

H. AUCHU.
MACHINE FOR MAKING PAPER CARTRIDGES OR SHELLS.
APPLICATION FILED JULY 28, 1910.

1,018,473.

Patented Feb. 27, 1912.

2 SHEETS—SHEET 1.

Fig. 4.

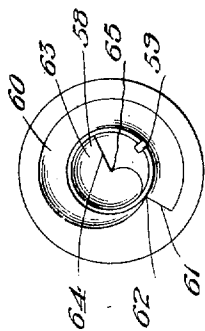
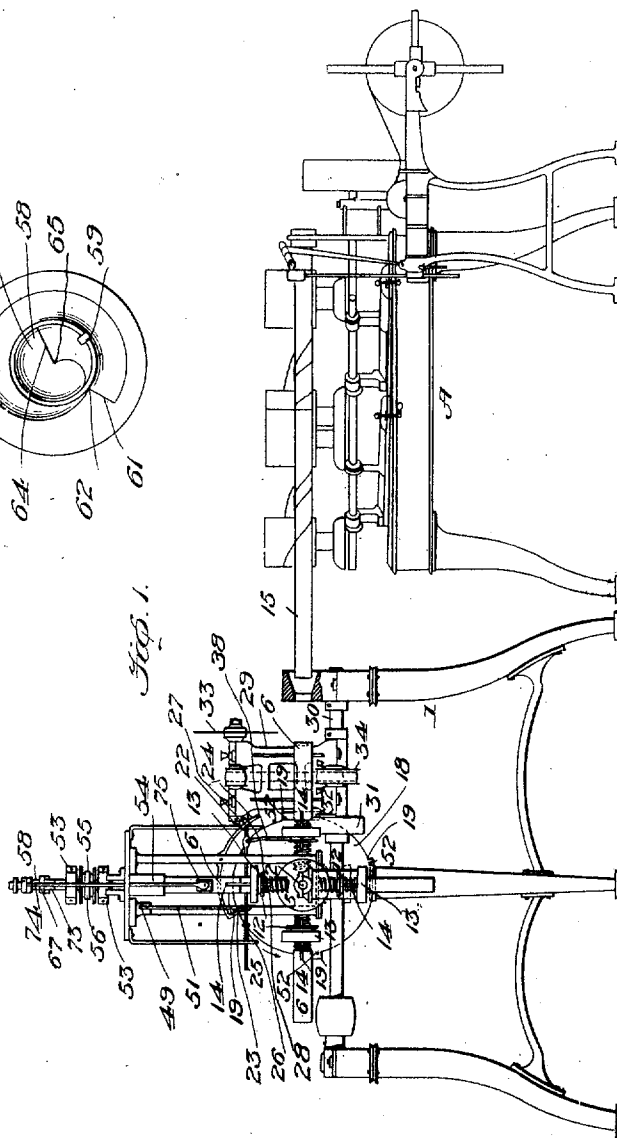


Fig. 1.



Witnesses.

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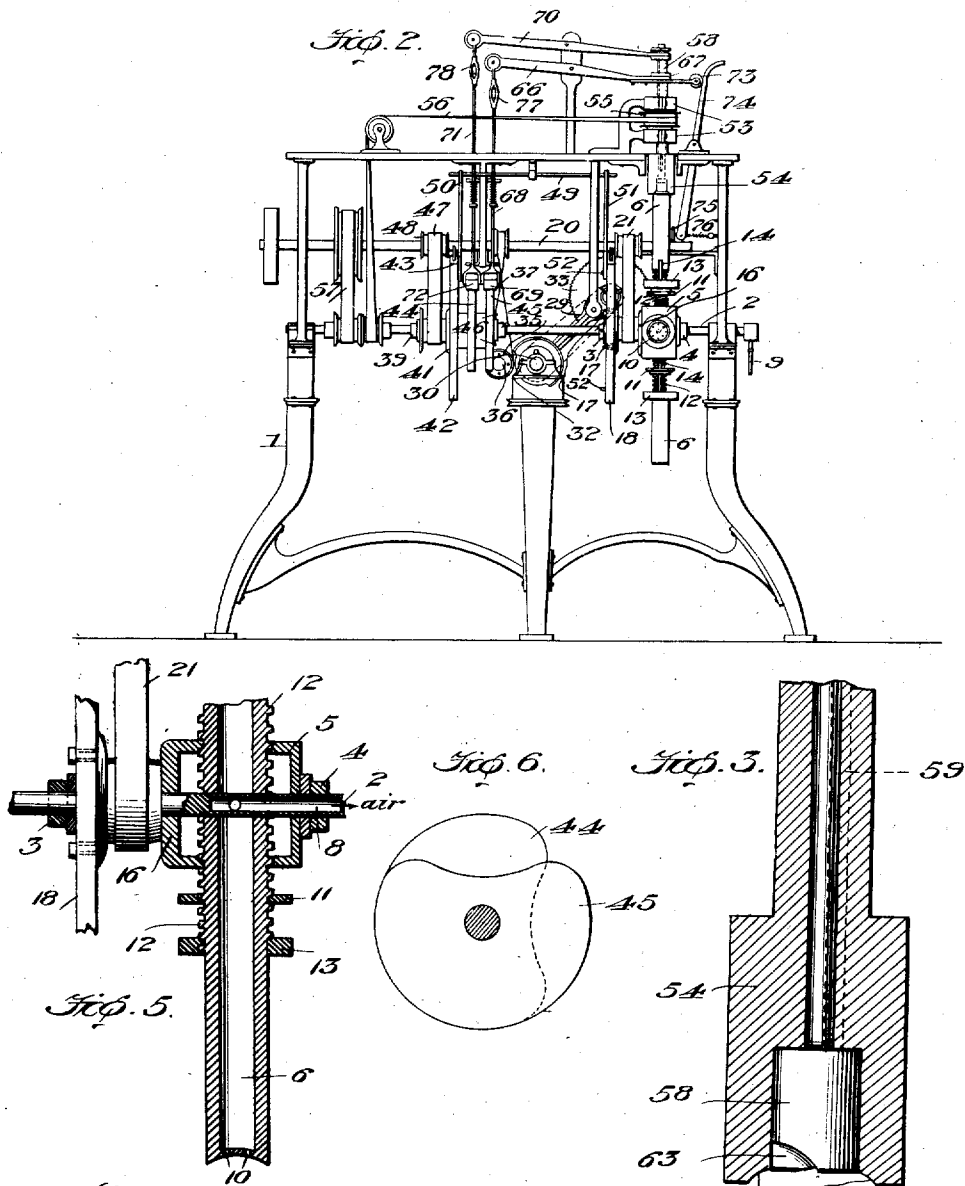
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UNITED STATES PATENT OFFICE.

HENRY AUCHU, OF EMPORIUM, PENNSYLVANIA.

MACHINE FOR MAKING PAPER CARTRIDGES OR SHELLS.

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Specification of Letters Patent.

Patented Feb. 27, 1912.

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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 Making Paper Cartridges or Shells, of which the following is a specification.

This invention relates to machines for making paper cartridges or shells.

Explosive gelatin, dynamites, and other high explosives, are commonly incased in shells or cartridges of suitably prepared paper for convenient handling, safety, protection against deterioration, and other purposes.

The present invention relates to machinery for the formation of shells of the character set forth and has for its object the provision of a novel automatic machine which will be adapted to receive from any approved type of spiral wind continuous tube-forming machine, a tubular continuous paper tube which is to be transformed into a cartridge or shell, to automatically sever the tube at a predetermined time, operate on said severed tube to crimp or form an end thereof and to automatically eject the finished shell ready for filling thereof by hand or machinery with the explosive so that the dynamite cartridge may be subsequently closed at the open end thereof.

In my invention, the continuous tube of paper which is formed by any approved machine, is presented to one of a series of rotatably mounted mandrels of my machine and at a time predetermined by its feed, automatically operates mechanism releasing a saw which severs the continuous tube, thereby cutting off the shell therefrom; thereafter the mandrel which has received the shell is automatically turned into a position where novel folding or crimping mechanism closes the outer open end of said shell and, preferably, mechanism is also used which stamps the shell with its designating characters or trade-mark, the cutting saw meanwhile having been restored to its normal position ready for a repetition of the operation on another section of the continuous paper tube which has been received on a succeeding mandrel, and the finished shell is finally automatically discharged from its mandrel, preferably by the use of air pressure which is introduced against the folded end thereof at a predetermined time.

In the accompanying drawings: Figure 1 is a front elevation of the machine; Fig. 2, a side elevation; Fig. 3, a longitudinal partial section of the folding and crimping plungers; Fig. 4, an end view thereof; Fig. 5, a sectional detail showing the interior construction of the mandrels, whereby the shell is discharged; and Fig. 6, a detail of the cam arrangement for operating the folding and crimping mechanism.

The machine frame 1 supports a fixed shaft 2 on which is rotatably mounted, between set collars 3 and 4, the hub 5 of the mandrel wheel which is composed of said hub and a plurality, four in the present instance, of hollow mandrels 6, whose inner ends rest against the shaft 2, being packed in any desired fashion, in position to communicate, at a certain point of their revolution on shaft 2, with an opening 7 (Fig. 5) which communicates with the hollow interior 8 of said shaft 2, and receives air pressure which is admitted to the interior of the shaft 2 via the pipe 9 (Fig. 2). In consequence, when a given mandrel has its interior in line with the ports 7, the air pressure enters the mandrel and presses against the shell contained thereon and effects its discharge, a plurality of openings 10 being provided in the end of each mandrel to distribute the air against the closed or crimped end of the shell. Each of the mandrels is provided with an adjustable nut or collar 11, whose adjustment can be effected by providing screw-threads 12 on the mandrel, or, said collar or nut can be provided with a set screw and the screw-threads be dispensed with. Slidable on the mandrel is a gage collar 13 which may be provided with a spline to slip in a slot 14 in the mandrel (Fig. 2).

The gage 13 forms a movable abutment for the free end of the continuous paper tube 15 which is of slightly greater interior diameter than the diameter of the mandrel and is formed by any suitable spiral wind machine, such as "A," which forms no part of my invention except in its association with my machine, whereby the continuously formed tube of the machine A is advanced and telescopes over the mandrel 6 until it strikes against the gage 13, and, by its advance, moves the gage until it contacts with the set collar 11, whose adjustment regulates the length of the shell which will be cut off.

The hub 5 is provided with an integral belt pulley 16 which is connected by an ad-

justable slot and bolt fastening 17 to a ratchet wheel 18. By employing the adjustable connection 17, the ratchet wheel 18 can be set and clamped so that the functions of the machine will be properly timed. The ratchet wheel has teeth 19 corresponding in number to the number of mandrels employed. Various mechanisms of the machine are driven by a shaft 20, said shaft being belted at 21 to the pulley 16.

Pivoted to a part of the frame-work 1 is a dog 22 having a toe 23 adapted to engage the teeth 19 of the ratchet wheel 18 and provided with a tail 24. Slidable in bearings on the frame is a trip bar 25 which is normally actuated by a spring 26 to hold its free end 27 in position to engage a lug 28 on a drop saw frame 29, which is loosely journaled on a shaft 30 and carries a mutilated friction wheel 31, the friction wheel being secured to the frame 29 by an adjustable slot and belt connection 32 whereby it can be adjusted in relation to the saw frame 29 to regulate the operation thereof. The saw frame carries a rotary saw 33 which is belted to a pulley 34 secured to the shaft 30, whereby the saw is continuously driven at a high rate of speed.

The numeral 35 designates a friction pinion on a shaft 36 which is continuously driven by a belt 37 from shaft 20, said pinion being positioned with its friction face just out of engagement with the wheel 31 when the saw frame is caught and held by rod 25 after being raised. It will be understood that a gang of saws adapted to operate in a step-by-step manner could be used instead of a single saw.

When the paper tube 15 pushes the gage 13 from the normal position shown in dotted lines until it strikes the depending arm 38 connected to the bar 25, the bar 25 is pushed back from its normal position, thereby releasing the engagement thereof with the lug 28, whereupon the saw frame 29 drops by gravity, the saw 33 quickly severing the paper tube 15 and thus cutting off a section to be subsequently used as a shell. After severing the tube the frictional face of greater radius of the pulley 31 engages with the pulley 35, whereupon the saw frame is rapidly elevated to normal raised position and just before it resumes its engagement with the end 27, it bears against the tail 24 of the dog 22 and releases the toe 23 of said dog from the tooth 19 with which said toe was previously engaged. The pulleys 31 and 35 disengage just before the lug 28 and rod 25 become engaged.

The belt 21 is sufficiently loose so that it will continuously rotate around the pulley 16 while the ratchet wheel 18 and the mandrel wheel are locked but immediately upon the release of the toe 23 from the tooth 19, the frictional engagement of the belt 21

with pulley 16 becomes sufficient to cause rotation of the ratchet wheel 18 and the set of mandrels so that the mandrel carrying the severed shell is turned in the direction of the arrow from a horizontal to a vertical position ready for the crimping or folding of the end of the shell.

Loosely rotatable on the shaft 2 and located between set collars 39 and 40 (Fig. 2) is a belt pulley 41, a ratchet wheel 42 having a single tooth 43, and two cams 44 and 45 (Fig. 6) which are connected by slot-and-bolt connections 46 with the ratchet wheel so that they can be adjusted in relation to each other and hence the crimping, folding and stamping mechanisms operated thereby may be timed to suitably act. To rotate the pulley, ratchet wheel, and cams, all of which are securely clamped together, there is provided a belt 47 which runs over a pulley 48 on the shaft 20.

Journalled in suitable bearings on the main frame is a rock shaft 49 having arms 50 and 51, the former being adapted to engage with the tooth 43 to normally lock the ratchet wheel 42 and the cams 44 and 45 against rotation. The ratchet wheel 18 carries trip pins 52, suitably positioned, which are adapted to engage the arm 51 immediately after the release of the ratchet wheel 18 by the dog 22.

The belt 47 is adapted to slip while the ratchet wheel 42 is locked by the arm 50, but immediately upon the rocking of the shaft 49 by the engagement of one of the pins 52 with the arm 51, and consequent release of the ratchet wheel 42, the tension of the belt 47 is such that motion will be immediately transmitted to the pulley 41 and the cams 44 and 45 will turn a complete revolution, being again stopped by the engagement of the arm 50 with the tooth 43, such complete revolution of the cams 44 and 45 occurring during a quarter revolution of the ratchet wheel 18 and the arrangement being such that the cam 45 will have a slight lead over the cam 44 for the purpose of crimping the end of the shell and operating the stamping and clamping mechanism slightly in advance of folding and pressing the center part of the end.

Journalled in suitable bearings 53 on the upper part of the frame is a crimping plunger 54 (Figs. 3 and 4) on which is loosely splined a driving belt pulley 55 which is continuously operated by belting 56 and 57 from the shaft 20. Slidable lengthwise within the crimping plunger 54 is a folding plunger 58 which is loosely splined at 59 to the plunger 54 so that the two plungers always rotate together, but they are relatively movable longitudinally. The plunger 54 is provided with a spiral concaved end 60 (Fig. 4) which is adapted to engage the end of the shell and crimp it sufficiently

so that it will be in proper condition to be folded and finished by the end of the plunger 58. The crimping operation starts at 61 and ends at 62, and thereupon the spiral 5 concaved end 63 of the plunger 58 starts the folding operation beginning at 64 and completes it at the center of the end of the shell as shown at 65. To effect these operations, I provide a pivoted rocker 66 which is 10 engaged at 67 with the plunger 54 and has a spring-actuated rod 68 provided with a roller 69 which is adapted to engage the cam 45. A similar arrangement of elements 70, 71 and 72 causes operation of the 15 plunger 58 from the cam 44. The rocker 66 is provided with an extension having a roller as shown at 73 adapted to engage a lever 74 provided with a combined stamp and clamp 75 and retracted by a spring 76, the 20 stamp 75 bearing suitable wording which is intended to be printed on the shell and, while effecting the printing operation, serving as a clamp to prevent the shell from twisting on the mandrel and also to lock 25 the mandrel wheel against backward turning. The operations are timed so that the cam 45 raises the roller 69 out of the dwell of said cam, causes the crimping plunger 54 to be lowered onto the free end of the shell 30 which is presented thereto and immediately thereafter, the lever 74 is operated and the stamp and clamp 75 performs its function. Very shortly after the crimping operation, thus described, has been effected, the roller 35 72 is lifted out of the dwell of cam 44 and the plunger 58 is depressed inside of the plunger 54 and takes hold of the crimped end of the shell and folds it against the end of the mandrel. In order that nice adjustment may be had, I provide rods 68 and 71 with turn buckles 77 and 78.

The sequence of operations is as follows: The continuously forming tube 15 is fed onto the mandrel 6, engages the gage 13 and 45 presses it until the gage strikes the arm 38, whereupon the saw frame 29 is released and the rapidly rotating saw drops onto the paper tube and severs it. Thereupon the friction wheel 31 engages the friction pinion 35 and the saw is returned to normal position and re-locked by the engagement of the parts 27 and 28 ready for a subsequent operation, but in returning to normal position, the lug 28 engages the tail 24 of the 50 dog 22 and throws the toe 23 out of engagement with the tooth 19 of ratchet wheel 18, whereupon the belt 21 rotates the mandrel wheel to bring the shell to vertical position ready for crimping and folding, but in rotating, the pin 52 strikes the arm 51 and causes release of the ratchet wheel 42, whereupon the belt 47 rotates the ratchet wheel 42 and the cams 44 and 45. When the mandrel wheel has turned the quarter revolution 65 set forth, the toe 23 engages a succeeding

tooth 19 so that the mandrel wheel does not turn farther, but the crimping, stamping and folding operations are then perfected. In the meanwhile another length of the tube 15 having struck the gage 13 of the 70 mandrel which was previously lowermost, that gage is pushed inwardly and the saw again released and the foregoing operations are repeated, but the rotation of the cams 44 and 45 has in the meanwhile brought the 75 dwells thereof in position so that the rollers 69 and 72 drop into said dwells and the crimping and folding operations having been completed, the plungers 54 and 58 are raised from the crimped and folded end of 80 the shell so that the next quarter revolution of the mandrel wheel will bring the finished shell to a position diametrically opposite to that in which it was located when being severed from the tube 15. The next quarter 85 revolution of the mandrel wheel brings the shell into its lowermost position, whereupon the gage 13 falls by gravity and the compressed air having been admitted to the mandrel when in that position, the shell is 90 blown off.

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

1. In a machine for making shells, the 95 combination of a shell holder adapted to receive a continuous tube, a severing device adapted to automatically cut off the tube to define the shell, and automatically acting means for thereafter closing the end of the 100 shell.

2. In a machine for making shells, the combination of a movable shell holder adapted to receive a continuous tube when in a given position, a severing device adapted 105 to cut off the tube to define the shell, and automatically acting means for closing the end of the shell after the shell holder has been moved to another position.

3. In a machine for making shells, the 110 combination of a movable shell holder adapted to receive a continuous tube, means for automatically moving said shell holder at predetermined times, an automatically acting severing device adapted to cut off the 115 tube at predetermined times to define the shell, and means for automatically closing the end of the shell after the shell holder has been moved to another position.

4. In a machine for making shells, the 120 combination with a shell holder adapted to receive a continuous tube, an automatic severing device adapted to cut off the tube to define the shell, automatic means adapted 125 to close the end of the shell, and automatic means adapted to thereafter blow the finished shell from the shell holder.

5. In a machine for making shells, the combination with a plurality of movable 130 mandrels adapted for the reception of tubu-

lar shells, slipped thereover of means for successively moving said mandrels step by step, means for feeding tubular shells to said mandrels in succession, automatic means adapted to close the ends of the shells at predetermined times as the mandrels are successively brought into coöperative relation thereto, and means for automatically blowing the shells from the mandrels at predetermined times after the ends of the shells have been closed.

6. In a machine for making shells, the combination with a plurality of movable mandrels adapted to successively receive a continuous tube fed thereto by any suitable means, of an automatic severing device adapted to cut said tube at a predetermined time, means for successively moving said mandrels step by step, said mandrels being adapted to receive and hold the shells in succession, automatic means adapted to close the ends of the shells at predetermined times as the mandrels are successively brought into coöperative relation thereto, and means for automatically blowing the shells from the mandrels at predetermined times after the ends of the shells have been closed.

7. In a machine for making shells, inner and outer shell end forming members each having a spiral former at its end, said members being relatively axially movable and adapted to twist and close the end of the shell.

8. In a machine for making shells from a continuous tube, the combination with a shell holder adapted to receive the end of the continuous tube, of a severing device mounted to move in but one plane adapted to cut the tube to define the shell, means co-operating with the severing device which is

actuated by the movement of the tube at a predetermined time to cause operation of the severing device, and means adapted to immediately restore the severing devices to normal position after operation thereof.

9. In a machine for making shells, the combination with a shell holder adapted to receive a continuous tube, of a swinging gravitally acting cutter mounted to move in but one plane adapted to sever the tube to define the shell held by the shell holder, trip mechanism for holding said cutter in poised position which is adapted for release at a predetermined time by the movement of the continuous tube, means for rotating the cutter, and means automatically thrown into action after severing of the tube for restoring the cutter to normal position.

10. In a machine for making shells, the combination with a shell holder adapted to receive a continuous tube, of a swinging gravitally acting cutter adapted to sever the tube to define the shell held by the shell holder, trip mechanism for holding said cutter in poised position which is adapted for release at a predetermined time by the movement of the continuous tube, means for rotating the cutter embodying a mutilated friction wheel carried by the swinging cutter and a driving friction wheel co-related thereto so that after the severing operation the mutilated friction wheel engages the driving friction wheel and the cutter is thereby automatically restored to normal position.

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

HENRY AUCHU.

Witnesses:

M. L. NEWCOMB,
WM. C. HEMPHILL.