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CARTRIDGE SHELL WAD WINDER.
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CARTRIDGE-SHELL-WAD WINDER.

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To all whom it may concern:

Be it known that we, WILLIAM B. PLACE, residing at Kings Mills, in the county of Warren, and GERSHOM MOORE PETERS, residing at Cincinnati, in the county of Hamilton, State of Ohio, citizens of the United States, have invented new and useful Improvements in Wad-Winders for Cartridge-Shell-Making Machines, of which the following is a specification.

This invention relates to cartridge-shell machinery, and more particularly to mechanism for winding a wad and placing it in a shell-case.

The invention consists in substantially the construction, location, and arrangement hereinafter more particularly described, as illustrated in the accompanying drawings, forming a part hereof, and finally set forth in the appended claims.

Reference is now had to the accompanying drawings, wherein like reference letters and numerals are employed throughout the several views thereof to indicate like parts, wherein—

Figure 1 is a side elevation of the entire machine. Fig. 2 is a front elevation of the same, showing the wad-strap-holding trays in central vertical section. Fig. 3 is a horizontal sectional view taken on the line x x, Fig. 1. Fig. 4 is a vertical sectional view taken on the line y y, Fig. 3, looking in the direction of the arrows. Fig. 5 is a vertical sectional view taken on line z z, Fig. 1, and looking toward the left. Fig. 6 is a detail sectional view showing on the line a a, Fig. 3. Fig. 7 is a detail sectional view showing the wad-placing die in the set of placing a wad in a shell. Fig. 8 is a detail view, in horizontal section, of the wad-placing plunger and die for rupturing or tearing a wound wad from the strip of wad material and the means for partially turning said die, taken on the line b b, Fig. 6, and looking in the direction of the arrows. Fig. 9 is a detail view, in horizontal section, taken on the line c c, Fig. 6, looking in the direction of the arrows and showing the strip of wad material fed into the wad-winding die. Fig. 10 is a detail view in horizontal section, showing a wad wound on the winding-die and illustrating the action of the die for rupturing or tearing the wad from the strip of wad material.

Reference—Sign A represents a suitable supporting-table having legs B. This table may be of any desirable size or proportion for sustaining the mechanism hereinafter to be described. Upon the table is suitably secured or bolted a base-plate C, having uprights or standards D E rising therefrom, in which is journaled the shafting, hereinafter to be described. Upon the rear of table A is bolted a standard F, which is provided with a journal box or casing G, bolted or secured thereto. In this journal box or bearing and a suitable bearing in the upright D is journaled the main driving-shaft G, upon which is mounted a suitable drive-wheel or pulley to receive rotary motion from any suitable source and to transmit the same, through shaft G, to the mechanism hereinafter described. A suitable clutch mechanism J is provided for throwing said drive-wheel into and out of gear with its supporting-shaft. Any well-known form of clutch shifting mechanism may be employed for operating said clutch such, for instance, as a bell-crank lever K, pivoted upon a post L, rising from the table of the machine, and a rod M, connecting with a treads (not shown) conveniently located near the foot of the operator.

Main shaft G has mounted thereon two gear-wheels 1 and 2, wheel 1 being a spur-wheel and located intermediate the main drive-wheel H and the standard D, in which shaft G has its bearing. Gear 2 is a bevel-wheel and is mounted on the end of shaft G, projecting through its bearing in standard D. (See Figs. 1 and 5.) Spur-gear 1 intermeshes with two spur-gears 3 and 4, one on either side thereof, which are in turn mounted on horizontal shafts 5 and 6, extending longitudinally of the machine and having suitable bearings in uprights or standards D and E. Upon the front end of shaft 5 is mounted a plate 7, in the face of which is a cam-groove 8, and suitably a plate 8, having a cam-groove 10 in the face thereof, is mounted on the front end of shaft 6. These grooves are adapted to receive lags or projections 11 (see Fig. 6) of the carrier 12 for the wad-placing dies, presently to be described. The eccentric-
tricity of the cam-grooves 9 and 10 are in the same direction, and consequently the reciprocations of the wad-placing dies are in unison with each other.

The driving mechanism for rotating the wad-winding spindles periodically will now be described.

Mounted on shaft 5, intermediate its bearings in standards D and E, is a large mutilated gear-wheel 13, which has approximately one half of its periphery formed with cogs or teeth and for about the other half has no teeth. Just at the boundaries of the teeth are formed two recesses, one opposite to the other, on the wheel, which extend considerably below the bottom line of said teeth with a somewhat gradual curve, and these recesses are adapted to properly-shaped projections from another wheel, which will hereinafter be specified. On this same wheel 13 there is preferably formed a convex plain periphery which occupies that portion of the wheel not taken up by the teeth or the recesses. Meshing with the mutilated wheel 13 is a mutilated pinion 14, which latter is mounted upon a counter-shaft 15, arranged parallel with the shaft 5 and being suitably journaled in the standards D and E. This mutilated pinion 14 has teeth upon the greater portion of its periphery; but the remaining portion is extended some little distance beyond the periphery to form a projection whose sides are curved to adapt them to roll on the sides of the recesses in the wheel 13, and the outer or peripheral surface of the projection is concaved in such a manner that it may easily ride upon the convex plain surface of the other mutilated gear and while it so rides act as a locking device to prevent any rotation being imparted to its shaft or through intermediate gearing to the winder-spindle. Upon shaft 15 is also mounted a large gear-wheel 16, which is arranged to mesh with pinion 17, which latter is carried on a shaft 18 and journaled longitudinally of the machine in suitable bearings in standards D and E. Upon the front end of shaft 18 is mounted a large bevel-gear 19, which meshes with two bevel-pinion 20 and 21. Bevel-pinion 20 is mounted upon the upper end of the wad-winding spindle 22, which is supported by and journaled in a bearing 23, bolted or secured to a bracket projecting from standard E. Bevel-pinion 21 is mounted on the end of a short horizontal shaft 24, which latter is journaled in a suitable box 30, which is bolted to a bracket 27 of the framework. On the opposite end of shaft 24 is carried a bevel-gear 25, which meshes with another bevel-gear 26, mounted upon the upper end of wad-winding spindle 28, supported by and journaled in a suitable bearing 29, carried by bracket 27. Gears 20, 21, 25, and 26 are so proportioned as to rotate the winding-spindles 22 and 28 at the same rate of speed and to give each spindle an equal number of rotations. The rate of speed and number of rotations may, however, be made to vary according to the size of wad required in different-gaged shells.

It will be readily understood from the above description that, a rapid rotation of several turns is given each winding-spindle during each rotation of the main driving-shaft 6 and that during each revolution of the main shaft there is, owing to the mutilated gears, a period of rest or inaction of said winding-spindle. It is during this period of rest that the wound wad is stripped from the winding-spindle by the placing-die and forced into the open end of a shell-case, as will be more clearly hereinafter set forth.

We will now describe the construction and relative arrangement of the winder-spindles and wad stripping and placing dies; but inasmuch as the construction and arrangement of each set are identical with the other it is only necessary to describe one set.

Attention is particularly directed to Figs. 1, 4, 6, and 7. Bolted to the front standard E is a guide-box 31, provided with a circular opening 32 therethrough, countersunk at its lower end, as at 33. This opening 32 is adapted to receive a hollow cylindrical extension of the placer and stripper die carrier 12 and to guide the same in its vertical reciprocations. The placer-die 34 is secured to the lower end of carrier 12 in any desirable manner, as by means of a screw 35. The wad-placer die is also hollow, and through the hollow carrier and die proper the winding spindle or mandrel is adapted to project. The part of the spindle upon which the wad is wound is reduced in size, as at 36, and the lower end thereof is split to receive the end of the wad strip or material out of which the wad is made. The stripping and placing die 38 has its inner bore contracted to closely hug and envelop the reduced end of the winding-spindle, as is clearly shown in Figs. 4, 6, 7, and 8. A bushing 38 is fitted in the countersunk portion of the cylindrical cavity in casing 31. The end of the winding-spindle is flush with the lower edge of this bushing, and said bushing is provided with a slot in its lower edge, as clearly indicated in Fig. 4, through which the strip of wad material is fed to the winding-spindle. The two placer and stripping dies are reciprocated by means of the cam-grooves 9 and 10 in the plates 7 and 8, as above described. The operation of this part of the machine is as follows: The end of the strip of material is fed through the slot in the lower edge of the bushing 38 and into the slit in the end of the winding-spindle. A rapid rotary motion is given said spindle by the gearing above described and the wad is spirally wound therearound. The wad is then torn off or broken from the strip of material from which it is wound by mechanism presently to be described. At this point in the operation the open shell is brought into position immediately beneath the winding-spindle and its surrounding stripper and placer die by mechanical means, presently to be de-
scribed. The cam-slots in plates 7 and 8 begin to force the stripping-dies downwardly, thus forcing the formed wads off the ends of spindles 22 and 28 and placing them in the open ends of the shells 40. (See Figs. 6 and 7.) Further rotation of cam-plate 7 and 8 elevates the stripping and placing dies, thus leaving the lower ends of the spindles free to receive the ends of the strips of wad material to form other wads. Therefore at each rotation of main driving-shaft G two wads are wound, torn, or broken from the strip of material, stripped from the winding-spindles, and placed in the open ends of shell-cases.

The mechanism for bringing the shell-cases underneath the winder and placing-dies to receive the wads will now be described.

Bevel-gear 2 on the projecting end of main shaft G meshes with a bevel-gear 41 on the end of a vertical shaft 42, journaled in suitable bearings formed on or bolted to rear standard D. Suitably secured to and rotating with shaft 42 is a cam 44, adapted to operate against a cross-head 45 to reciprocate the same. A friction-roller 46 may be provided to reduce friction. The action of the cam against cross-head 45 is opposed by two stout spiral springs 47 48, attached at one end to projecting arms of said cross-head and at the other end to a fixed part of the framework, as standard D. (See Fig. 3.) The cross-head 45 is provided with a forwardly-extending plunger-rod 49, adapted to slide in suitable bearings in standard E. To the front end of plunger-rod 49 is bolted or secured a cross-arm 50. Two pairs of guides 52 53 and 54 55 are formed on or bolted to the top of base-plate C. Adapted to slide in each pair of guides is a plunger-block 51 53. (See Figs. 3 and 6.) Suitable connections 55, depending from cross-arm 50 on plunger-rod 49, serve to reciprocate the plunger-blocks back and forth in the guides. Upon the top of each plunger-block 51 53 is suitably secured a plate 56, perforated as at 57. (See Fig. 6.) In its rear face each plunger-block is provided with a semicircular groove (shown in dotted lines in Fig. 6) adapted to conform to the contour of a shell.

Opposite the rear end of each plunger-block just specified are stationary blocks 58, having each a groove in its front face to correspond with the groove in the rear face of the plunger-blocks. The plunger-blocks are reciprocated toward the stationary blocks 58, and the grooves in the approaching faces thereof together form a circular opening of a size and form adapted to receive and fit a shell 40, as clearly shown in Fig. 6. Suitably secured to the top of each plunger-block is a plate 56, which extends some little distance beyond the rear face of said block and in the other dimension of the blocks overlaps the stationary blocks. In such plate 56 there is a hole 57, which is of larger bore than the diameter of the shell or of the groove formed by the adjoining recessed faces of the plunger-block and stationary block. When a shell 40 drops into the semicircular groove of the plunger-block, it would be liable to topple over except that it is prevented by the walls of the hole 57 in the plate 56. When this shell thus held in the semicircular groove in the plunger-block and in the hole of the plate 56 is moved in position under the placing-die ready to receive the wad which has just been formed, it is kept in exact registry by reason of the fact that the two grooves, respectively, in the plunger-block and stationary block are at that time directly under the placing-die and nicely fit the shell and hold it in proper position for the insertion of the wad; but, as will be seen, while the shell is thus actually held by these blocks there is a space between it and the walls of the slot 57 in the plate 56, and therefore after the wad has been inserted in the shell and the plunger-block recedes it does not carry the shell with it, because the plunger-block itself being only a semicircular groove will not move the shell, because the slot 57 is large enough to allow some movement of the plate before the wall thereof strikes the shell, and the action of the parts is so timed that before this latter event can happen the supporting-plate III is withdrawn and the shell has fallen below the plate 57. By this construction, therefore, the shell upon its entrance in front of the plunger-block is prevented from toppling over; yet when such shell has had its wad inserted the plunger-block can begin to recede without danger of carrying the shell with it, for the space in the perforation in the plate will allow sufficient play in the movement so that the shell may be dropped out of the way prior to any contact with the wall of the slot 57 with such shell. The comparatively large perforation 57 will also facilitate the entrance of the shell as it drops from the chute.

Shell-feeding chutes 59 60, one for each plunger-block, wad-spindle, and stripping and placing die, are secured by suitable means on the front faces of guide-boxes 31 32 and is each provided with a flaring mouth 61 62, into which the shell-tubes are fed by an operator before such tubes have received their wads. The shells descend in a column in the chutes until the lowermost shell reaches and rests upon plate 56 upon the top of a plunger-block, thus supporting the column of shells in the chute. It will thus be seen, referring to Figs. 3 and 6, that the column of shells is supported until the hole or aperture in the plate 56 is brought under such column and that then a shell drops through such aperture in the semicircular groove in front of the plunger-block, whereupon the plunger-block is forced toward the stationary block by the action of the springs upon cross-head 45, which in turn acts upon the rod 49, connected to the plunger-block and produces said motion of the blocks. This movement carries one shell forward in each block and retains the remaining shells in the chutes,
resting upon the perforate ends of the plates 56. The shell which has thus been fed forward by each block is, as heretofore set forth, in proper position to receive its wad, which is delivered to it by the stripping and placing die, and the shell is then caused to drop into the delivery-chute 114 and passes from the machine. After the shell has received its wad and passes from the machine the cam 44 bears upon the roller of the cross-head 45 and causes the latter to move the plunger-rod 49, the head 50, and the plunger-blocks 51 and 53, and superposed plates back into position to receive another shell.

The mechanism for feeding the strip of wad material will now be described.

An arm or bracket 63 64 projects from opposite sides of the machine, respectively, and each arm is provided with a hub 65 66, respectively, in the outer end thereof. In the hubs 65 66 are mounted the supporting stems of trays 67 68, respectively. The trays 67 68 are provided with a central projecting hub 69 70, respectively, adapted to receive thereon around the bundle or reel of wad material 71 72, respectively, spirally wound in convolute layers, much in the same manner as tape is wound. The trays 67 68 are respectively provided with a slit or opening 73 74 in the rim thereof adjacent to the machine, and through this slit the end of the strip is fed edgewise into the machine. Each slit 73 74 is respectively provided with a small circular post or pin 75 76, the office of which is to prevent the strip of paper from being torn off or broken by contact with the edge of a slit as the latter is fed and guided out of the tray. (See Fig. 3 of the drawings.) Suitable guide-blocks 77 78, supported by projections 79 and 80, bolted to the table A, are provided with guideways, as clearly shown in Fig. 4, to receive the end of the wad-strips and guide the same accurately and truly into the machine.

The lower end of shaft 42, projecting beneath the table A, is provided with a crank-arm 81, and pivoted to this arm is a triangularly-shaped lever 82. To each of the other corners of said lever is pivoted a crank-pin projecting from crank-plates 83 84, mounted on the lower ends of short shafts 85 86, projecting vertically through suitable bearings in table A. Upon the upper end of the left-hand shaft 15, the bolted on the front of the machine, is a disk 87, adapted to receive a slotted plate 88, having serrations upon one of the edges thereof. (See Fig. 3.) This slotted plate 88 is adapted to be adjusted back and forth upon its supporting-disk 87 in order to regulate the amount of projection of its serrated edge, which is adapted to be projected through a slot in the guide-box and engage the face of the strip of wad material and feed the same as said serrated plate is rotated. The guide-box at the left is shown in Fig. 3 as designated by the numerals 77, and the guide-box at the right by the numerals 78. The object of this feeding mechanism is to feed the end of the strip through the slit in the lower end of the bushing 88, the die, presently to be described, and the winding-spindle. (See Figs. 4 and 9.) One rotation of serrated disk 83 is sufficient for this purpose. This feeding of the end of the strip of wad material is effected during a period of rest of the winding-spindle, and as soon as the feeding is completed and the end of the strip is passed into and through the slit in the end of the winding-spindle a distance sufficient to be grasped thereby the said spindle begins its rapid rotation through the mechanism heretofore described, and thus reels off from the bundle 71 or 72, as the case may be, a sufficient length of material to form a wad, which is tightly wound around the spindle in a manner readily understood.

The construction of the strip-feeding mechanism employed on the right-hand side of the machine looking from the forward end is similar in all respects to that just described for the left-hand side, except that a gear-wheel 89 is mounted on the shaft, to which is imparted rotation by a crank 94, which in turn is given movement by its connection with the swinging lever 82, as will be best seen in Figs. 2 and 3 of the drawings. This gear-wheel meshes with a gear 90 on the lower end of the shaft which supports the serrated feeding-disk. The object of these gears is to change the direction of rotation of the right-hand feeding-disk, so that the disks will feed toward each other, as will be readily understood.

When the wad is formed on the end of the winding-spindle, it is torn or broken from the strip. The mechanism for accomplishing this purpose will now be described.

A circular plate 91 is mounted upon and rotates with shaft 42. This plate has a sharply-defined cam tooth or projection 92 on the periphery thereof adapted to engage a cross-head 93. The friction roller 94 may be provided to reduce the friction of contact. This cross-head 93 is adapted to slide back and forth in suitable guides projecting from base-plate C, and the action of the cam-tooth 92 thereon is resisted by springs 95, coiled around rods 96, carried by said cross-head, which said rods slide in perforated lugs or ears 96, bolted or secured to base-plate C. Two arms 97 98 project forwardly from said cross-head, one on each side of the machine, through suitable guide-plates 99, (see Fig. 1,) bolted or secured to the front standard E, and each carries on its forward end in a suitable transverse perforation a pin 99, suitably held therein by means of a set-screw, so as to permit of adjustment as occasion may require. This pin is provided with a rounded head 100, adapted to be received in a similarly-shaped recess in the surface of a sleeve or bushing 101, surrounding the lower end of the winding-spindle and within or longitudinally through which the wad stripping and placing die is
adapted to reciprocate. This sleeve or bushing 101 constitutes the die by which the wad when wound is torn or broken from the strip of wad material. Said die 101 is slitted in its lower edge to permit the end of the strip of wad material to be fed therethrough to the slit in the lower end of the winding spindle (see Figs. 9 and 10) and is held stationary by pins 99 and arm 97 during the winding operation. Upon the face of block 31 adjacent to the slits through which the strip of material is fed into the spindle is provided an adjustable plate 102 to assist in the tearing or breaking of the wad from the strip of wad material. The operation of this part of the mechanism is as follows: The wads are wound on spindles 22-28. Before the stripping and placing die begins to descend to strip the wad from its winding-spindle and place the same into the end of a shell-case 40 the camooth 92 acts upon cross-head 93 to project rapidly in a forward direction arms 97, carrying the pins 99. The die 101 is thus given a quick short rotary movement and tears or breaks the wad from the strip of material from which it is wound, as will be readily understood from Figs. 9 and 10. The springs 94, acting in the opposite direction upon cross-head 93 and arms 97, serve to return said tearing or breaking die to its normal position to receive through the slot therein the broken or torn-off end of material to form another wad. The mechanism for supporting the shell-case 40 while having a wad placed therein and permitting it to be removed from the machine when it has received the wad will now be described.

Upon the lower end of the left-hand disk feeder shaft 85 looking from the front of the machine, is mounted a cam 108, (see Figs. 1, 2, and 4,) adapted to engage a sliding rod 104. A roller 105 may be provided to reduce friction. Rod 104 is adapted to slide in suitable guides 107-107, carried by a plate 106, secured to and depending from arm or bracket 63. This rod 104 is shouldered, and the rear end slides through a depression in an upturned flange 108, carried by plate 106. A spiral spring 109 resists the action of cam 108. Rod 104 carries a standard 110, rising therefrom, and on the top of this standard is adjustably secured a strip or plate 111, having perforations 112 therein. These perforations are adapted to register with similar perforations in base-plate C and table A during a certain part of the reciprocating movement of the plate. This plate moves in suitable guides in the base-plate C transversely of the machine and is adapted to receive and support the shell-cases when they are brought into position by sliding block 51 to receive a wad, as clearly shown in Fig. 6. After the wad has been placed therein the cam 103 acts to move the plate 111, so as to bring the perforations 112 into register with perforations 113 in the base-plate and table, allowing the shell-cases, with the wads placed therein, to fall by gravity into chute 114, from which they are collected in any suitable receptacle.

A hand-wheel 115 is provided on shaft 5 for rotating said shaft by hand for adjusting purposes.

It will be observed that cross-head 45 is moved positively by cam 44 in a direction to carry the blocks 51-53 into position to receive the shells from the feeding-chutes 59 and 60 and that said blocks 51-53, carrying the shells, are moved rearwardly into position for the cases to receive the wads by means of the springs 47, thus avoiding possible injury to the shells should they not be received in proper position in the groove in the face of the placing blocks 51 or 53. It will be seen from the above description that upon each complete revolution of main shaft G two wads are wound, placed in their shell-cases, the shell-cases ejected from the machine, and fresh ones brought into position to receive wads. We are aware that broadly it is not new to perform these operations and that wad-spindles have been operated periodically by means of continuously-rewinding shafts, the intermission being accomplished by forming the wad-spindle into two or more parts, which were caused at intervals to clutch and unclutch or to have a play one upon the other, and this we do not desire to be understood as claiming. The mechanism which we use to secure the intermission in the revolution of the wad-spindle is outside of the spindle itself—that is, it is arranged between the spindle and the main driving-shaft instead of being a form of clutch acting as a part of the spindle. Within the limits indicated many modifications may be made in the form of the mechanism for securing the periodical movement of the wad-spindle without departing from the spirit of our invention, and while we prefer the form shown and described we wish it to be understood that we do not desire to be limited to such exact details and arrangements as to this mechanism or any of the other mechanisms which we have shown and described. We also wish to disclaim as our invention the triangular arm or lever 82 per se, as we only design to be regarded as the inventors of the combination in which said lever is shown and described, that combination being capable of coaction with some equivalent element or elements in place of the lever.

Having thus described our invention, what we claim as new, and desire to secure by Letters Patent of the United States, is:

1. In a machine for winding wads for cartridge-shells, a rotatable winding-spindle slotted at its lower end, and adapted to receive the strip of wad material and winding the same into a wad, in combination with a feeding mechanism for automatically feeding the wad-strap to the spindle, and a positively-acting gearing connecting the winding-spindle with the driving-shaft and including inter-
meshing mutilated gears constructed and arranged to successively rotate said spindle and arrest the rotation thereof; substantially as and for the purpose set forth.

2. In a machine for winding wads for cartridge-shells, a rotatable spindle slotted at its lower end and adapted to receive the strip of wad material and to wind the same into a wad, in combination with an automatic mechanism for feeding the wad-strip to the spindle, confining means for holding the coiled wad-strip while being wound, and a positively-acting mutilated gearing connecting the spindle with the driving-shaft and constructed and arranged to successively rotate such spindle and arrest the rotation thereof; substantially as and for the purpose set forth.

3. In a machine for winding wads for cartridge-shells, a rotatable winding-spindle slotted at its lower end, in combination with automatic mechanism for feeding the wad-strip thereto and a bushing surrounding the spindle and adapted to confine the coil of the wad-strip as it is being wound, and positively-acting mutilated gears connecting the spindle and the main driving-shaft and including intermeshing mutilated gears constructed and arranged to successively rotate and arrest the spindle; substantially as and for the purpose set forth.

4. In a machine of the class described, a rotatable winding-spindle slotted at its lower end, in combination with automatic mechanism for feeding the wad-strip to the spindle, a bushing surrounding the spindle within which bushing the wad is wound, devices for holding a shell in position beneath the spindle, and positively-acting gears connecting the spindle and the main shaft and including a pair of mutilated gears, one of which has a portion of its surface smooth and curved below the level of its teeth and the other of which has a projecting surface concavely curved to fit the curve of the smooth surface on the other gear; substantially as and for the purpose set forth.

5. In a machine of the class described, a rotatable winding-spindle, in combination with positively-acting gearing connecting such spindle with the main driving-shaft and including a pair of mutilated gears, one of which is convexly curved on a surface below the level of its teeth and at each boundary of said line of teeth has a curved recess and a depression, and the other of such gears having a projection provided with a surface concave on its face and curved sides whereby such projection coacts with the recess and with the convex surface of the first-mentioned mutilated gear, an automatic feeding mechanism for the wad-strip and a confining bushing within which the wad is wound; substantially as and for the purpose set forth.

6. In a machine of the class described, a rotatable spindle slotted at its lower end, in combination with an automatic wad-strip-feeding mechanism, a confining mechanism within which the wad is wound, and positively-acting gearing connecting the spindle and main drive-shaft and comprising gearing upon the spindle, gearing upon cross-shafts meshing with the gearing upon the spindles, and a pair of mutilated locking gears; substantially as and for the purpose set forth.

7. In a machine of the class described, the combination with the wad-winding spindle and mechanism for rotating said spindle periodically, a strip-feeding mechanism adapted to feed the wad-strip into a slot in the spindle, a die with slotted lower edges surrounding the spindle and providing a space between its inner walls and the spindle within which the wad may be wound, and mechanism for oscillating said die, and means for cooperating with the die for rupturing the strip of wad material; substantially as and for the purpose set forth.

8. In a machine of the class described, the combination with the wad-winding spindle having a slotted lower end, and mechanism for rotating said spindle periodically, a circular lower die and slotted for the passage of the wad-strip and surrounding the slotted end of the spindle but with a sufficient intervening space within which the wad may be formed, a plate tangentially arranged to the die and extending partially over the slot in the die, the mechanism for oscillating such die periodically, and means for feeding the wad-strip through the slot in the die and into the slot in the spindle; substantially as and for the purpose set forth.

9. In a machine of the class described, the combination with the wad-winding spindle, of a mechanism for rotating said spindle periodically, a strip-feeding mechanism, an oscillating die adapted to receive the strip of material, means cooperating with said die for rupturing the strip of material, a reciprocating stripping and placing plunger, and suitable means for properly actuating all the several mechanisms; substantially as and for the purpose set forth.

10. In a machine of the character described and in combination with wad-winding mechanism, a slotted wad-strip rupturing or tearing device through which the wad-strip is adapted to pass, and means for imparting a partial rotation thereto; substantially as and for the purpose set forth.

11. In a machine of the class described, and in combination with wad-winding and wad-placing mechanism, a wad-strip tearing or breaking device comprising a slotted bushing or die through which the wad-strip is adapted to pass, and means for partially rotating said die, and cooperating means for acting in connection with such rotatable die in the tearing or breaking operation; as and for the purpose set forth.

12. In a machine of the character described, a wad winding and placing mechanism suitably actuated, in combination with a wad-strip rupturing device comprising a stationary plate and a cooperating slotted oscillating
die and mechanism for actuating the same, including a cam on the main shaft, a cross-head arranged to be reciprocated by said cam, an arm carried by said cross-head, and connections between said arm and die; substantially as and for the purpose set forth.

15. In a wad-winding machine, a wad-winding mechanism, means for feeding a strip of wad material thereto, a shaft having a cam thereon, and means for rotating said shaft, a cross-head adapted to be operated by said cam, springs resisting the action of said cam, arms carried by said cross-head and pins in the ends thereof, and wad-strip-tearing devices adapted to be operated by said pins; all combined and arranged as and for the purpose set forth.

20. In a wad-winding machine, a wad-winding mechanism, means for feeding a strip of wad material thereto, a shaft, means for rotating the same, a disk having a sharply-defined cam-tooth on the periphery thereof mounted on said shaft, a wad-tearing die provided with a slot through which the strip of wad material is fed, a reciprocating part operated by said cam-tooth and connected to said wad-tearing die for imparting a partial rotation to said die whereby the strip of wad material is ruptured; and as and for the purpose set forth.

25. In a wad-winding machine, the combination with a slotted wad-winding spindle and means for giving the same a rapid rotation, of a wad-strip-feeding mechanism, a slotted wad-strip-breaking device through which the wad-strip is fed to said spindle, and means for partially rotating said slotted wad-strip-breaking die to which said wad-strip is adapted to be fed, and means adapted to cooperate with said die for tearing or breaking the wad when formed from the strip of wad material when said die is partially rotated; and as and for the purpose set forth.

30. In a wad-winding, a stripping and placing machine, a slotted wad-winding spindle, means for giving the same a periodically-rotated, a reciprocating stripping and placing die surrounding said spindle and means for reciprocating the same, a slotted strip tearing or rending die surrounding said stripping-die and arranged adjacent to the end of said spindle, means for giving said tearing or rending die a partial rotation periodically, means cooperating therewith for effecting a rupture of the strip of material, a shell-case-feeding mechanism and a wad-strip-feeding mechanism; substantially as and for the purpose set forth.

35. In a machine of the class described, a slotted and recessed wad-strip-tearing die, a reciprocating arm, a pin carried thereby having a rounded head adapted to be received in said recess, means for reciprocating said arm, and means cooperating with said die for tearing or rupturing the strip of material; and as and for the purpose set forth.

40. In a machine of the character described, a wad-winding mechanism, means for feeding a strip of wad material thereto, a guide-block bushing, a slotted wad-strip-tearing die carried thereby through the slot in which the wad-strip is adapted to be fed, a plate carried by said block, and means for partially rotating said tearing-die; and as and for the purpose set forth.

45. In a machine of the character described, a countersink guide-block bushing in a countersink, a slotted bushing set in said countersink, a slotted wad-summering or breaking die carried in said bushing, an adjustable plate secured to the face of said bushing adjacent to the slot therein, and means for giving said tearing or breaking die a partial rotation; and as and for the purpose described.

50. In a machine of the character described, and in combination with a wad-winding and wad-placing mechanism, a shell-case-feeding mechanism comprising a plunger-block groove on its face, a reciprocating plunger-rod, and connections between said plunger-rod and plunger-block; and as and for the purpose set forth.

55. In a machine of the character described, and in combination with wad-winding and wad-placing mechanism, a shell-case-feeding mechanism comprising a feeding-chute adapted to receive the cases and to deliver the same singly, a plunger-block provided with a semicircular groove in the face thereof adapted to receive a case, a reciprocating plunger-rod connected to said plunger-block and adapted to reciprocate the same, whereby a shell-case is removed from the chute upon each reciprocation of the plunger-block; and as and for the purpose set forth.

60. In a machine of the character described and in combination with wad-winding and wad-placing mechanism, a shell-case-feeding mechanism comprising a feeding-chute, a plunger-block groove in the face thereof, a perforated plate carried by said block adapted to support the column of cases in the chute upon the movement of said block in one direction but to permit a shell-case to drop through said perforation and into the groove upon the movement of said block in the opposite direction, a reciprocating plunger-rod, means for reciprocating the same, and connections between said plunger-rod and plunger-block; and as and for the purpose specified.

65. In a machine of the character described, a stationary block having a semicircular groove on its front face, a reciprocating plunger-block provided with a semicircular groove on its rear face registering with said first-mentioned groove and adapted to receive therein a shell-case from a suitable feeding-chute, means for reciprocating said block, whereby said shell-case is moved so as to be grasped and securely held in the circular groove formed by the meeting of the edges of said blocks, in combination with wad winding, stripping and placing mechanism, wad-
strip-feeding mechanism, and means for operating the mechanisms mentioned; and as and for the purpose set forth.

24. In a machine of the character described and in combination with wad winding and placing mechanism, a shell-case-placing mechanism comprising a plunger-block, a plunger-rod connected therewith, a cam for moving said rod in a direction for the plunger-block to receive a shell-case, and springs for moving said rod in the opposite direction to place said case in position to receive a wad, and a stationary block arranged to cooperate with said plunger-block to clamp the case in wad-receiving position; substantially as and for the purpose set forth.

25. In a wad winding and placing machine, the combination with a wad-winding mechanism, a wad stripping and placing mechanism, a wad-feeding mechanism and means operating said mechanisms, of a shell-placing mechanism comprising a grooved plunger-block, a feeding-chute adapted to deliver to the groove in said block the case, a plunger-rod connected to said block, a cam for moving said plunger-rod in a direction to receive a shell-case in the plunger-block, springs for moving said plunger rod and block in the opposite direction for placing the case in position to receive a wad, a stationary block arranged to cooperate with said plunger-block to clamp said case in wad-receiving position, and means for rotating said cam; as and for the purpose set forth.

26. In a wad winding and placing machine and in combination with a wad-winder, a wad-placing mechanism and shell-placing mechanism, of a perforated plate adapted to support the case when in position to receive a wad, and means for moving the same to permit the case to drop through the perforations therein when the wad has been placed in said case; as and for the purpose set forth.

27. The combination with a wad-winding mechanism, wad stripping and placing mechanism, wad-strip breaking or tearing mechanism, shell-case feeding or placing mechanism, and means for operating the same, of a perforated table, a plate for holding the shell-cases in position while receiving the wads and having perforations therein and adapted when said plate is reciprocated to register with the perforations in the table, and means for reciprocating said plate.

28. In a machine of the character set forth, a single main driving-shaft, a pair of wad-winding spindles, a wad-stripping and wad-placing die for each spindle, means for feeding a strip of wad material to each winding-spindle, cartridge-shell-case-placing mechanism, a single reciprocating plunger, a pair of plunger-heads carried thereby and each adapted to feed a shell-case to a winding, placing and stripping mechanism, and gearing intermediate said driving-shaft and the devices and mechanisms mentioned for operating all the same in unison, whereby upon each revolution of said main shaft a wad is wound and placed in each of two shell-cases; as and for the purpose set forth.

29. In a machine for winding wads, a slotted wounding-spindle, a drive-shaft, gearing between said shaft and spindle including mutilated gears constructed to impart intermittent rotation to said spindle and to lock the same during its period of rest, and means for feeding a strip of wad material to said winding-spindle, whereby during the rotation of said spindle a wad is formed thereon as and for the purpose set forth.

30. In a machine for winding wads and in combination with shell-feeding mechanism, a winding-spindle, a driving-shaft, gearing between said shaft and spindle adapted to impart intermittent rotary motion to the latter, including intermeshing mutilated gears, and a wad-strip-feeding mechanism adapted to present the end of a strip of wad material to said spindle, whereby when said spindle is actuated a wad is wound thereon; as and for the purpose set forth.

31. In a machine of the character described, a stationary slotted guide-block, a slotted wad-strip-tearing die arranged within said guide-block, means for feeding the wad-strip through slots in said block and die, and means for moving said die relative to said block; as and for the purpose set forth.

32. In a machine of the class described, a wad-winding spindle, a stationary slotted guide-block, a strip-rupturing stationary plate, a slotted die arranged in the block, and means for feeding a wad-strip through the slots in said block and die, whereby the strip of material is ruptured or broken; as and for the purpose set forth.

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