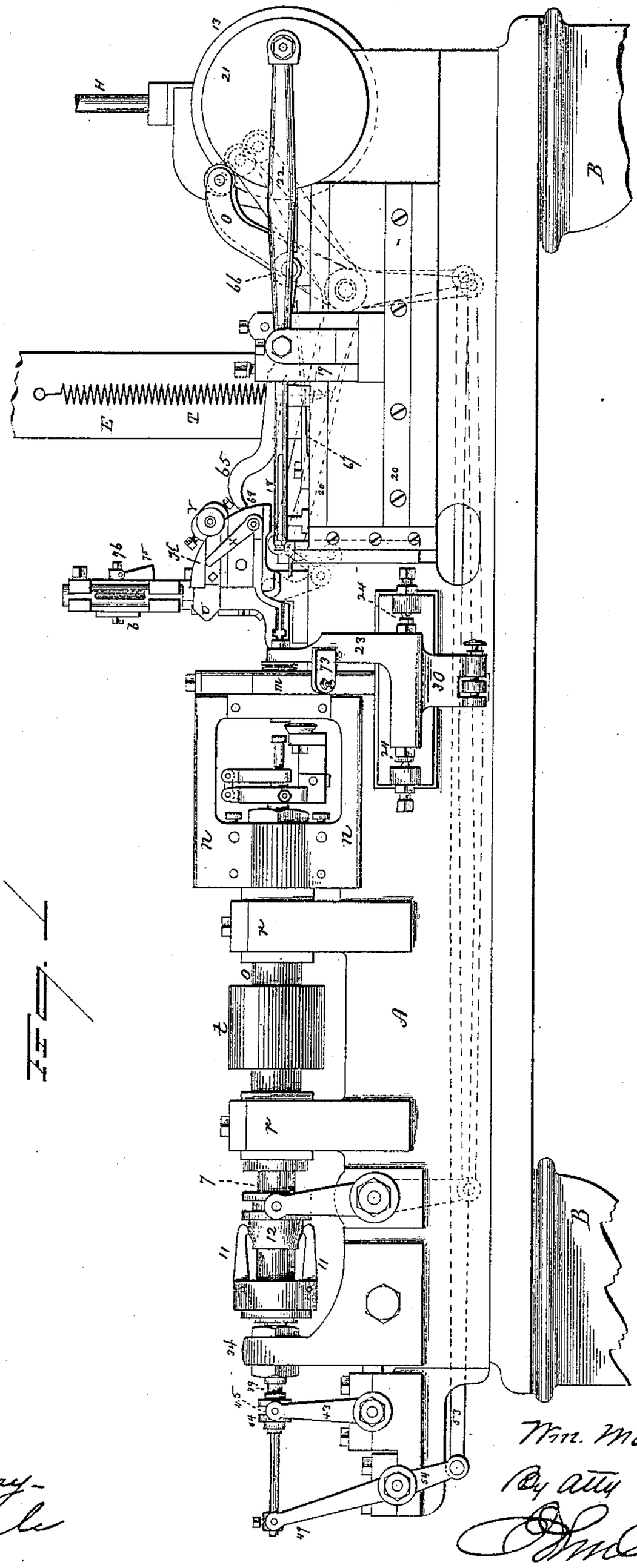
(No Model.) 8 Sheets—Sheet 1.

W. MASON.

MACHINE FOR TRIMMING CARTRIDGE SHELLS.

No. 323,180. Patented July 28, 1885.



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(No Model.) 8 Sheets—Sheet 2.

W. MASON.

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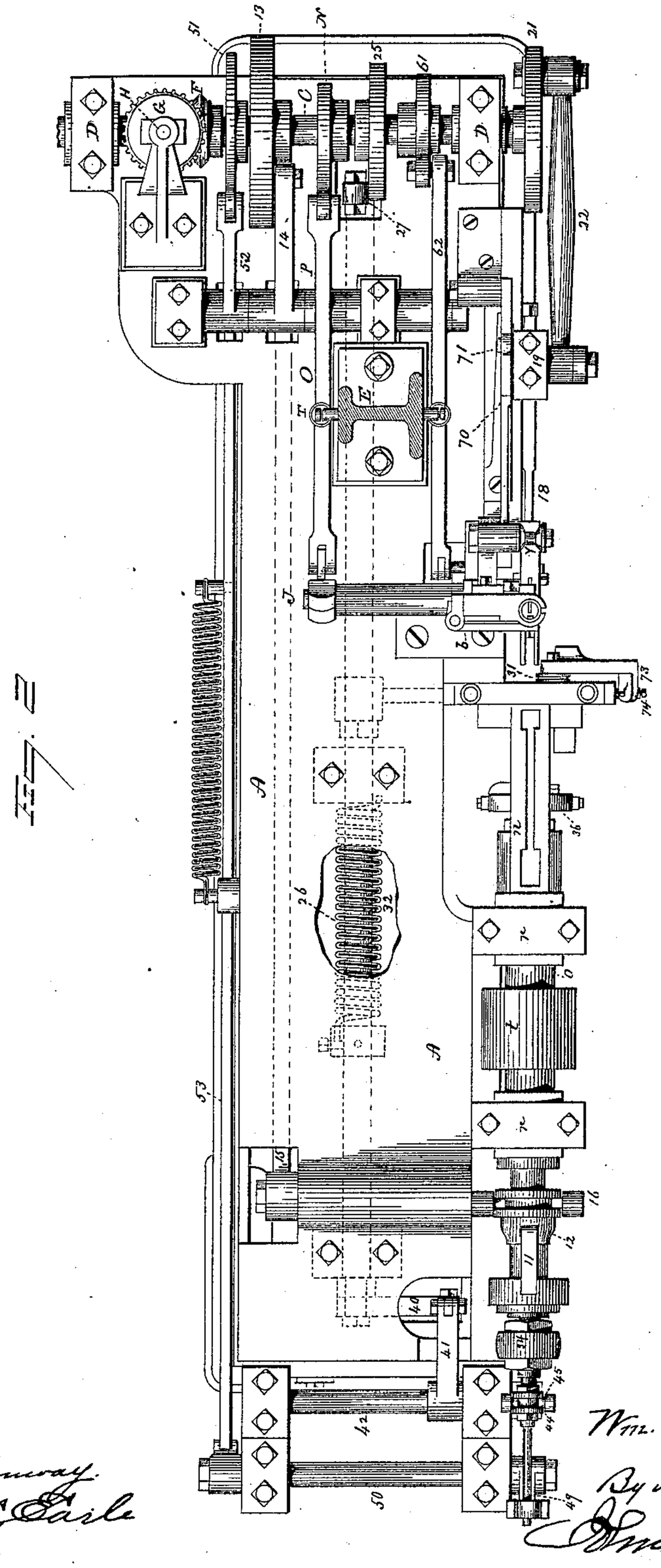

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(No Model.) 8 Sheets—Sheet 3.

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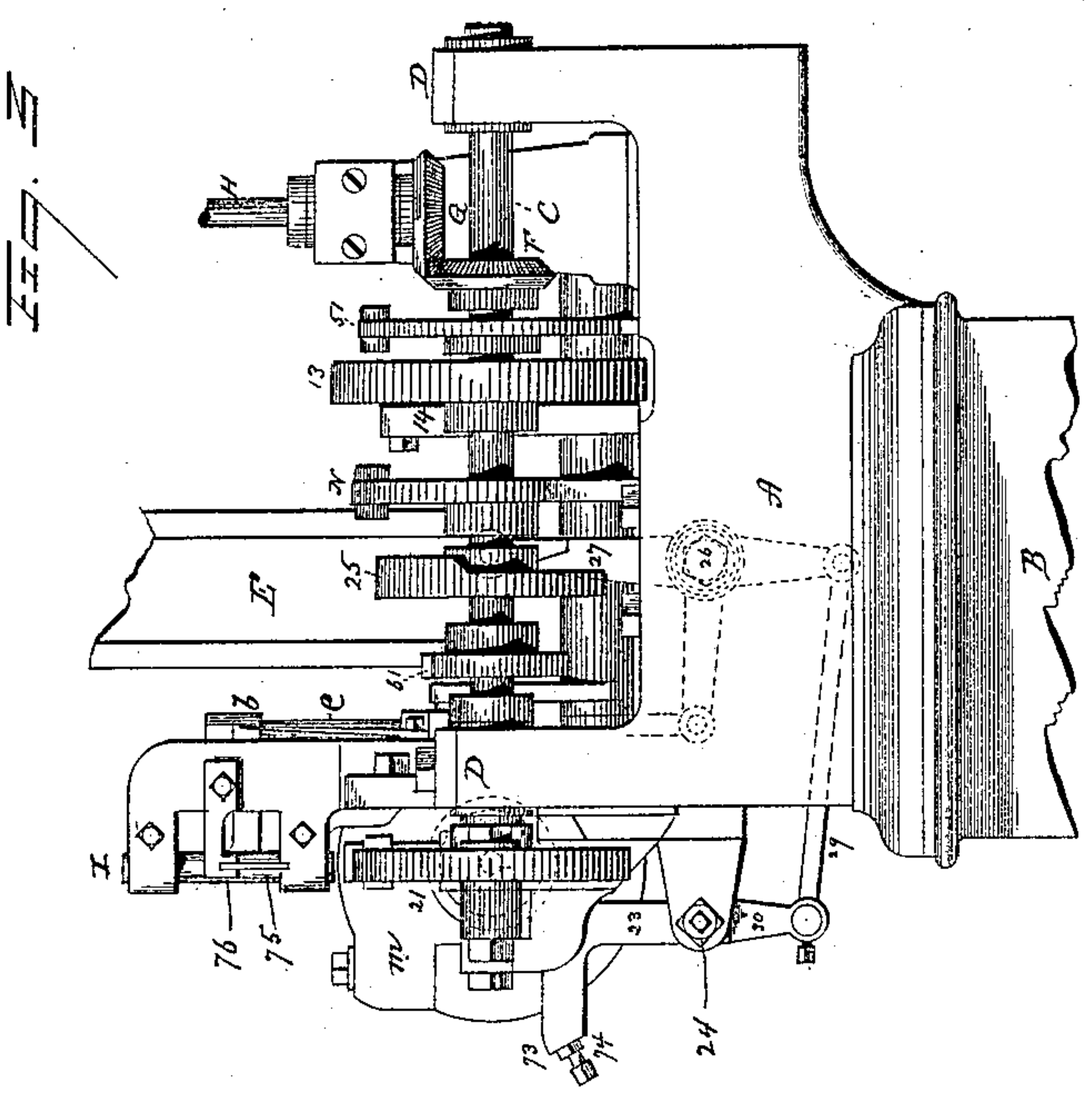

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(No Model.) 8 Sheets—Sheet 4.

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MACHINE FOR TRIMMING CARTRIDGE SHELLS.

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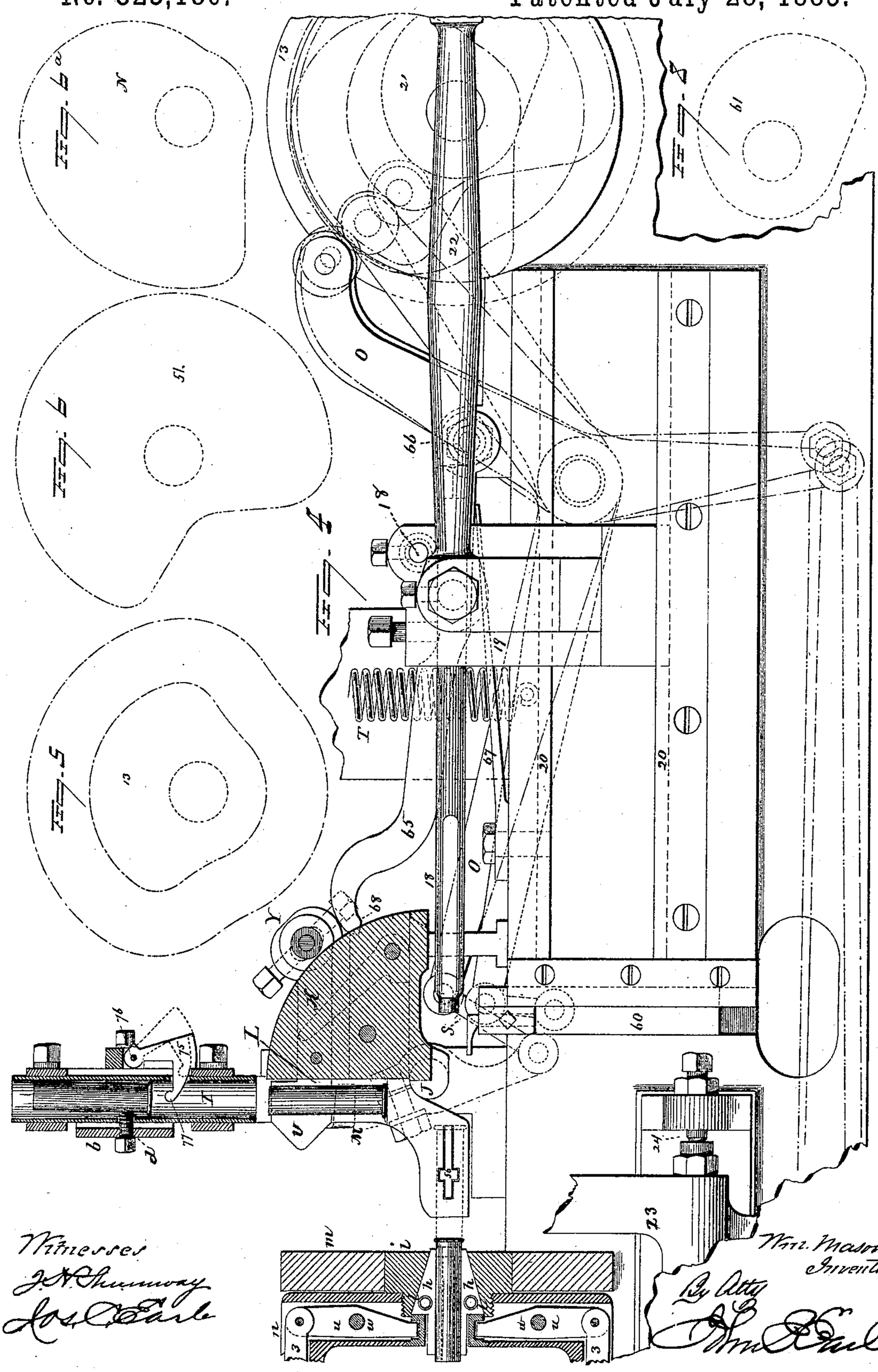

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W. MASON.

MACHINE FOR TRIMMING CARTRIDGE SHELLS.

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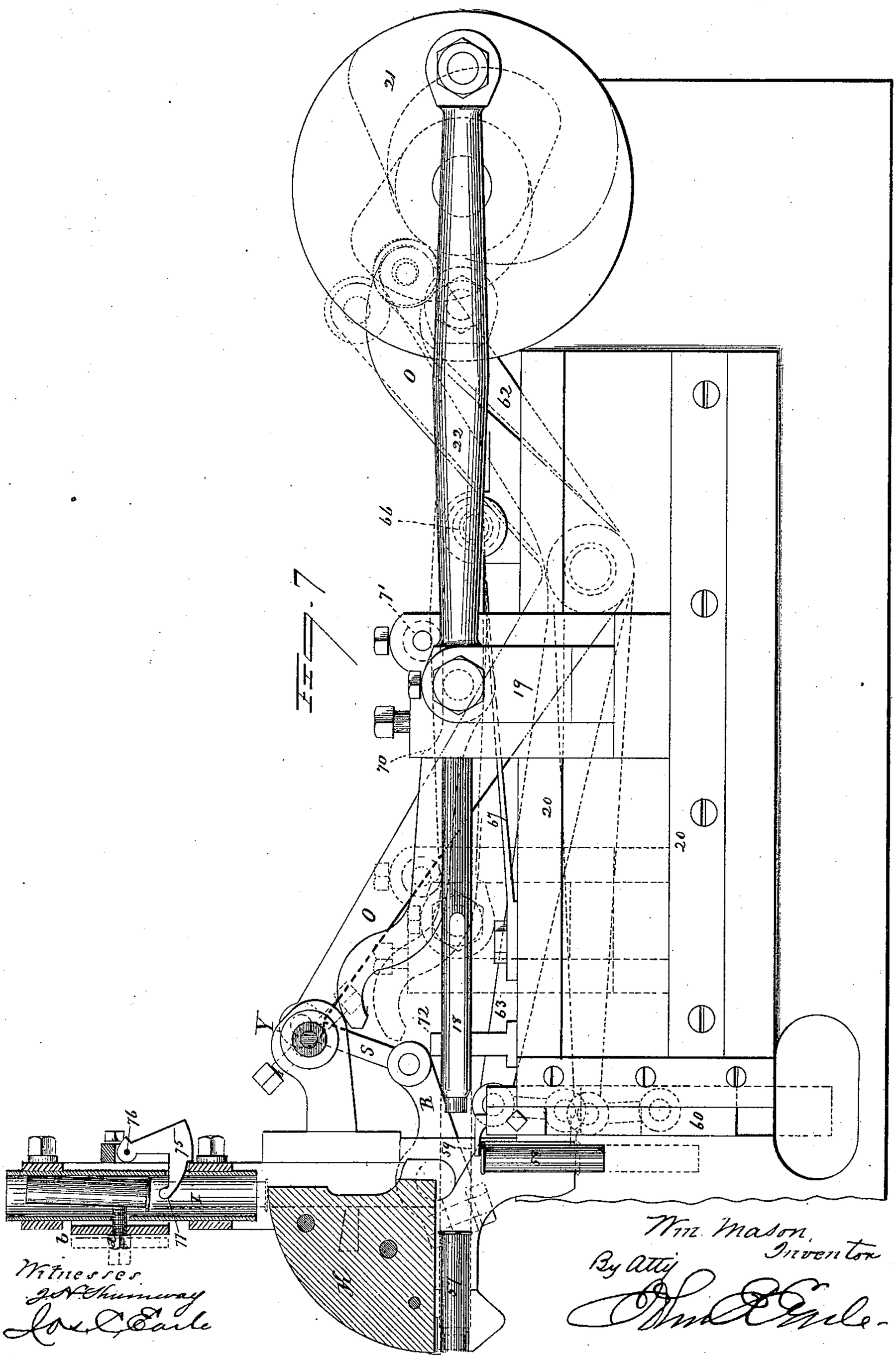

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W. MASON.

MACHINE FOR TRIMMING CARTRIDGE SHELLS.

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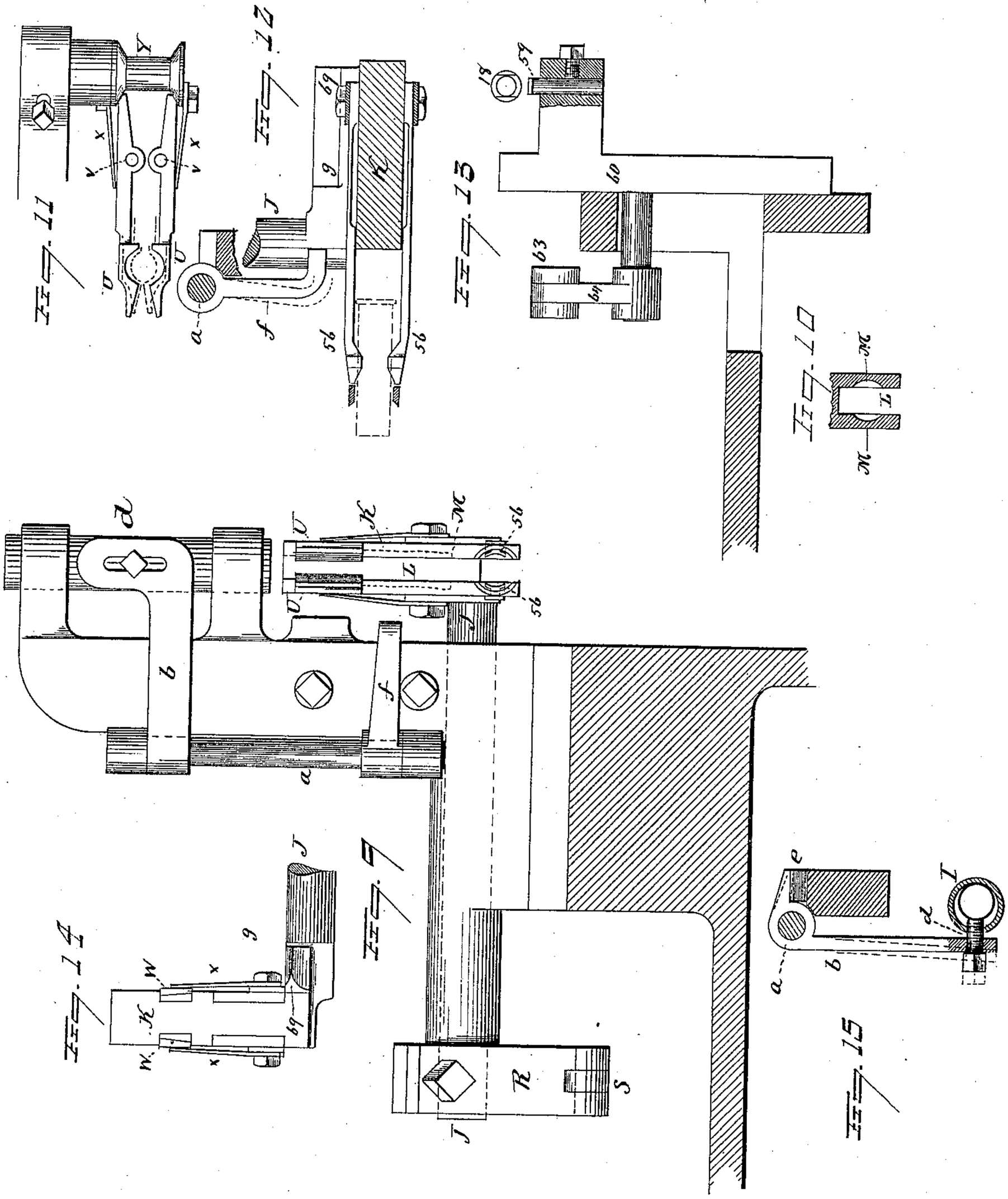

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(No Model.)

8 Sheets—Sheet 7.

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MACHINE FOR TRIMMING CARTRIDGE SHELLS.

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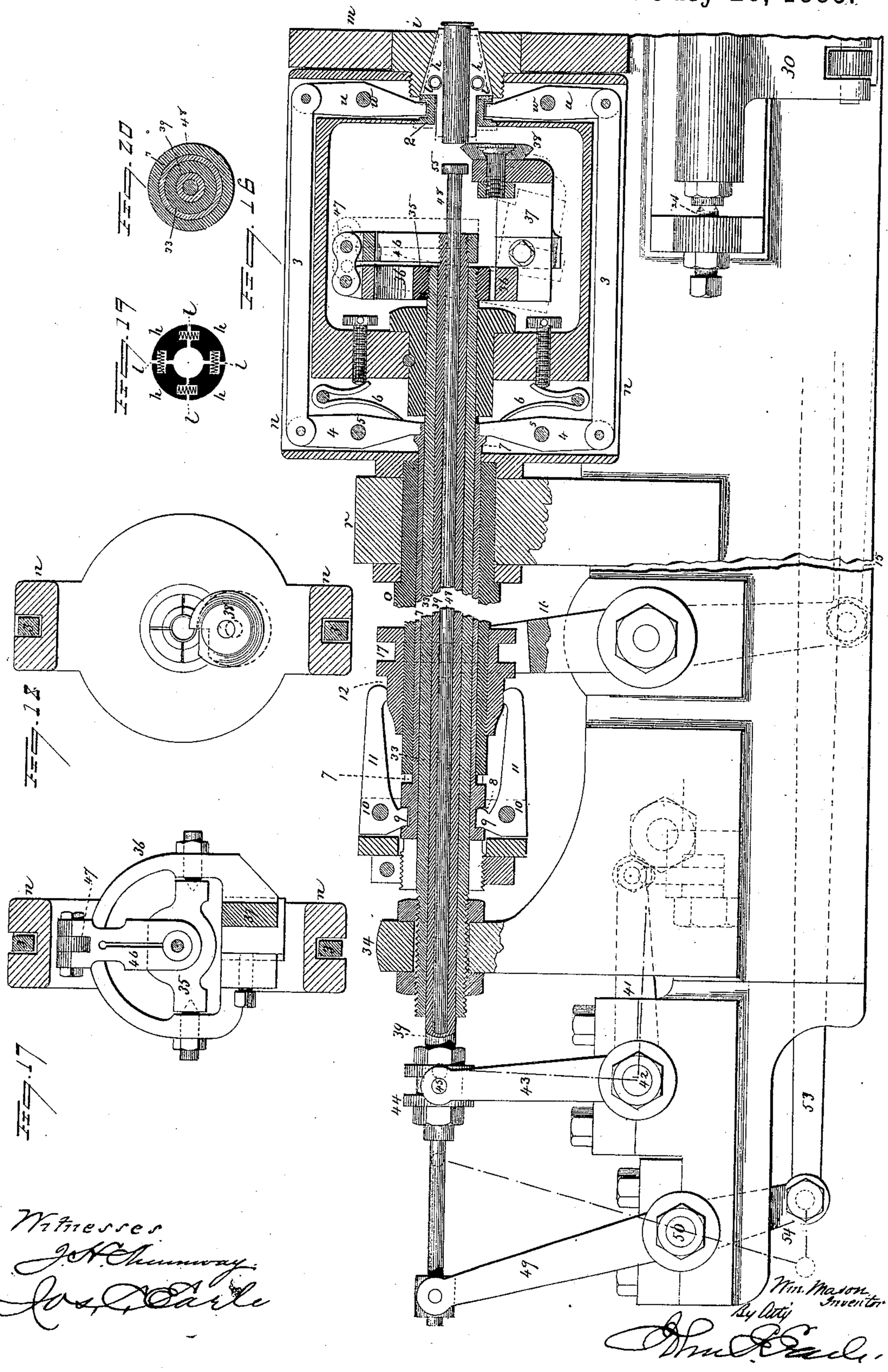

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(No Model.) 8 Sheets—Sheet 8.

W. MASON.

MACHINE FOR TRIMMING CARTRIDGE SHELLS.

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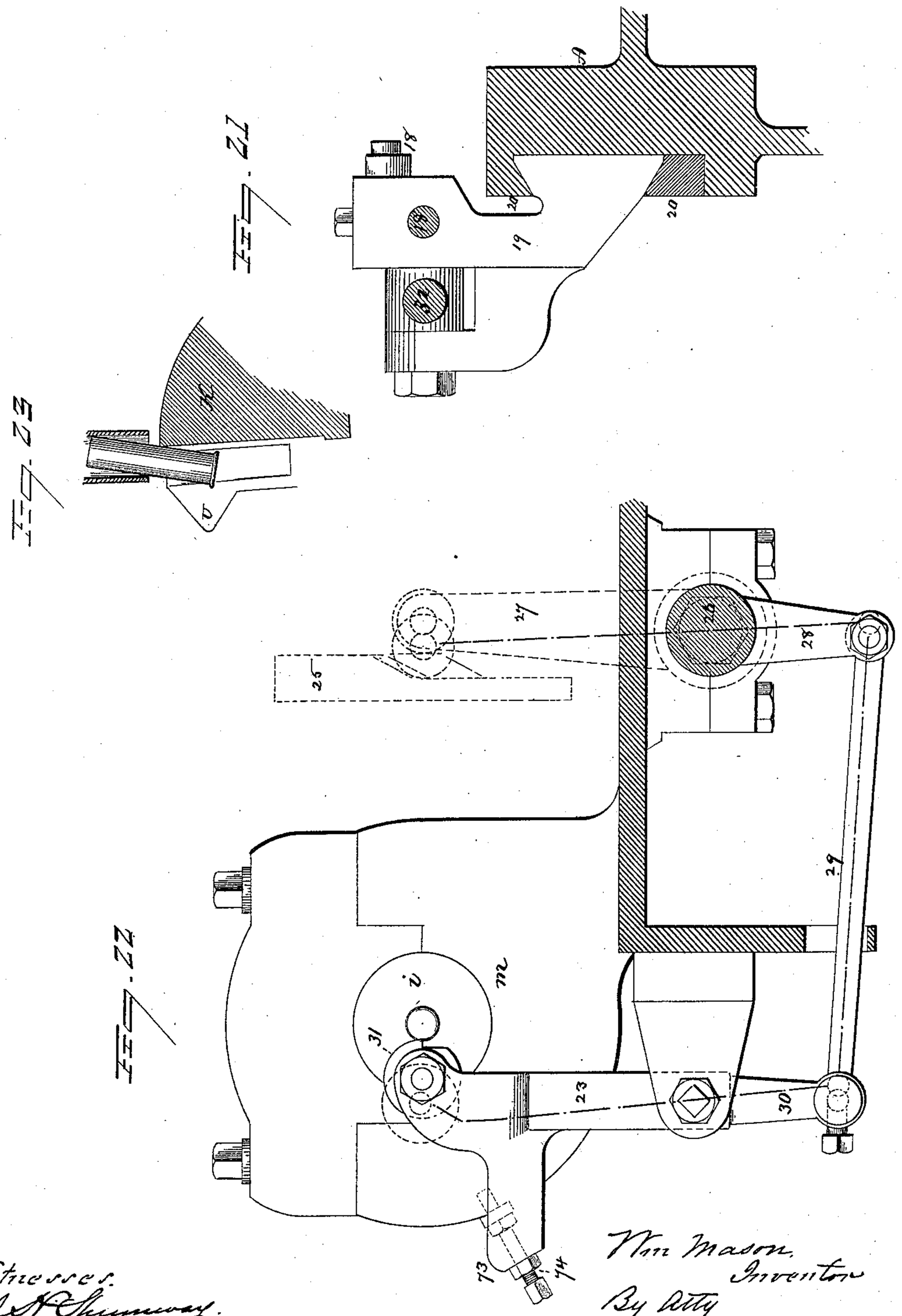

Witnesses.
I. N. Shumway.
Louis C. Earle

Wm Mason,
Inventor
By Atty
Wm. C. Earle.

UNITED STATES PATENT OFFICE.

WILLIAM MASON, OF NEW HAVEN, CONNECTICUT, ASSIGNOR TO THE WINCHESTER REPEATING ARMS COMPANY, OF SAME PLACE.

MACHINE FOR TRIMMING CARTRIDGE-SHELLS.

SPECIFICATION forming part of Letters Patent No. 323,180, dated July 28, 1885.

Application filed May 18, 1885. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM MASON, of New Haven, in the county of New Haven and State of Connecticut, have invented new Improvements in Machines for Trimming Cartridge-Shells; and I do hereby declare the following, when taken in connection with accompanying eight sheets of 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 front view of the machine complete; Fig. 2, a top view of the same; Fig. 3, an end view from the right; Fig. 4, a vertical section through the chuck, carrier, and feed-tube, showing a side view of the mechanism forward of the chuck, the carrier in the position of having received the shell from the tube and about to receive a shell from the chuck; Figs. 5, 6, 6ª, and 8, diagrams of the several cams; Fig. 7, a sectional view of the carrier and the tube, with a side view of the mechanism, the same as in Fig. 4, but showing the carrier as having received its oscillatory movement to transfer the shell received from the tube to a position forward of the chuck, and also as having transferred the shell which it has received from the chuck to a position beneath the ejector-finger; Fig. 9, a transverse section, cutting between the chuck and the carrier, showing a face view of the carrier and side view of the feed-tube; Fig. 10, a transverse section through the carrier, showing the recess into which the shells fall from the tube; Fig. 11, a top view of the spring-jaws U of the carrier which receive the shells from the tube, showing the cam Y by which the jaws are opened; Fig. 12, a horizontal section through the carrier, showing top view of the spring-jaws 56, which receive the shell from the chuck, also showing top view of the lever *f*, by which the check in the feed-tube is operated; Fig. 13, a sectional face view of the slide carrying the ejector; Fig. 14, a rear view of the carrier; Fig. 15, a transverse section through the feed-tube, showing top view of the check-lever *b;* Fig. 16, a longitudinal central section through the chuck, its frame, and arbors, showing a side view of that portion of the machine below; Fig. 17, a transverse section through the chuck-frame in front of the yoke, by which the cutter in the frame is operated; Fig. 18, a transverse section through the frame in front of the cutter, illustrating the movement of the cutter; Fig. 19, a transverse section through the chuck-jaws; Fig. 20, a transverse section through the arbor, showing the spindle, shaft, tube, sleeve, and arbor; Fig. 21, an end view of the reciprocating slide 19, showing a transverse section of the guide in which it moves; Fig. 22, a transverse section forward of the cutter-bar 23, showing a side view of that bar, the operating-cam and connecting-levers being shown in broken lines; Fig. 23, a section of the carrier and tube, showing the carrier as clogged by an imperfect passage of the shell from the tube to the carrier. (Figs. 4 to 23, inclusive, enlarged.)

This invention relates to the construction of a machine to perform the work on cartridge-shells commonly called "trimming." In the larger class of cartridges the edge of the heads require to be trimmed to bring them to a uniform size and shape, and to give to them a smooth finish. The operation of drawing the shells from a disk of sheet metal leaves the edge at the mouth rough and of variable length in different shells. It is necessary that the shells shall be of a uniform length and that the edge at the mouth shall be smooth; hence the shell at the mouth end requires to be trimmed to produce this result. These operations of trimming have heretofore been performed in separate machines, and in the larger class the shells are more generally fed to the machine by hand.

The object of my invention is the construction of a machine which, receiving the shells in mass, may successively trim both the head and mouth, or the mouth alone, should the head not require to be trimmed, whereby the constant presence of an attendant is avoided; and the invention consists in the combination of elements producing an organized machine, as more fully hereinafter described, and particularly recited in the claims.

A represents the bed of the machine, which is supported upon suitable legs, B; C, the driving-shaft arranged transversely across the ma-

chine at one end and supported in bearings D, power being applied to said shaft by any of the usual devices for such purpose.

E is a post arranged on the bed of the machine, and upon which the feed to supply the shells is supported. This feed may be of any of the known feeds adapted to successively supply shells from a mass to the machine. (Not necessary to be shown or described in this specification, as it constitutes no part of the invention.) I would here state, however, that the feed particularly adapted for this class of machine is that for which Letters Patent of the United States, No. 317,396, were granted to this applicant, dated May 5, 1885. On the driving-shaft is a bevel-pinion, F, working into a corresponding pinion, G, on a vertical shaft, H, which shaft is designed to operate the feed, the post E and shaft H being shown as broken off in the several figures. The shells, by any suitable feed, are delivered into a fixed tube, I, head downward, as seen in Fig. 4.

Below the tube I, and upon the transverse shaft J, the carrier K is hung, adapted to receive the shells from the tube I and present them for subsequent operation. The carrier K is preferably of quadrant shape, and on its face is constructed with a vertical recess, L, which, when the carrier is in the position seen in Fig. 4, stands directly beneath the tube, and forms, substantially, a continuation of the tube. The recess L has a shoulder, M, in its sides, against which the head of the shell falling therein from the tube may rest, as seen in Figs. 4 and 9, Fig. 10 showing the recess in transverse section.

To the shaft J and the carrier K an oscillatory or rocking movement is imparted from a cam, N, on the driving-shaft, through a lever, O, hung upon a fulcrum at P, one arm of the lever working upon the face of the cam, the other arm extending toward the carrier and connected to an arm, R, on the shaft J, by a link, S. (See Figs. 4 and 7.) The action of the cam is to depress the arm in connection with the carrier, so as to bring the carrier to the position seen in Fig. 4, with its recess directly beneath the tube I, and to support it in that position during a certain portion of the revolution. To turn the lever in the opposite direction when the cam permits, a spring, T, is provided, tending to lift upon the forward arm of the lever, and so that when the depression of the cam permits the carrier K will be turned from the position seen in Fig. 4 to that seen in Fig. 7—that is, will receive substantially a one-fourth revolution—and so that under such movement the shell which has been received into the carrier from the tube will be transferred into a position in a horizontal line, as seen in Fig. 7. To support the shell during this transfer, a pair of jaws, U U, are arranged in the carrier, said jaws being adapted to embrace the cartridge-shell. They are hung in the carrier on vertical pivots V V, (see Fig. 11,) the tails W of the jaws extending rearward, and to the jaws springs X are applied, the tendency of which is to force the forward or grasping end of the jaws upon the shell when permitted so to do. When the carrier stands in its up position or receiving position, as seen in Fig. 4, the tails of the jaws have entered between the convergent faces of a stationary cam, Y, (see Fig. 11,) so that the jaws in that position are separated to permit the shell to pass down between them; but as the carrier commences its rotative movement the tails of the jaws U escape from the cam Y and spring toward each other, as indicated in broken lines, Fig. 11, and so as to grasp the shell and hold it to prevent its displacement during the rotative movement of the carrier from the position seen in Fig. 4 to that seen in Fig. 7. The back of the carrier is of segment shape, the axis upon which the carrier rotates being the center of such segment, and so that as the carrier turns from the position seen in Fig. 4 to that seen in Fig. 7 the back of the carrier passes beneath the lower or delivery end of the tube I, and so that the next shell above the one delivered to the carrier may ride upon the back of the carrier, and be supported thereby until the carrier returns after having delivered its first shell. Then the next shell will drop into the grasp of the jaws U. Thus the carrier may form a stop or support for the column of shells during the transfer of the shell which enters the carrier; but I prefer to provide a check independent of the carrier. To this end I arrange a vertical shaft, *a*, parallel with the tube, (see Fig. 9,) and from this shaft an arm, *b*, extends toward the tube, and from the said arm *b* a stud, *d*, extends inward through an opening in the side of the tube, so that if the shaft *a* be turned to force the arm *b* toward the tube the stud will engage the shell, which at that time happens to be at that point in the tube, and as seen in Figs. 4, 7, and 15. The bearing movement of the stud upon the shell—that is, the inward movement of the arm—is produced by a spring, *e*, (see Fig. 3,) so that when the arm *b* is free the spring forces it inward and so that the stud will engage the shell in the tube, as seen in Figs. 4 and 7; but when the arm is turned away, as indicated in broken lines, Fig. 7, then the column of shells will be free to fall. To thus relieve the column of shells, a second arm, *f*, extends from the shaft *a*, (see Figs. 9 and 12,) the end of which stands in the path of a shoulder or projection, *g*, on the carrier, and so that as the carrier is turned from the position of receiving the shell (see Fig. 4) to that of delivering the shell, as seen in Fig. 7, and during the last part of the movement of the carrier, the shoulder *g* strikes the end of the arm *f* and turns it with the shaft *a*, as indicated in broken lines, Fig. 12, correspondingly turning the arm *b* to take the stud from engagement with the shell in the tube, as seen in Fig. 7 in dotted lines. When the shell is thus relieved, the column will force the lowest shell downward, as indicated in broken lines,

Fig. 7, until the head rests upon the back of the carrier K; then as the carrier returns the shell thus resting will ride upon the back of the carrier, and so soon as the arm *f* is released from engagement with the carrier the spring *e* returns the shaft *a* and forces the stud *d* inward and against the second shell, as seen in Fig. 7, and so that the second shell will be engaged with sufficient force to support the column of shells above, and so that when the carrier has reached its up position, as seen in Fig. 4, the shell which had been riding upon the back of the carrier will fall into the recess on the face of the carrier and be grasped by the jaws, as before described. The rotative movement of the carrier transferring the shell from a vertical to the horizontal position, (seen in Fig. 7,) presents the shell in line with a chuck designed to receive the shell. The chuck, as here represented, consists of four jaws, *h*. (See Figs. 16 and 19.) These jaws are arranged in a head, *i*, the back of the jaws of conical shape, and so that an advance or forward movement of the jaws will give to them an inward radial or grasping movement, or a retreat of the jaws will permit them to open; and that the jaws may thus be forced to open, springs *l* are arranged between the adjacent jaws. (See Fig. 19.) The head carrying the jaws is supported in a bearing, *m*, extending up from the bed. The head *i* is in connection with a rectangular frame, *n*, which is made fast to a tubular arbor, *o*, supported in bearings *r r*, (see Fig. 1,) to which power is applied through a pulley, *t*, to cause the arbor, with the chuck-frame *n*, to revolve rapidly. The axis of the arbor is at right angles to the axis of the driving-shaft, and is in line with the axis of the shell presented by the carrier to the chuck. The jaws *h h* are operated by a system of levers, as shown in Figs. 4 and 16, the system there being shown as duplicates, although a single system may answer the purpose. In the frame *n*, and diametrically opposite each other, levers *u* are hung, each upon a fulcrum, *w*. The inner arm of the levers extends into an annular groove in a collar, 2, arranged upon a cylindrical portion of chuck-jaws and so as to bear forward against the shoulder on the jaws. From the other arm of the levers *u* a connection, 3, extends to the arm of like levers, 4, at the rear end of the chuck-frame, the levers 4 being each hung upon a fulcrum, 5. To these levers 4 a spring, 6, is applied, the tendency of which is to so turn the levers 4 as to impart to the collar 2 a rear movement, tending to release the jaws to permit the retreat and opening movement. The reverse movement of the levers is imparted by a tubular sleeve, 7, within the arbor *o*. The forward or outer end of the sleeve 7 bears against the inner end of the levers 4. At the rear end of the sleeve 7 is an annular groove, 8, into which a short arm, 9, of the levers, hung upon a fulcrum, 10, enters. The other arm, 11, of the said levers extends forward, and between them enters a cam-like collar, 12, surrounding the arbor *o*, and movable longitudinally thereon. Longitudinal movement is imparted to the collar 12 from a side grooved cam, 13, through a lever, 14, and connecting-rod 15, which connects said lever 14 with a forked lever, 16, working in an annular groove, 17, in the collar 12, and so that at the proper time a rear movement is imparted to the collar 12, tending to force it between the longer arms, 11, of the sleeve-actuating levers, as seen in Fig. 16, or in the reverse direction to withdraw the collar 12 from between the said arms, so as to allow them to approach each other. This mechanism for moving the sleeve 7 is a common one in many machines where an automatic chuck-closing device is desirable. As the collar 12 enters between the arms 11 it turns the levers upon their fulcrum and gives to the shorter arms, 9, a forward movement, which is imparted to the sleeve 7, and this forward movement of the sleeve 7 turns the levers 4 against the action of the springs 6, and gives to the levers *u* a corresponding movement, which is imparted to the collar 2, and this movement of the collar forces the jaws into their conical seat and gives to them a closing action, from which they are released by the withdrawal of the collar 12 from between the arms 11 of the actuating-levers, and under the influence of the spring 6. When the carrier has been turned to present the shell it has received in the horizontal position, as seen in Fig. 7, and in axial line with the chuck, the shell then standing in the carrier is forced between the jaws of the chuck, as from the position in Fig. 7 to that in Fig. 16, or as from the position in broken lines, Fig. 4, to the position in solid lines same figure. The transfer of the shell from the carrier to the chuck is produced by a longitudinally-reciprocating follower, 18, attached to and moving with a slide, 19. The slide 19 is arranged between longitudinal guides 20 on the side of the machine. (See Figs. 4 and 21.) The longitudinal movement is imparted to the slide 19 by a crank-wheel, 21, on the driving-shaft through a connecting-rod, 22, between said crank-wheel and slide. When the carrier has been turned to present the shell into the position seen in broken lines, Fig. 7, then the follower 18 advances, as indicated in broken lines, Fig. 7, striking the head of the shell then in the carrier, forcing it forward into the chuck, as seen in Figs. 4 and 16, and, having thus transferred the shell from the carrier to the chuck, the follower retreats. So soon as the shell has been thus transferred to the chuck, the jaws of the chuck are forced inward, as before described, and so as to grasp the shell and hold it in a concentric position in, and so that it may revolve with, the chuck. Thus held the flange or head of the shell projects outside the nose of the jaws, and the mouth extends inward beyond the tail of the jaws. After having thus delivered the shell to the chuck, the carrier returns to the position in Fig. 4, to receive a second shell, and

during such time the trimming of the shell is performed.

I will first describe the mechanism for trimming the head. The cutter-holder 23 is hung upon the side of the frame on centers or bearings 24, (see Fig. 1,) and so that the axis of motion of the cutter-holder is parallel with the axis of the shell to be trimmed. To this holder a rocking movement is imparted from a side faced cam, 25, on the driving-shaft, which actuates a rock-shaft, 26, which extends longitudinally beneath the bed, (see Fig. 2,) an arm from the rock-shaft extending up and so as to work against the side of the cam 25, as seen in Figs. 2 and 3, and in broken lines, Fig. 22. From the rock-shaft an arm, 28, extends downward, and from the arm 28 a connection, 29, is made with an arm, 30, extending down from the cutter-holder 23, (see Fig. 22,) and so that at a predetermined time the cam 25 imparts to the cutter-holder a swinging movement toward and from the shell, and as indicated in Fig. 22. At its upper end the cutter-holder is provided with a cutter, 31. The cutting-edge of this cutter is shaped corresponding to the required shape of the flange. As shown in the drawings, this cutter is made in the shape of a disk, having an annular groove in its edge corresponding to the cut to be made, and then at one point in its periphery a portion is cut away, as indicated in Fig. 22, so as to present a cut ting edge in the periphery of the cutter to the head of the shell, as indicated in Fig. 22. As the cutter is thus brought up against the head, it trims the edge of the head to the required shape and size. After having done this work, the cutter is withdrawn by the return of the shaft 26, under the action of a spring, 32, on the said shaft, (see Fig. 2,) the said spring being a helical spring around the shaft, one end fixed to a support on the bed, and the other to a collar on the shaft, as shown. At the same time the head is being trimmed, the trimming operation at the opposite end is going on. The mouth-trimming apparatus is shown in Figs. 16, 17, and 18. Inside the sleeve 7 is a tube, 33, which at the forward end extends into the chuck-frame *n*. At its opposite end it is made fast in a head, 34, on the bed of the machine, so that it has neither longitudinal or rotative movement, the arbor *o* and the sleeve 7 revolving freely upon the outside of the fixed tube 33. On the end of the tube 33, and within the chuck-frame, a cross-head, 35, is applied, and made fast to that end of the tube. (See Fig. 17.) To the cross-head a yoke, 36, is hung upon pivots at diametrically opposite points, and so that the yoke may swing on said pivots in a plane coincident with the axis of the revolving chuck-frame, as indicated in broken lines, Fig. 16. From the under side of the yoke an arm, 37, projects forward, and carries a cutter, 38. This cutter, like the cutter previously described, is best made in circular shape, with its periphery in the form of the cut to be made, and with a shoulder cut in the periphery, as indicated in Fig. 18, to present a cutting-point. In this case the edge of the cutter is required only to cut off and trim the mouth of the shell; hence it presents a sharp or inverted V-shaped edge. The cutter is brought into cutting position or removed therefrom by a swinging movement imparted to the yoke 36. This swinging movement is produced by means of a hollow shaft, 39, arranged within the tube 33, and so as to receive longitudinal movement therein, but without rotation. Longitudinal movement is imparted to the shaft 39 from the rock-shaft 26 by an arm, 40, on the said rock-shaft 26, in link-connection with an arm, 41, extending from a transverse rock-shaft, 42, as seen in Figs. 2 and 16. From the rock-shaft 42 an arm, 43, extends upward, bifurcated at its upper end to embrace an annular grooved collar, 44, on the shaft 39, studs 45 in the end of the bifurcated arm entering the annular groove in the said collar, as seen in Fig. 2, so that the rocking movement of the shaft 26 will impart a longitudinal vibratory movement to the arm 43, and a corresponding longitudinal reciprocating movement to the shaft 39. The shaft 39 extends through the yoke into the chuck-frame, and to that end of the shaft 39 an arm, 46, is applied, which moves longitudinally with the shaft 39. At its upper end the arm 46 is connected by a link, 47, to the upper edge of the yoke 36; hence as the shaft 39 is moved forward, as indicated in broken lines, Fig. 16, it takes with it the arm 46, and through the link-connection 47 carries the upper end of the yoke 36 also forward, turning the yoke upon its pivots, and thereby turns the cutter downward away from its active or cutting position, as indicated in broken lines, Fig. 16; but on the rear movement of the shaft 39 the arm 46 returns and brings the cutter up to its work, as seen in Fig. 16, the cutter trimming the mouth of the shell at the same time the head is being trimmed. This cut not only finishes the mouth of the shell, but brings the shell to the required length; and as the introduction of the shell is to a positive predetermined position with relation to the chuck and the respective cutters, it follows that all shells so trimmed will be of uniform length. The time at which the cutters are presented to thus trim the shell, as before stated, occurs while the carrier is returning to receive a second shell. After the shell has been trimmed, it is removed from the chuck by means of a longitudinally-movable spindle, 48, which extends entirely through the hollow shaft 39. At its rear end it is in connection with one arm, 49, of a lever hung upon a transverse rock-shaft, 50, at the extreme end of the machine. To this rock-shaft a rocking movement is imparted by means of a cam, 51, on the driving shaft, through a lever, 52, and its connection 53, with an arm, 54, extending down from the rock-shaft 50. (See Figs. 2 and 16.) After the shell has been trimmed,

the grasp of the jaws of the chuck is released, as before described. Then the spindle 48 advances, as indicated in broken lines, Fig. 16. The head 55 of the spindle comes against the open end of the shell and forces it outward and away from the jaws, and so that it may be delivered from the machine. This may be directly from the jaws into any suitable conductor; but I prefer to mechanically transfer the trimmed shell to a position for discharge, as into a tube, which will conduct it to a suitable receptacle prepared for the purpose. To this end I construct the carrier K with a pair of spring-jaws, 56, (see Fig. 12,) which extend at right angles to the recess in the carrier which first receives the shell, and so that when the carrier is in its position to receive a shell the jaws 56 stand in a longitudinal plane, and in line with the shell then in the jaws of the chuck, and as seen in Fig. 4. The adjacent faces of these jaws are of a shape to readily embrace the shell, as seen in Fig. 9. They are elastic, as indicated in Fig. 12, and from the bearing-point the jaws are inclined in both directions longitudinally, as seen in Fig. 12. At the time the shell has been trimmed, as before described, the jaws 56 stand in line with the shell, and as it is forced outward by the advance of the spindle 48 it passes between the jaws 56, as indicated in Figs. 4 and 12, the jaws yielding for such reception of the shell, and holding it by a frictional contact in that position, and, as seen in Fig. 4, free from the chuck, and so that when next the carrier is turned to present the second shell, 57, as seen in Fig. 7, the first shell, 58, is carried down by the jaws into a vertical position, as seen in Fig. 7, and is there held, the carrier resting while the shell 57 is transferred to the chuck, as before described. The shell 58, transferred by the jaws 56, as before described, stands beneath a finger, 59, fixed in a vertical slide, 60. To the slide 60 an up and down movement is imparted by a cam, 61, on the driving-shaft, through a lever, 62, one arm, 63, of which is connected to the slide by a link, 64, as seen in broken lines, Fig. 7, and also shown in Fig. 13. As the slide 60 descends, the finger bearing upon the head of the shell, then between the jaws 56, forces the shell downward and away from the jaws, as indicated in broken lines, Fig. 7, and free from the machine, to be carried to any desirable point by a suitable conductor. The conductor should be of tubular shape, somewhat larger than the shell, so that the shell may enter and pass freely through to its destination without liability of injury to the shell, a conducting device common in cartridge-making machinery. The shell being thus delivered from the carrier and the second shell introduced into the chuck, the carrier is returned, as before described. The carrier K is turned to present the shell from the feeding-tube to the chuck by the action of the spring T, and is therefore not a positive movement, for the reason that if, perchance, a shell is not entirely passed from the tube into the carrier, the carrier would be clogged, and a positive movement under such circumstances must necessarily break something; or if from any cause the delivery movement of the carrier should be clogged, a like result would follow; hence it is that the delivery movement is made under the action of a spring instead of positive; but it is necessary that the carrier shall stand in one of its two extreme positions before the follower 18 advances, and so that, should the delivery movement of the carrier be interrupted, it may be returned to its position to receive the shell from the tube, and also bring the shell which has been received from the chuck back into line with the chuck, and so that as the follower next advances it will simply return the shell into the chuck, and thereby avoid jamming the shell against the face of the chuck, which would be the case were it out of line with the chuck and follower. To avoid such a difficulty, I arrange a dog, 65, hung upon a pivot, 66, with a spring, 67, beneath it, the tendency of which is to lift the dog. When the dog is raised, as seen in Fig. 4, its nose 68 is outside the path of a flange, 69, Figs. 12 and 14, on the side of the carrier, and so that as the carrier is rotated it escapes the nose of the dog. On the back of the dog is a forward and upward incline, 70, and projecting from the slide 19 is a stud, 71, and which, as the slide 19 advances, strikes the incline 70 on the dog, and turns the nose of the dog downward, as seen in broken lines, Fig. 7; but before this movement occurs the carrier has been turned to its position for delivering the shell. If, however, the carrier should have been clogged in its movement, as before described, such interruption in the movement of the carrier will occur before the flange 69 on the carrier shall have risen so far as to escape the nose of the dog, as indicated in Fig. 23. Then as the dog descends its nose will strike the flange 69, and will return the carrier to its place of rest, bringing it to a bearing upon a stop, 72, and this will occur before the follower shall have reached the carrier, so that should the carrier fail to perform its movement in time to present a shell, it will be returned and held until the follower shall have advanced and returned and until the parts are ready for the next movement, and the dog will so continue until the clogging of the carrier is removed. In this case the machine will simply go through its movements without performing work.

For nicety of work it is necessary that the cutter 31, which trims the mouth of the shells, shall only advance to a certain predetermined point. Generally the action of the cam will be sufficient for this purpose; but for greater precision I construct the cutter-holder 23 with an arm, 73, and in this arm I arrange an adjustable screw, 74, which, when the cutter has arrived at its extreme inward position, will

come to a bearing against a stationary adjacent portion of the machine, as indicated in Fig. 22.

It will be apparent that it is necessary that the shells shall be presented to the carrier with their head downward; but it will sometimes occur that a shell will enter the feeding-tube mouth downward. To provide against a shell in this condition entering the carrier, I hang a loose gravity-dog, 75, upon a pivot, 76, the nose 77 of the dog extending through a slot in the tube so that it will hang within the tube. A shell striking this dog-head first will cause the dog to swing outward, as indicated in broken lines, Fig. 4, so that the shell will escape and pass freely to its position in the carrier; but should the shell be presented inverted or mouth downward, then the mouth of the shell will catch upon the hook-shaped nose of the dog, and so engage the dog that it cannot turn outward. In that case the movement of the column of shells will be interrupted until such misplaced shell is removed.

I have represented the chuck as having conical jaws, in which the grasping or radial movement is produced by a longitudinal movement of the jaws; but it will be understood that many of the known chucks may be substituted for the particular construction which I have illustrated, and it will also be evident to those skilled in the art that many of the details of construction may he changed without departing from my invention, the details which I have shown being the best known to me to produce the desired result.

I have represented the machine as adapted to perform the two operations of trimming the head and trimming the mouth; but in cases where the head only is required to be trimmed, the mouth-trimming portion may be omitted, or in cases where only the mouth-trimming is required, then the head-trimming mechanism may be omitted.

I have thus far described the invention as applicable to trimming cartridge-shells, but the invention is adapted to many other uses, such, for instance, as trimming the mouth of cup-shaped tubes where such work is required, or for various other purposes. Where work is required to be performed upon one end of a cylindrical article, it may be introduced into the chuck and the proper tool applied to the tool-holder to be presented and perform its work upon the inwardly-projecting end of such article. I therefore do not wish to be understood as limiting my invention to any particular use, and from the foregoing it will be evident that the carrier and presenting device may be omitted, the chuck, the chuck-frame, and tool-operating mechanism employed with any suitable device by which the article may be introduced into the chuck for the operation of the tool; or such article may be introduced by hand, and the machine in that case consist only of the operative mechanism shown in Fig. 4.

By the term "cartridge-shell," I wish to be understood as including all articles upon which the mechanism is adapted to operate.

I claim—

1. The combination of a revolving chuck arranged to receive and hold a shell to be operated upon, a carrier arranged to oscillate in a plane coincident with the axis of said chuck said carrier provided with spring-jaws arranged to receive and hold a shell, and under the oscillating movement of the carrier present said shell in axial line with the chuck, and a follower arranged to reciprocate in axial line with said chuck and adapted to transfer said shell from the grasp of said jaws into said chuck, substantially as described.

2. The combination of a revolving chuck arranged to receive and grasp a shell to be operated upon, a carrier arranged to oscillate in a plane coincident with the axis of said chuck and constructed with a recess adapted to receive a shell, and under the oscillating movement of said carrier to present said shell in axial line with said chuck, the said carrier also constructed with a second recess at substantially right angles to the recess which so receives and presents the shell, a follower arranged to reciprocate in the axial line of said chuck and adapted to pass through the first-mentioned recess in said carrier when said recess is in axial line with the chuck, whereby the shell therein will be transferred to said chuck, and a second reciprocating follower also in axial line with the chuck, but upon the opposite side to the first-mentioned follower, said second follower adapted to transfer the shell from the chuck to the second recess in said carrier, when said recess is in its turn presented in line with the chuck, substantially as described.

3. The combination of a revolving chuck arranged to receive and hold a shell, a carrier arranged to oscillate in a plane coincident with the axis of said chuck, constructed with two recesses at substantially right angles to each other, the said recesses being in the plane with the axis of said chuck, the oscillatory movement of said carrier first presenting one of said recesses and then the other to said chuck, a feeding-tube arranged to successively conduct shells to said carrier and deliver a single shell to the first recess therein when presented to the mouth of the tube while the second recess is in axial line with the chuck, the oscillatory movement of said carrier adapted to transfer the shell so received into a position in axial line with the chuck, a follower arranged to reciprocate in axial line with said chuck and adapted to pass through the recess in the carrier containing the said shell when so presented to the chuck, and thereby transfer the shell from the carrier to the chuck, and a second follower reciprocating in axial line with said chuck, but upon the opposite side of the chuck to the first-mentioned follower, the said second follower adapted to pass

through the chuck and transfer the shell introduced by the first follower from the chuck to the second recess in the carrier, substantially as described.

4. The combination of a revolving chuck adapted to receive and hold cartridge-shells, a carrier arranged to swing in a plane coincident with the axis of said chuck, the said carrier constructed to receive a shell and present it in line with the chuck, a reciprocating follower in axial line with said chuck and adapted to transfer the shell from said carrier to said chuck, and a cutter arranged to swing in a path at right angles to the axis of and in front of said chuck, substantially as described, whereby under such swinging movement of the cutter it is brought into contact with and so as to operate upon the shell held by the chuck.

5. The combination of a revolving chuck arranged to receive and hold a shell to be operated upon, a carrier arranged to oscillate in a plane coincident with the axis of said chuck, said carrier provided with spring-jaws arranged to receive and hold a shell and under the oscillating movement of the carrier present said shell in axial line with the chuck, and a follower arranged to reciprocate in axial line with said chuck and adapted to transfer said shell from the grasp of said jaws into said chuck, and a cutter arranged to swing in a path at right angles to the axis of and in front of the said chuck, substantially as described, and whereby under such swinging movement of the cutter it is brought into contact with and so as to operate upon the shell held by the chuck.

6. The combination of a revolving chuck arranged to receive and grasp a shell to be operated upon, a carrier arranged to oscillate in a plane coincident with the axis of said chuck and constructed with a recess adapted to receive a shell, and under the oscillating movement of said carrier to present said shell in axial line with said chuck, the said carrier also constructed with a second recess at substantially right angles to the recess which so receives and presents the shell, a follower arranged to reciprocate in the axial line of said chuck and adapted to pass through the first-mentioned recess in said carrier when said recess is in axial line with the chuck, whereby the shell therein will be transferred to said chuck, a second reciprocating follower also in axial line with the chuck, but upon the opposite side to the first-mentioned follower, said second follower adapted to transfer the shell from the chuck to the second recess in said carrier when said recess is in its turn presented in line with the chuck, and a cutter arranged to swing in a path at right angles to the axis of and in front of said chuck, substantially as described, and whereby under such swinging movement of the cutter it is brought into contact with and so as to operate upon the shell held by the chuck.

7. The combination of a revolving-chuck arranged to receive and hold a shell, a carrier arranged to oscillate in a plane coincident with the axis of said chuck, constructed with two recesses at substantially right angles to each other, the said recesses being in the plane with the axis of said chuck, the oscillatory movement of said carrier first presenting one of said recesses and then the other to said chuck, a feeding-tube arranged to successively conduct shells to said carrier and deliver a single shell to the first recess therein when presented to the mouth of the tube while the second recess is in axial line with the chuck, the oscillatory movement of said carrier adapted to transfer the shell so received into a position in axial line with the chuck, a follower arranged to reciprocate in axial line with said chuck and adapted to pass through the recess in the carrier containing the said shell when so presented to the chuck, and thereby transfer the shell from the carrier to the chuck, a second follower reciprocating in axial line with said chuck, but upon the opposite side of the chuck to the first-mentioned follower, the said second follower adapted to pass through the chuck and transfer the shell introduced by the first follower from the chuck to the second recess in the carrier, and a cutter arranged to swing in a path at right angles to the axis of and in front of said chuck, substantially as described, whereby under such swinging movement of the cutter it is brought into contact with and so as to operate upon the shell held by the chuck.

8. The combination of a substantially rectangular frame arranged upon a hollow arbor so as to revolve therewith, chuck-jaws arranged in said frame at the outer end and in axial line with the revolution of said frame, a longitudinally-sliding sleeve arranged within said arbor, and a system of levers between said longitudinally-sliding sleeve and the jaws of said chuck, whereby said jaws are made to open or close, as the case may be, a tube arranged longitudinally within said arbor, fixed at its rear end, the other end extending into the frame in rear of the chuck-jaws, a yoke hung within the frame upon the end of said fixed tube so as to swing in a plane coincident with the axis of the chuck, and a longitudinally-reciprocating shaft within said tube and extending through it into said frame, and carrying an arm upon its end within the frame, the said arm in connection with the yoke upon one side of the center, the said yoke extending to the opposite side of the center and there carrying a cutter, whereby under the longitudinal reciprocating movement of said shaft the said cutter will be turned inward or outward from the center of motion of the chuck, substantially as described.

9. The combination of a substantially rectangular frame arranged upon a hollow arbor so as to revolve therewith, chuck-jaws arranged in said frame at the outer end and in axial line with the revolution of said frame, a longitudinally-sliding sleeve arranged within said arbor, and a system of levers between

said longitudinally-sliding sleeve and the jaws of said chuck, whereby said jaws are made to open or close, as the case may be, a tube arranged longitudinally within said arbor, fixed at its rear end, the other end extending into the frame in rear of the chuck-jaws, a yoke hung within the frame upon the end of said fixed tube so as to swing in a plane coincident with the axis of the chuck, a longitudinally-reciprocating shaft within said tube and extending through it into said frame and carrying an arm upon its end within the frame, the said arm in connection with the yoke upon one side of the center, the said yoke extending to the opposite side of the center and carrying a cutter, whereby under the longitudinal reciprocating movement of said shaft the said cutter will be turned inward or outward from the center of motion of the chuck, a carrier arranged to oscillate in a plane coincident with the axis of said chuck and forward of the face of the chuck, the said carrier constructed to receive a shell at one of its extreme points of movement and at its other extreme present said shell in axial line with said chuck, and a follower reciprocating in the axial line of said chuck and arranged to pass through said recess in the carrier when presented in axial line with the chuck, substantially as described, whereby the shell so presented by the carrier will be transferred therefrom into the chuck.

10. The combination of a substantially rectangular frame arranged upon a hollow arbor so as to revolve therewith, chuck-jaws arranged in said frame at the outer end in axial line with the revolution of said frame, a longitudi-tudinally-sliding sleeve arranged within said arbor, and a system of levers between said longitudinally-sliding sleeve and the jaws of said chuck, whereby said jaws are made to open or close, as the case may be, a tube arranged longitudinally within said arbor and fixed at its rear end, the other end extending into the frame in rear of the chuck-jaws, a yoke hung within the frame upon the end of said fixed tube so as to swing in a plane coincident with the axis of the chuck, a longitudinally-reciprocating shaft within said tube and extending through it into said frame and carrying an arm upon its end within the frame, the said arm in connection with the yoke upon one side of the center, the said yoke extending to the opposite side of the center and carrying a cutter, whereby under the longitudinal reciprocating movement of said shaft the said cutter will be turned inward or outward from the center of motion of the chuck, a carrier arranged to oscillate in a plane coincident with the axis of said chuck and forward of the face of the chuck, the said carrier constructed to receive a shell at one of its extreme points of movement and at its other extreme present said shell in axial line with said chuck, a cutter arranged to swing in a plane at right angles to the axis of said chuck and outside the front face of the chuck, and a follower reciprocating in the axial line of said chuck arranged to pass through said recess in the carrier when presented in axial line with the chuck, substantially as described, whereby the shell so presented by the carrier will be transferred therefrom into the chuck.

11. The combination of a substantially rectangular frame arranged upon a hollow arbor so as to revolve therewith, chuck-jaws arranged in said frame at the outer end in axial line with the revolution of said frame, a longitudinally-sliding sleeve arranged within said arbor, and a system of levers between said longitudinally-sliding sleeve and the jaws of said chuck, whereby said jaws are made to open or close, as the case may be, a tube arranged longitudinally within said arbor and fixed at its rear end, the other end extending into the frame in rear of the chuck-jaws, a yoke hung within the frame upon the end of said fixed tube so as to swing in a plane coincident with the axis of the chuck, a longitudinally-reciprocating shaft within said tube and extending through it into said frame and carrying an arm upon its end within the frame, the said arm in connection with the yoke upon one side of the center, the said yoke extending to the opposite side of the center and there carrying a cutter, whereby under the longitudinal reciprocating movement of said shaft the said cutter will be turned inward or outward from the center of motion of the chuck, a carrier arranged to oscillate in a plane coincident with the axis of said chuck and forward of the face of the chuck, the said carrier constructed with two recesses at right angles to each other, one of which is presented in axial line with the said chuck at each extreme movement of said carrier, the first of said recesses arranged to receive a shell and present it in axial line with said chuck, a reciprocating follower arranged to pass through said first recess in the carrier when in line with the chuck and transfer the shell therein to the said chuck, and a spindle arranged longitudinally through the arbor carrying the chuck-frame and in axial line with the chuck, the said spindle arranged to reciprocate in said axial line outward through said chuck and return, substantially as described, whereby the shell so introduced to the chuck by the said follower will be forced from the chuck by said spindle into the second recess in the said carrier when presented in axial line with the chuck, substantially as described.

12. The combination of a revolving chuck, feed-tube I, oscillating carrier K, spring-jaws U U, hung in said carrier, double fixed cam Y, reciprocating follower 18, and transversely-swinging cutter-arm 23, carrying the cutter 31, substantially as and for the purpose described.

13. The combination of the revolving chuck, feed-tube I, oscillating carrier K, spring-jaws U U, hung in said carrier, spring-jaws 56, also hung in said carrier, reciprocating follower 18, transversely-swinging cutter-holder

23, carrying the cutter 31, and vertically-reciprocating slide 60, carrying the ejecting-finger 59, substantially as described.

14. The combination of the revolving chuck, the feed-tube I, hook-shaped dog 75, oscillating carrier K, constructed with a recess to receive shells from said tube and with a second recess at substantially right angles to said receiving-recess, a reciprocating follower 18, and reciprocating spindle 48, substantially as and for the purpose described.

15. The combination of the revolving chuck, the feed-tube I, hook-shaped dog 75, oscillating carrier K, constructed with a recess to receive shells from said tube and with a second recess at substantially right angles to said receiving-recess, a reciprocating follower, 18, and reciprocating spindle 48, with a vertically-reciprocating ejecting-finger, 59, substantially as and for the purpose described.

16. The combination of the revolving chuck, feed-tube I, oscillating carrier K, between said tube and chuck, said carrier constructed with a recess adapted to receive shells from said tube and transfer them into line with said chuck, the reciprocating-follower 18, transversely-swinging cutter-holder 23, carrying the cutter 31, and the reciprocating spindle 48, substantially as described.

17. The combination of the feed-tube, oscillating carrier K, longitudinally-reciprocating follower 18, revolving chuck-frame *n*, chuck-jaws arranged in the outer end of said frame, yoke 36, hung upon fixed bearings within said frame and carrying a cutter, 38, at one side of the axis of said frame, longitudinally-reciprocating shaft 39, carrying an arm, 46, in connection with said yoke upon the opposite side of the axis of the chuck-frame, substantially as described.

18. The combination of the feed-tube, oscillating carrier K, longitudinally-reciprocating follower 18, revolving chuck-frame *n*, chuck-jaws arranged in the outer end of said frame, yoke 36, hung upon fixed bearings within said frame and carrying a cutter, 38, at one side of the axis of said frame, longitudinally-reciprocating shaft 39, carrying an arm, 46, in connection with said yoke upon the opposite side of the axis of the chuck-frame, and the transversely-swinging cutter-bar 23, carrying the cutter 31, substantially as described.

19. The combination of the feed-tube, oscillating carrier K, longitudinally-reciprocating follower, revolving chuck-frame *n*, chuck-jaws arranged in the outer end of said frame, yoke 36, hung upon fixed bearings within said frame and carrying a cutter, 38, at one side of the axis of said frame, longitudinally-reciprocating shaft 39, carrying an arm, 46, in connection with said yoke upon the opposite side of the axis of the chuck-frame, and the vertically-reciprocating ejector-finger 59, substantially as described.

20. The combination of the feed-tube, oscillating carrier K, longitudinally-reciprocating follower 18, revolving chuck-frame *n*, chuck-jaws arranged in the outer end of said frame, yoke 36, hung upon fixed bearings within said frame and carrying a cutter, 38, at one side of the axis of said frame, longitudinally-reciprocating shaft 39, carrying an arm, 46, in connection with said yoke upon the opposite side of the axis of the chuck-frame, and the transversely-swinging cutter-bar 23, carrying the cutter 31, and the vertically-reciprocating ejector-finger 59, substantially as described.

21. The combination of the revolving chuck, feed-tube I, carrier K, constructed with a shoulder, 69, reciprocating follower 18, dog 65, and rest 72, substantially as described.

22. The combination of the revolving chuck, feed-tube I, carrier K, constructed with the shoulder *g*, lever *b*, carrying a stud, *d*, lever *f*, in connection with said lever *b*, and reciprocating follower 18, substantially as described.

WILLIAM MASON.

Witnesses:
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