

(No Model.)

2 Sheets—Sheet 1.

H. O. WHITNEY.
TUBE CUTTING MACHINE.

No. 460,317.

Patented Sept. 29, 1891.

Fig 1

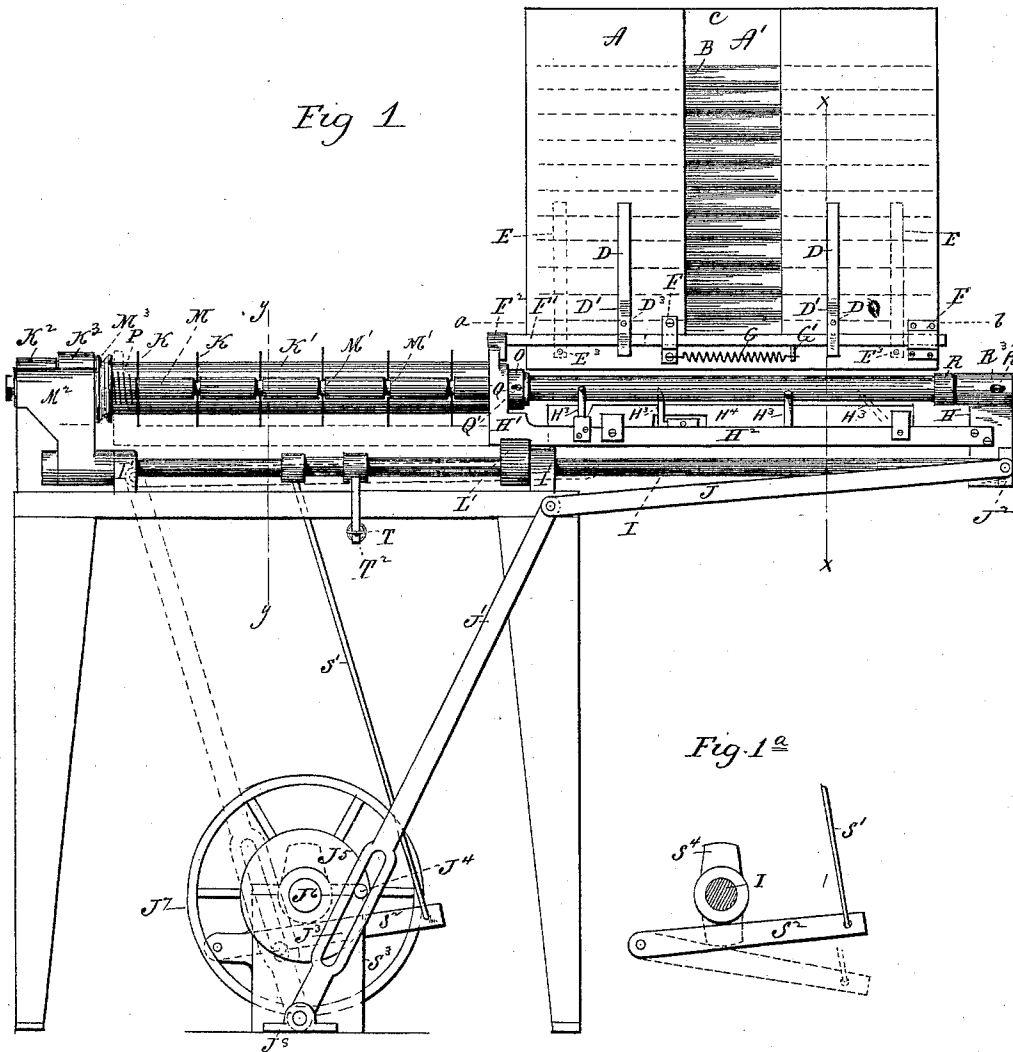


Fig 1^2

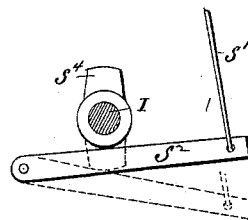
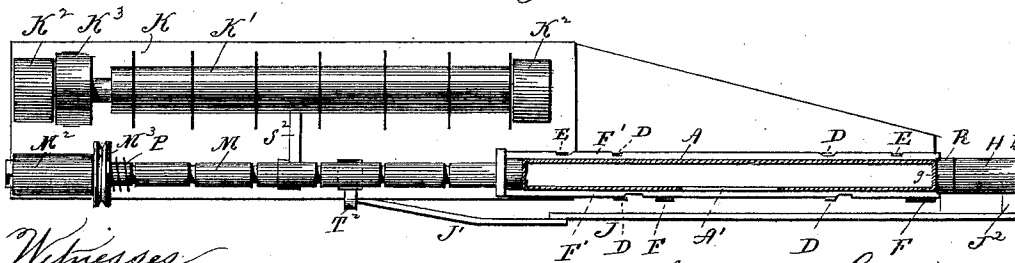


Fig 2



Witnesses
J. H. Shumway
William D. Kelby

Harry O. Whitney
Inventor
By J. Earl Seymour

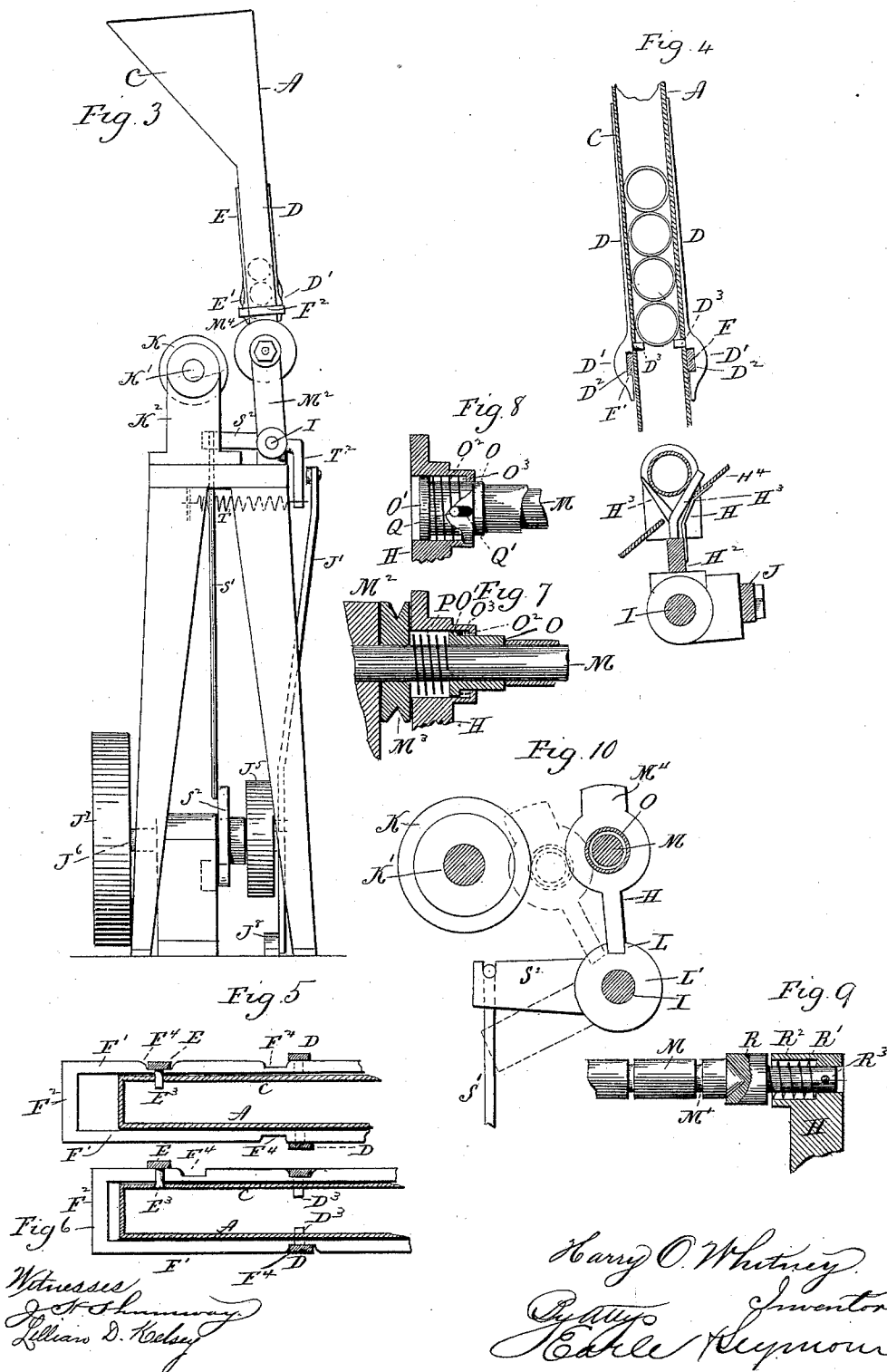
(No Model.)

2 Sheets—Sheet 2.

H. O. WHITNEY.
TUBE CUTTING MACHINE.

No. 460,317.

Patented Sept. 29, 1891.



UNITED STATES PATENT OFFICE.

HARRY O. WHITNEY, OF NEW HAVEN, CONNECTICUT, ASSIGNOR TO THE
WINCHESTER REPEATING ARMS COMPANY, OF SAME PLACE.

TUBE-CUTTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 460,317, dated September 29, 1891.

Application filed May 18, 1891. Serial No. 393,161. (No model.)

To all whom it may concern:

Be it known that I, HARRY O. WHITNEY, of New Haven, in the county of New Haven and State of Connecticut, have invented a new Improvement in Tube-Cutting Machines; and I do hereby declare the following, when taken in connection with accompanying drawings and the letters of reference marked thereon, to be a full, clear, and exact description of the same, and which said drawings constitute part of this specification, and represent, in—

Figure 1, a view in front elevation of a machine constructed in accordance with my invention; Fig. 1^a, a detached broken view showing the cam, the lever, and the draft-rod, which co-operate to rock the tube receiver or carriage to bring the tube under the action of the gang of rotary cutters; Fig. 2, a view showing the body of the machine in plan and the hopper in horizontal section on the line *a b* of Fig. 1; Fig. 3, a view of the machine in end elevation from the outer end of the hopper; Fig. 4, a view of the hopper and the tube receiver or carriage in vertical section on the irregular line *x x* of Fig. 1; Fig. 5, a broken view of the hopper in a horizontal section on line *c d* of Fig. 1, showing the delivering-frame for operating the delivering-springs in its projected position, in which the column of tubes in the hopper is sustained by the lower pins; Fig. 6, a similar view with the said frame in its retired position, in which the column of tubes in the hopper is sustained by the upper pins; Fig. 7, a view in vertical section on line *e f* of Fig. 2, showing the tube-adjusting sleeve and the springs employed for securing the final adjustment of the tubes on the grooved tube-arbor; Fig. 8, a similar but less complete view showing the retraction of the tube-adjusting sleeve by the lighter spring; Fig. 9, a view in vertical section of the tail-stock on the line *g h* of Fig. 2, the said view also showing the extreme end of the grooved tube-arbor; Fig. 10, a view in transverse section on line *y y* of Fig. 1, and showing by broken lines the positions of the tube receiver or carriage and the tube-arbor when they are rocked to bring the tube into contact with the rotary cutters. Figs. 4 to 10, inclusive, are drawn to a larger scale than the preceding figures.

My invention relates to an improved machine for cutting blank tubes into the short lengths required for paper-shell cartridges, the object being to provide a simple and effective automatic machine having a large capacity for work.

With these ends in view my invention consists in an automatic machine having certain details of construction and combinations of parts, as will be hereinafter described, and pointed out in the claims.

The hopper of the machine is provided with a straight front wall A, slightly inclined from the perpendicular and having a central vertical opening A', extending from its upper to its lower edge to permit the charge of tubes B within it to be observed. The rear wall C of the hopper is carried rearwardly at its upper end to secure capacity therein; but at its lower end it is made parallel with the front wall to form a neck or throat adapted in its dimensions to permit a single column of tubes to pass downward through it freely, but with little opportunity for play in any direction. Two pairs of upright springs D, D are respectively attached by their upper ends to the front and rear walls of the hopper. Each of these springs is provided at its free lower end with an enlargement or head D', carrying an inwardly-projecting pin D³ and having a horizontal transverse slot D² formed in its inner face. The said pins project through suitable perforations in the walls of the hopper into the throat or neck thereof, so as to engage with the column of tubes therein. Two corresponding springs E, E, secured to the rear wall of the hopper near the ends thereof, are provided at their lower ends with corresponding slotted heads or enlargements E', having transverse horizontal slots E² in their inner faces and provided at their lower ends with pins E³, projecting through perforations in the rear wall of the hopper into the throat thereof. These springs D and E, I shall hereinafter speak of as "delivering-springs," inasmuch as their function is to successively deliver the tubes from the hopper. The springs constitute movable supports for the pins. A delivering-frame attached to the lower end of the hopper in bearings F F, in which it reciprocates, consists of

two side bars F' F', united at their outer ends by a cross-piece F², which I shall hereinafter call a "bumper," the said bars respectively extending along the front and rear walls of the hopper. The outer faces of the said side bars are provided with cam-recesses F³, appropriately located to co-operate with the heads D' of the respective springs D, the said bars being entered into the slots D², formed in the inner faces of the said heads. The rear side bar is also provided with two cam-recesses F⁴, arranged for co-operation with the heads E' of the two springs E. A spiral spring G, attached to the delivering-frame through a pin G' depending from the forward side bar thereof and also connected with the inner bearing F of the said frame, is provided for automatically throwing the same into its projected position. From the hopper the tubes are successively dropped into a movable tube-receiver consisting, essentially, of a tail-stock H, a head-block H', and two parallel horizontal bars H² H², forming a connection between the said stock and block and four fingers H³, connected with the bars H² at suitable points in the length thereof, extending upward therefrom, and diverging, as shown in Fig. 4 of the drawings, to receive the tubes. While I have shown only four of these fingers more may be employed, if desired. The said tube-receiver is also provided with a fender H⁴ inclining rearward and adapted to direct the short lengths into which the tubes are cut into the receptacle provided for them. The said tail-stock is mounted so as to slide freely upon a shaft I, journaled in bearings I' I' and adapted to be turned therein, as will be hereinafter described. The tube-receiver is reciprocated upon the projecting outer end of the said shaft by means of two levers J J', the former having its outer end attached to a small block J², connected with the foot of the tail-stock H in such a manner as to permit the same to rock independently of it. The inner end of the said lever J is connected with the upper end of the lever J', the lower end whereof is hinged to a foot J³, bolted to the floor on which the machine stands. The said lever J' is enlarged toward its lower end and constructed with a longitudinal slot J³, receiving a pin J⁴, mounted in a wheel J⁵, which is secured to a shaft J⁶, driven from a pulley J⁷. (See Fig. 3.)

By means of the operating connections just described the tube-receiver is reciprocated back and forth under the hopper and in front of the gang of rotary cutters K, which are mounted at equal distances apart upon a shaft K', journaled in bearings K² K² and furnished with a driving-pulley K³, driven from any convenient source of power. When constructed to be reciprocated as described, the tube-receiver virtually forms a carriage. The head-block H' of the tube receiver or carriage is set into a groove L, formed in a collar L', (see Fig. 10,) rigidly attached to the shaft I, the said block sliding back and forth with

the tube-receiver in the said groove. The said head block is provided with a horizontal cylindrical chamber M, which receives, as the tube receiver or carriage is moved back and forth, a tube-arbor N, located in line with the same and constructed throughout its length with annular grooves M', which are spaced in accordance with the spacing of the cutters K, which they receive, the said arbor being journaled at one end in an upright bearing M², rigidly secured to the projecting end of the shaft I, with which it rocks, so that the arbor and carriage are together deflected toward the cutters. The bearing M², as will be seen by reference to Fig. 2, is made long enough to afford ample support for the tube-arbor, which is provided at a point close to the inner face of the bearing with a pulley M³, receiving a belt (not shown) driven from any convenient source of power. The head-block is also provided with a finger M⁴, arranged to engage with the bumper F² of the delivering-frame, so as to push the same back into its retired position, and thus operate the springs E E in delivering a tube to the carriage. The head-block is further provided with a tube-adjusting sleeve O, corresponding in diameter to the diameter of the tubes to be cut and furnished at its inner end with a flange O', which retains in place a light spiral spring O², interposed between the said flange and the outer wall O³ of the chamber M. A heavier spiral spring P, also located in the said chamber, but on the outside of the flange O' of the sleeve O, is provided for overcoming the tension of the spring O² and projecting the sleeve when its outer end is brought into engagement with the adjacent face of the pulley M³, as shown by Fig. 7 of the drawings. A pin Q, mounted in the said sleeve, projects through a horizontal slot Q' formed in the block and limits the sliding movement of the sleeve, and also prevents the same from rotating. The particular offices of the said sleeve and spring will be set forth later on. The free or outer end of the grooved tube-arbor is slightly pointed to adapt it to be centered in a corresponding recess formed in a small cylindrical head R, which is provided with a shank R', entering a horizontal opening formed in the upper end of the tail-stock. A spring R², encircling the said shank and located in a chamber formed for it in the tail-stock, provides for the required movement in the said head R, which is held against displacement by a pin R³ and a horizontal slot R⁴, as shown by Figs. 1 and 9 of the drawings. When the carriage has been brought into position in front of the cutters, both it and the arbor are rocked toward the same, so as to bring the tube upon the latter into contact with them by means of an arm S, (see Fig. 10,) rigidly connected with the rotatable shaft I, and having its outer end attached to a draft-rod S', connected at its lower end with a lever S², hung at its opposite end upon a standard S³, and engaged

midway of its length by a cam S^4 , mounted upon the shaft J^6 , before mentioned. When the cam S^4 depresses the lever S^2 , the same will operate, through its draft-rod S' and the arm S , to turn the shaft I , and thus tilt the carriage and arbor into the positions in which they are shown by broken lines in Fig. 10 of the drawings. The carriage and arbor are immediately restored to their normal or upright positions after being so tilted by means of a spring T , located under the bed T' of the machine and connected at its forward end with an arm T , (see Fig. 1.), rigidly attached to the shaft.

Having described in detail the construction of my improved machine, I will now proceed to set forth the mode of its operation.

The tubes upon being fed into the hopper will at once form into an upright column in the contracted lower end or throat thereof; the said column being supported by the engagement of its lower tube with the two inwardly-projecting pins E^3 of the two delivering-springs $E E$. When now the carriage is moved into position to receive a tube, the finger M^4 of its head-block will engage with the bumper F^2 of the delivering-frame and push the same back into its retired position against the tension of the spring G . As the spring is pushed back in this manner the cam-recesses $F^4 F^4$, formed in the outer face of the rear bar of the said frame, will operate to push the springs $E E$ outward, and so withdraw the two pins $E^3 E^3$ from under the column of tubes, releasing the lower tube of the column and permitting the same to drop into the spreading-fingers H^3 of the carriage. Directly after the cam-recesses $F^4 F^4$ have thus acted upon the springs $E E$ the cam-recesses F^3 will be brought into range with the springs D to permit the same to come together and shoot or project their pins D^3 under the column of tubes and temporarily support them. Now as the carriage moves out from under the hopper the finger M^4 of the head-block will be carried away from the bumper F^2 of the delivering-frame and permit the spring G to act in throwing the said frame into its projected position. This movement of the frame causes the inclined walls of the cam-recesses F^3 to spread the springs D and withdraw their pins D^3 from under the column of tubes and again brings the cam-recesses F^4 into range with the springs F^3 , which are thus permitted to project their pins E^3 under the column of tubes before any have time to drop out of the lower end of the hopper, the column being now supported by the lower pins E^3 . It will be noted that when the tubes are dropped into the carriage they are supported by the lower pins, which engage the tubes near their ends, whereby the tubes are dropped more evenly than they would be if they were supported when dropped from the pins engaging them nearer their central points. When the tube drops into the carriage, its respective ends just clear the

face of the cylindrical centering-head R and the outer end of the tube-adjusting sleeve O , there being just enough clearance between the said head and the end of the sleeve to permit the tubes to assume their positions in the carriage. When the tube is resting in the carriage, it is exactly in line with the grooved tube-arbor, over which it is "telescoped," so to speak, by the outward movement of the carriage, and just before they are tipped to bring the tube into contact with the rotary cutters the outer end of the spring P engages with the small pulley M^3 , whereby the said spring is compressed and the tube-adjusting sleeve shot outward to take up the clearance-space required to permit the tube to take its proper position in the carriage. As the sleeve is shot outward its outer end engages with the adjacent end of the tube and pushes the same outward until its opposite end is firmly seated against the face of the cylindrical centering-head R . It will be apparent that as all of the tubes are firmly seated against the said head before they are cut up it constitutes a gage for them and insures equality in the length of the short shell-sections, waste material, due to excessive length in the tubes, being cut off from their opposite ends. It will be understood, of course, that by the time the final adjustment of the tube on the tube-arbor takes place the pointed end of the said arbor has been entered into the recess in the said head. When all is ready, as has been described, the rotatable shaft is rocked and the tube brought into the range of the rotary cutters, whereby it is cut into short lengths. The spring T now operates to throw the arbor and tube-carriage back into their upright positions and the return movement of the carriage begins, the tube-sections dropping off from the free end of the tube-arbor as the carriage moves back under the hopper. Just before it reaches its final position under the same the finger M^4 of the head-block again engages with the bumper F^2 of the delivering-frame and operates, as before, to actuate the springs E and D thereof in dropping the lower tube of the column and in supporting the same momentarily by the upper pins.

My improved device may be operated with considerable speed and requires but one attendant, the work done by it being more accurate than when done by hand and at much less expense.

If desired, some changes may be made in the construction herein shown and described. Thus the tube-receiver may be made stationary and the arbor arranged to reciprocate instead of the reverse arrangement shown and described. In this case the gang of cutters would be located on one side of the hopper instead of in line with its inner end, as shown. Again, the cutters might be advanced to the tube-carriage and tube-arbor, instead of advancing the carriage and arbor to the cutters, or all of the said parts might be advanced toward each other. I would therefore have it

understood that I do not limit myself to the exact construction and arrangement of parts herein shown and described, but hold myself at liberty to make such changes and alterations as fairly fall within the spirit and scope of my invention.

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

10 1. In a machine for cutting blank tubes into short lengths for paper-shell cartridges, the combination, with a hopper, of a tube-receiver and a tube-arbor located in line with each other, respectively receiving the tubes from
15 the hopper and supporting them while being cut and one being longitudinally movable, a gang of cutters, and means for moving one or more of the devices to subject the tubes when on the arbor to the action of the cutters, substantially as described.

2. In a machine for cutting blank tubes into short lengths for paper-shell cartridges, the combination, with a hopper, of a tube-receiver and a tube-arbor, one of which is longitudinally movable, adjusting devices for
25 automatically adjusting the tubes on the arbor preparatory to cutting them, a gang of cutters, and means for moving one or more of the said devices to subject the tubes on the arbor to the action of the cutters, substantially
30 as described.

3. In a machine for cutting blank tubes into short lengths for paper-shell cartridges, the combination, with a hopper, of a tube-receiver and a tube-arbor, one of which is longitudinally movable, an adjusting-sleeve
35 mounted on the tube-arbor for adjusting the tubes thereupon preparatory to cutting them, a gang of cutters, and means for moving one or more of the said devices to subject the tubes on the arbor to the action of the cutters, substantially
40 as described.

4. In a machine for cutting blanks into short lengths for paper-shell cartridges, the combination, with a hopper, of movable pins projecting into the same at different elevations, a longitudinally-movable delivering-frame for
45 operating the upper and lower pins alternately, a tube-receiver into which the tubes are successively delivered from the hopper, a grooved tube-arbor supported at one end and arranged to carry the tubes when they are being cut, one of the devices last mentioned
50 being longitudinally movable, a gang of circular cutters, and means for moving one or more of the said devices to subject the tubes on the arbor to the action of the cutters, substantially as described.

5. In a machine for cutting blank tubes into short sections for paper-shell cartridges, the combination, with a hopper, of movable pins entering the lower end of the same at two
60 different elevations and carried by springs attached to the walls of the said hopper, a horizontally-movable delivering-frame having side bars respectively embracing the front and rear walls of the hopper and constructed

with cam-recesses arranged to alternately operate the springs respectively carrying the upper and lower pins, a tube-receiver into
70 which the tubes are successively delivered from the hopper, a tube-arbor located in line with the tube-receiver and supported from one end, one of the said two devices last mentioned being longitudinally movable, and a
75 gang of cutters, substantially as described.

6. In a machine for cutting blank tubes into short lengths for paper-shell cartridges, the combination, with a hopper, of laterally-movable pins entering the lower end of the same
80 at two different elevations and carried by springs attached to the walls of the said hopper, a horizontally-movable delivering-frame having its side bars constructed with cam-recesses arranged to operate the springs carrying the upper and lower pins alternately, a
85 movable tube receiver or carriage into which the tubes are successively delivered, co-operating with the said delivering-frame to move it in one direction, a spring for actuating the
90 frame in the opposite direction, a grooved tube-arbor mounted in a rocking bearing and located in line with the carriage which telescopes the blank tubes over it, and a gang of cutters, substantially as described.

7. In a machine for cutting blank tubes into short lengths for paper-shell cartridges, the combination, with a hopper, of a tube receiver or carriage and a grooved tube-arbor located
95 in line with each other, both having rocking bearings and one being longitudinally movable, means for successively delivering the tubes from the hopper to the tube-receiver, a gang of cutters, and means for rocking the said receiver and arbor toward the cutters,
100 substantially as described.

8. In a machine for cutting blank tubes into short lengths for paper-shell cartridges, the combination, with a hopper, a reciprocating and rocking tube receiver or carriage, means
110 for delivering the tubes successively from the hopper to the same, a grooved tube-arbor mounted in a rocking bearing and located in line with the said carriage, which telescopes the blank-tubes over it, a gang of cutters, a
115 rotatable shaft with which the carriage and rocking bearing are connected, and means for turning said shaft to tip the carriage and tube-arbor toward the said cutters, substantially as described.

9. In a machine for cutting blank tubes into short sections for paper-shell cartridges, the combination, with a hopper, of a reciprocating tube receiver or carriage consisting, essentially, of a tail-stock, a head-block, connection
120 between the lower ends of said block and stock, and upwardly-projecting diverging fingers secured to the said connection, a grooved tube-arbor located in line with the receiver or carriage and thus arranged to have
125 the tubes telescoped over it by the movement thereof, and a gang of cutters, substantially as described.

10. In a machine for cutting blanks into

short sections for paper-shell cartridges, a tube receiver or carriage having a tail-stock provided with a centering-head and a head-block provided with a tube-adjusting sleeve, 5 a spring for retracting the said sleeve to clear the tubes as they are dropped into the carriage, and a spring for projecting the said sleeve to force the tubes against the face of the centering-head, substantially as described. 10 11. In a machine for cutting blank tubes into short lengths for paper-shell cartridges, the combination, with a hopper, of a reciprocating and rocking tube receiver or carriage, 15 means for delivering the tubes successively from the hopper into the said receiver or car-

riage, a grooved tube-arbor located in line therewith and supported at one end in a swinging bearing, a rotatable shaft with which the tube receiver or carriage and the arbor are connected, a gang of rotary cutters, and 20 means for turning the shaft to move the carriage and the tube-arbor toward the said cutters, substantially as set forth.

In testimony whereof I have signed this specification in the presence of two subscrib- 25 ing witnesses.

HARRY O. WHITNEY.

Witnesses:

DANIEL H. VEADER,
A. W. EARLE.