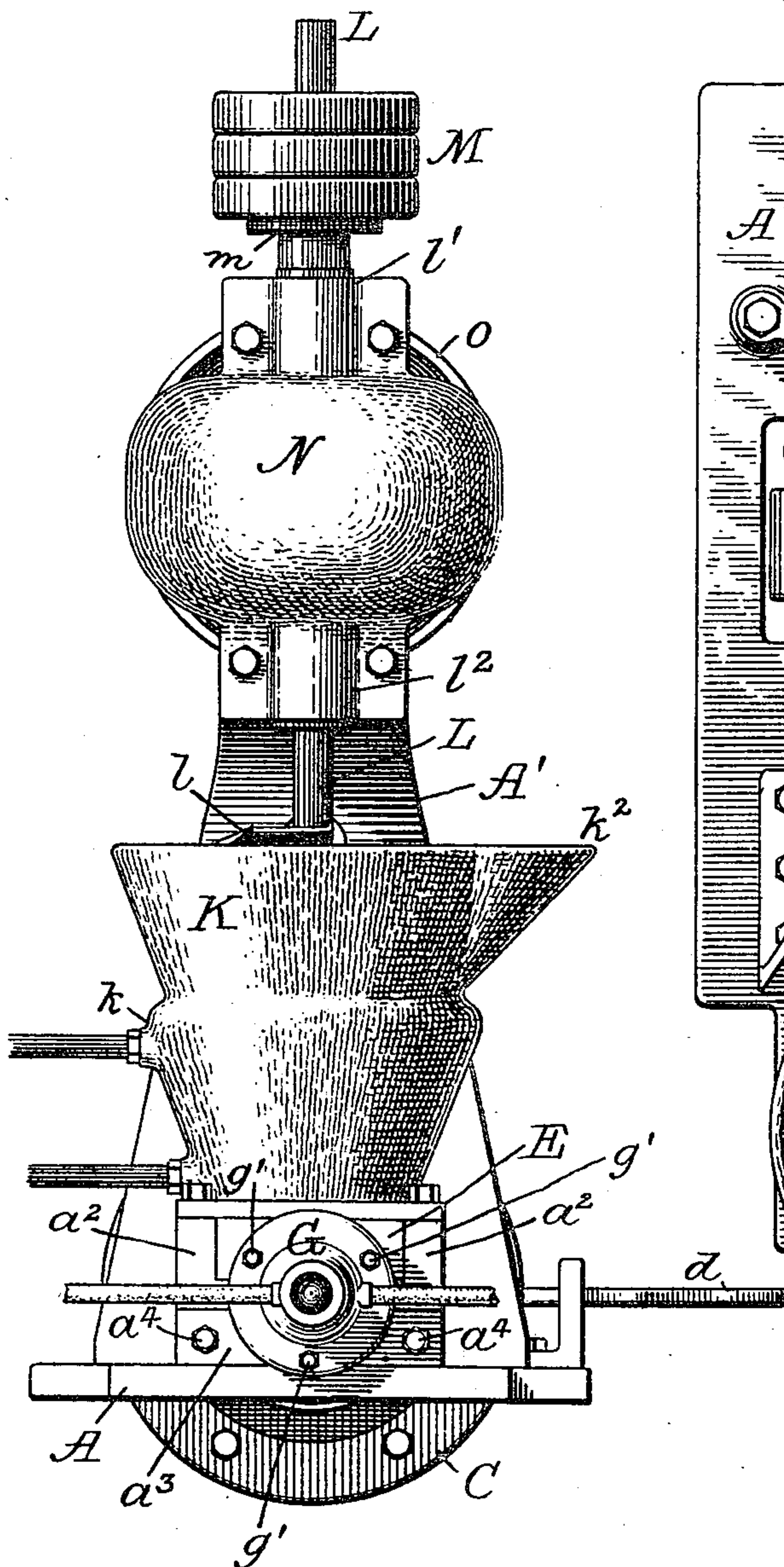
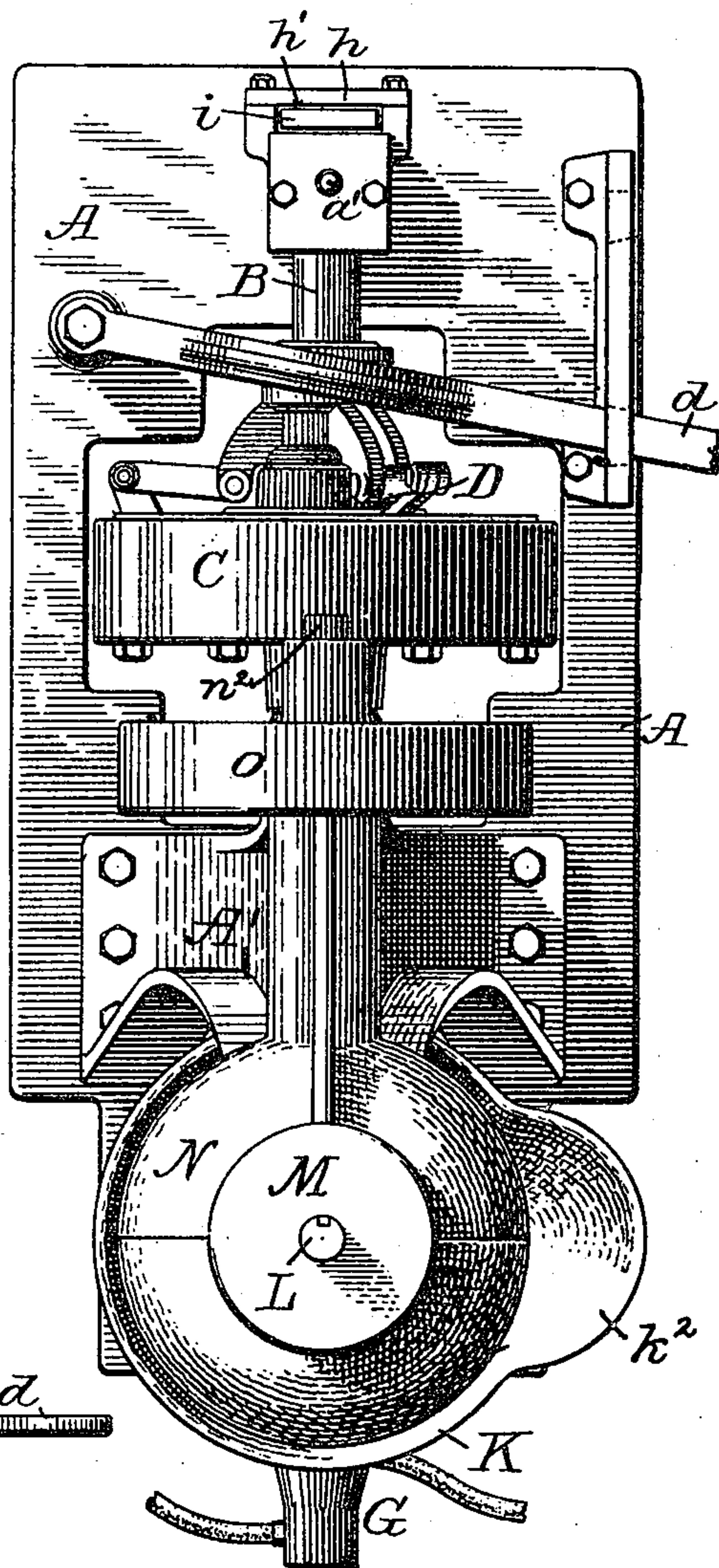


Fig. 2.



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MACHINE FOR PACKING EXPLOSIVE GELATIN.

SPECIFICATION forming part of Letters Patent No. 682,390, dated September 10, 1901.

Application filed July 28, 1900. Serial No. 25,116. (No model.)

To all whom it may concern:

Be it known that I, JOHN C. SCHRADER, a citizen of the United States, residing at Dover, in the county of Morris and State of New Jersey, have invented new and useful Improvements in Machines for Packing Explosive Gelatin, of which the following is a specification.

Explosive gelatin is put up for commercial use in the form of cartridges about eight inches long and of varying diameters. These cartridges are formed by a machine known to the trade as a "gelatin-packing" machine, which very closely resembles an ordinary sausage-making machine. As heretofore constructed it consists of a case containing a shaft and screw and provided with a hopper for containing the gelatin. The revolution of the shaft causes the thread of the screw to push the gelatin from the hopper through a nozzle at the end of the case, from whence it issues in a continuous rope. This rope is cut into desired lengths, which are rolled up in waterproof cartridge-paper for storage or shipment.

The sluggish character of the gelatin has rendered it necessary to provide means for forcing it from the hopper to the pressing-screw, and for this purpose the hopper has been provided with a plunger operated by a screw and lever after the manner of an ordinary screw-press. This construction necessarily limits the operation of the machine to the capacity of the hopper, it being necessary after the contents of the hopper have become exhausted to stop the machine and withdraw the plunger before another charge of gelatin can be introduced.

One object of my invention is to supply means for forcing gelatin to the pressing-screw which will leave the hopper open for the reception of material during the operation of the machine, and thus render the machine continuous in its operation, the result accomplished being a material saving in time and labor and a very considerable increase in the number of cartridges formed in the course of a day's operation.

The diameter of the cartridges is determined by the size of the nozzle through which the gelatin is forced by the packing-screw, the nozzle being readily detached and another substituted when it is desired to change from

one size of cartridge to another. The packing-screw has heretofore been a fixture in the machine and necessarily packed the same quantity of material in a given time, regardless of the size of nozzle used, and it will be readily apparent that cartridges of a large diameter could not be made as fast as those of smaller diameter. In order to render the machine capable of forming a rope of large diameter with the same rapidity as one smaller in size, I have so constructed my machine that the pressing-screw may be removed and another replaced with considerably less time and trouble than required for substituting one nozzle for another, and by providing screws of different pitch I am enabled to use with a large nozzle a screw having a greater pitch than the one to be used with a smaller nozzle, and thereby equalize the rapidity with which the different sizes of ropes are formed.

Another novel feature of my machine is the automatic action of the screw feeding mechanism by which the gelatin fed to the packing-screw is regulated according to the quantity required. In the old form of machine, where the hand-operated plunger is used, there is liability of the plunger being operated to force the gelatin beyond the capacity of the screw, and thus create danger of explosion. By automatically regulating the pressure upon the material in the hopper according to the requirements of the pressing-screw all danger of explosion from too great pressure is eliminated and greater uniformity is secured in the cartridges produced.

After a detail description of my invention the features deemed novel will be specified in the claims hereunto annexed.

Referring to the drawings, Figure 1 illustrates one of my machines in front elevation. Fig. 2 is a plan or top view of the same. Fig. 3 is a vertical longitudinal section through the working portions of the machine. Fig. 4 is a detail showing the spline connection between the shaft of the screw feeding mechanism and its driving-gear. Fig. 5 illustrates the key for holding the pressing-screw in position in the machine. Fig. 6 illustrates a pressing-screw of greater pitch than that shown in Fig. 3 to be used with a nozzle having a large bore, and Fig. 7 is a section of the nozzle to be used with the screw of Fig. 6.

On a base or bed plate A are bearings a and a' , supporting a hollow shaft B, which is the main driving-shaft of the machine. Upon shaft B is a driving-pulley C, loosely mounted thereon to be continuously driven from any convenient source of power. Pulley C is coupled for driving shaft B by means of a friction-clutch D, operated by a hand-lever d , said clutch being of a well-known construction and needing no special description. In line with shaft B is a screw-case consisting of a wooden block E, bored, as at e , for the reception of the packing-screw F and confined in position between blocks or projections a^2 a^2 , cast integral with the base A. Above the space between the case E and bearing a is a shield or plate e^2 , which protects the bearings from gelatin that may accidentally fall from the hopper K. In front of the case E is a casting a^3 , to which a water-jacketed nozzle G is bolted, said casting having an opening registering with the opening in the block or case E and being secured to the projections a^2 a^2 by bolts a^4 a^4 , as shown in Fig. 1. The nozzle G is detachably secured to the casting a^3 by bolts g' , and it is made tapering, as shown, so that the gelatin will be thoroughly compressed or packed in being forced through its outer end by the packing-screw F. Nozzles having different-sized openings are provided for forming the various sizes of cartridges, the change from one size to another being quickly made by means of the bolts g' , as will be readily understood. The pressing-screw F is formed on the end of a rod f , which is inserted in the hollow driving-shaft B, said rod and shaft being rotatively connected by a spline f' on the rod, which fits into a groove in the interior of the shaft B. At the rear of the machine is an abutment or stop h for the inner end of rod f , and between said abutment and the bearing a' is a space h' for a forked key i , (specially illustrated in Fig. 5,) which spans rod f and enters an annular groove f^2 , formed therein, and locks the rod (and screw F) to its position in the machine.

It will be seen that when the nozzle G is detached from the machine the screw F may be withdrawn from the hollow shaft by lifting the key i and another screw inserted without extra trouble or loss of time. Screws of different pitch are provided for the different-sized nozzles, the screw of greatest pitch being used with the largest nozzle and that with the least pitch with the smallest nozzle, so that all sizes of rope may issue from the machine with the same rapidity and an equal number of cartridges formed in the same time, regardless of their size.

The hopper K is in the form of an inverted cone located above the case E and communicating with the interior thereof by way of an opening e' , and said hopper is water-jacketed, as at k , so that its contents may be kept to the required temperature by means of water circulated through the jacketed portion, as

will be understood. Within the hopper is the screw feeding mechanism, which consists of blades l , projecting from a shaft L, suspended from a frame or support A', bolted to the base A and provided with suitable bearings l' l^2 , in which said shaft L rotates. The faces of the blades l are angular to their plane of rotation and move in the direction of their highest edge, so that material within the hopper will be thereby forced down to the screw F. The blade l^4 at the lower end of the shaft, being the last to act on the material, is made in the form of a screw-thread extending partially around the shaft in order to give a larger bearing-surface for contact with the material at that point. The gelatin in the hopper is prevented from rotating with the blades by the vertical ribs k' on the surface of the hopper. (Shown in Fig. 3.) Shaft L is free to rise in its bearings l' l^2 and is held in proper relation to the hopper by weights M, supported on an adjustable collar m , which normally rests on the upper bearing l' . Shaft L is driven by means of a gear n , mounted thereon between the bearings l' l^2 , said gear and shaft being rotatively coupled together by means of a spline connection, as shown in Fig. 4, so that the shaft may rise and fall independently of the gear. Meshing with gear n is a similar gear n' , fixed to a short horizontal shaft n^2 , mounted in the support A' and carrying at its outer end a pulley o , which is driven by a belt from pulley o' on the main driving-shaft B, as shown in Fig. 3. The gears n and n' are housed or inclosed within a casing N, one half of which is cast integral with the frame A' and the other half integral with the caps of the bearings l' l^2 , the cap-bolts serving to secure the two halves together.

The driving-pulley C is continuously driven by a belt from any source of power, the machine being started and stopped by means of the friction-clutch D, already referred to. The hopper K is provided with a projecting lip k^2 to facilitate the introduction of gelatin during the operation of the machine; but a continuous mechanical feed may be employed with entire safety, if desired; but provision should be made for regulating the feed in proportion to the quantity required, which will vary with the size of nozzle and pitch of screw employed.

The screw-feeding mechanism within the hopper is rendered automatic in its action by the angular surfaces of the blades and the mounting of the shaft L, whereby it is free to rise during the operation of the machine. The quantity fed to the screw is proportionate to the pressure upon the material in the hopper, which is rendered constant by the arrangement shown, regardless of the amount consumed or taken up by the screw. If the blades were held against upward movement, the pressure upon the material at the bottom of the hopper would considerably increase the moment the quantity removed by the

pressing-screw should fall behind the quantity fed thereto; but by mounting the blades so that they will be raised by any extra condensation of material no greater pressure can be put upon the material than the combined weight of the blades, with their shaft and adjustable weight. This pressure is regulated in the first instance to suit particular requirements by increasing or diminishing the weights M on the shaft L.

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

1. In a machine for packing explosive gelatin, the combination with a packing-screw and its case, of automatically-regulated feeding mechanism for variably supplying material to said case in response to variations in the quantity consumed by said screw, substantially as described.

2. In a machine for packing explosive gelatin, the combination with a packing-screw and its case, of a hopper, means for feeding material therefrom to said screw, and means whereby the amount fed to said screw will be automatically varied in response to variations in the quantity consumed by said screw, substantially as described.

3. In a machine for packing explosive gelatin, the combination with a packing-screw and its case, of a hopper, means within the hopper for forcing material therefrom to said screw, and means whereby the pressure upon the material in the hopper will remain constant during the operation of the machine regardless of the quantity consumed by said screw, substantially as described.

4. In a machine for packing explosive gelatin, the combination with a packing-screw and its case, of a hopper, means within the hopper for forcing material to the packing-screw, and means for regulating the pressure upon the material, substantially as described.

5. In a machine for packing explosive gelatin, the combination with a packing-screw and its case, of a hopper, a vertically-movable shaft suspended therein, horizontal blades carried by said shaft having downwardly-inclined faces, and means for rotating said shaft, substantially as described.

6. In a machine for packing explosive gelatin, the combination with a packing-screw and its case, of a hopper, revoluble blades within said hopper having faces angular to their plane of rotation, and means whereby said blades are free to rise during their rotation, substantially as described.

7. In a machine for packing explosive gelatin, the combination with a packing-screw and its case, of a hopper, a vertical shaft suspended therein having blades angular to a horizontal plane projecting radially therefrom, said shaft being free to rise in suitable bearings, an adjustable weight on said shaft, and means for revolving said shaft and screw, substantially as described.

8. In a machine for packing explosive gelatin, the combination with a packing-screw

and its case, of a frame, a hopper, a longitudinally-movable shaft suspended therein, horizontal blades carried by said shaft having downwardly-inclined faces, a gear splined to said shaft supported by said frame, and means for rotating said gear, substantially as described.

9. In a machine for packing explosive gelatin, the combination with a packing-screw and its case, of a frame, a hopper, a longitudinally-movable shaft suspended therein, horizontal blades carried by said shaft having downwardly-inclined faces, a gear splined to said shaft supported by said frame within a closed case, substantially as described.

10. In a machine for packing explosive gelatin, the combination of a hollow driving-shaft, a packing-screw provided with an extension fitting into said hollow shaft, and forming the sole support for said screw, and means for rotatively coupling said screw and shaft, substantially as described.

11. In a machine for packing explosive gelatin, the combination of a hollow driving-shaft, of a packing-screw provided with a rearward extension fitting into said hollow shaft and extending beyond the rear end thereof, and a key at the rear end of said extension for preventing its withdrawal from said shaft, substantially as described.

12. In a machine for packing explosive gelatin, the combination of a packing-screw case a packing-screw within said case, means for revolving said screw, and means whereby said screw may be readily withdrawn from said case and another inserted without disturbing the revolving means, substantially as described.

13. In a machine for packing explosive gelatin, the combination of a packing-screw case having a detachable nozzle, a packing-screw within said case, rotating mechanism for said screw, and means whereby said screw may be withdrawn from said case and from its connection with the rotating mechanism upon the removal of said nozzle, substantially as described.

14. In a machine for packing explosive gelatin, the combination with a packing-screw and its case, of a hopper communicating with said case, a vertically-movable shaft suspended in said hopper from bearings above the same, horizontal blades carried by said shaft having downwardly-inclined faces, and substantially vertical ribs on the inner surface of said hopper, substantially as described.

15. In a machine for packing explosive gelatin, the combination of a packing-screw, a case therefor, a jacketed hopper communicating with said case, and a detachable jacketed nozzle for said case, substantially as described.

16. In a machine for packing explosive gelatin, the combination with a packing-screw and its case, of a hopper communicating with

said case, horizontally-revoluble blades suspended in said hopper and adapted to force material therefrom to said screw, and means permitting the automatic rising of said blades
5 when the material offers sufficient resistance to the rotation thereof, substantially as described.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

JOHN C. SCHRADER.

Witnesses:

WILBUR L. HALE,
JOHN G. VAN ETEN.