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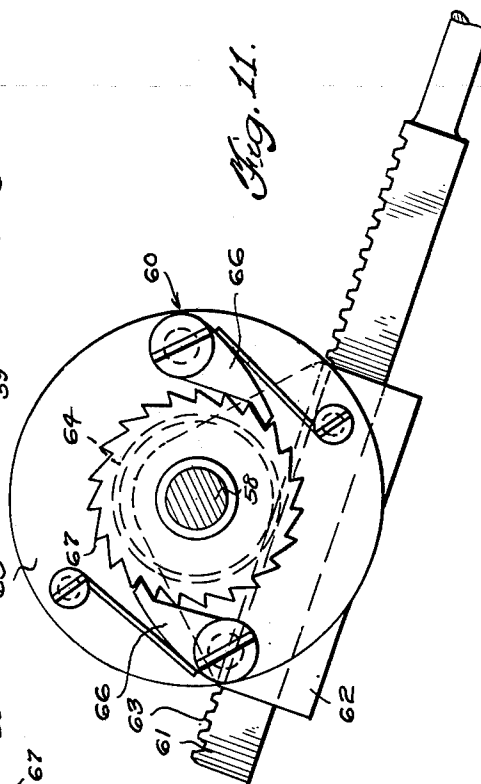
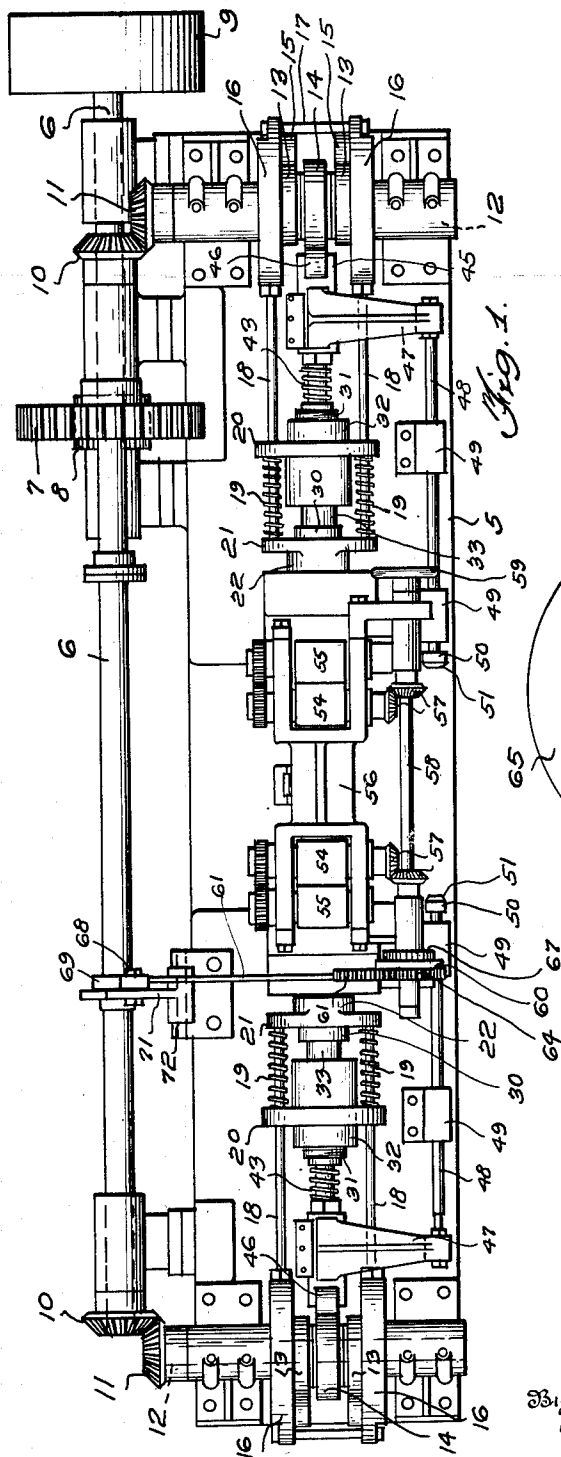
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2,061,576

WAD CUTTING AND PLACING MACHINE

Filed Jan. 30, 1933

7 Sheets-Sheet 1



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Nov. 24, 1936.

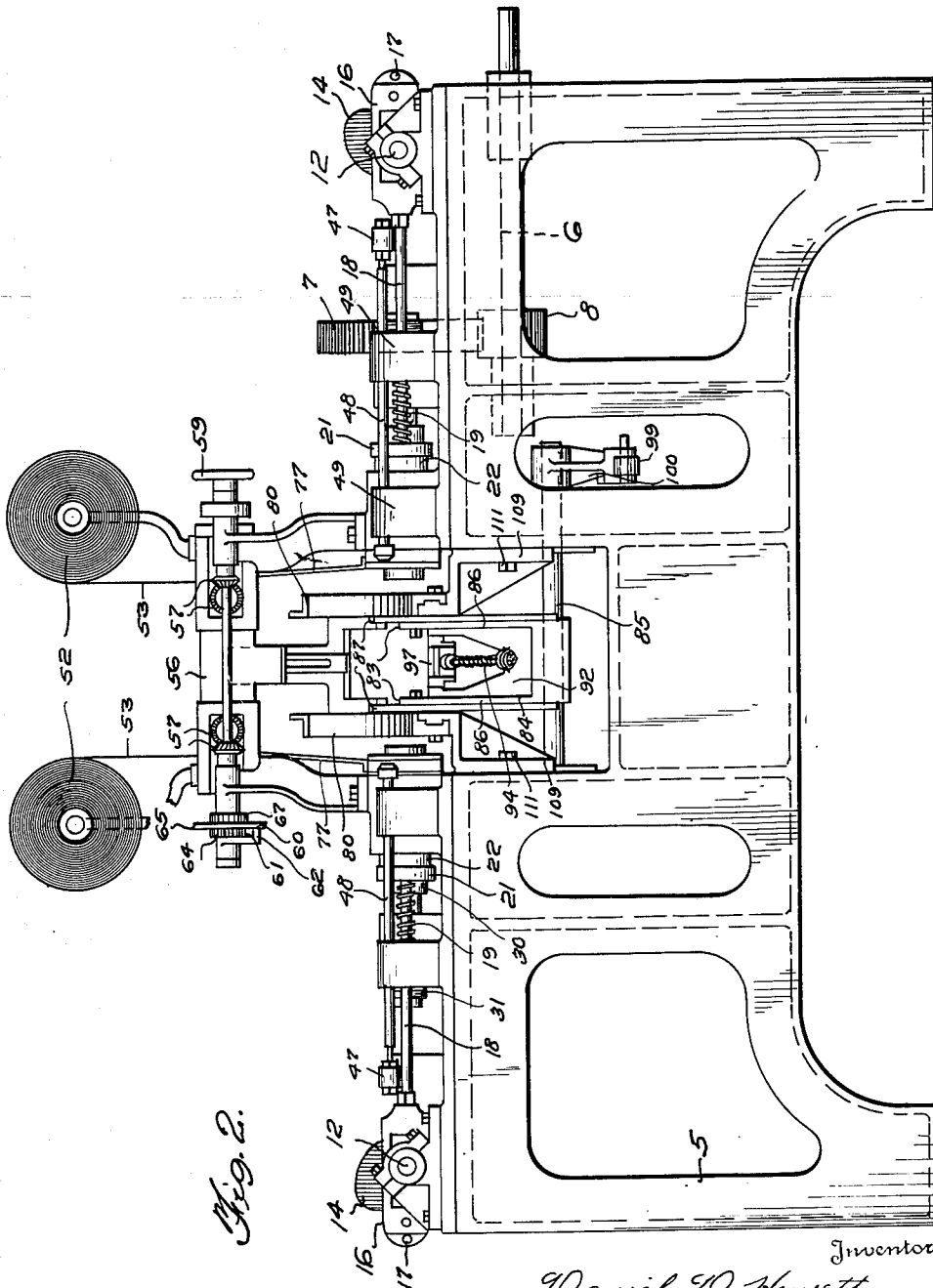
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7 Sheets-Sheet 2



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7 Sheets-Sheet 3

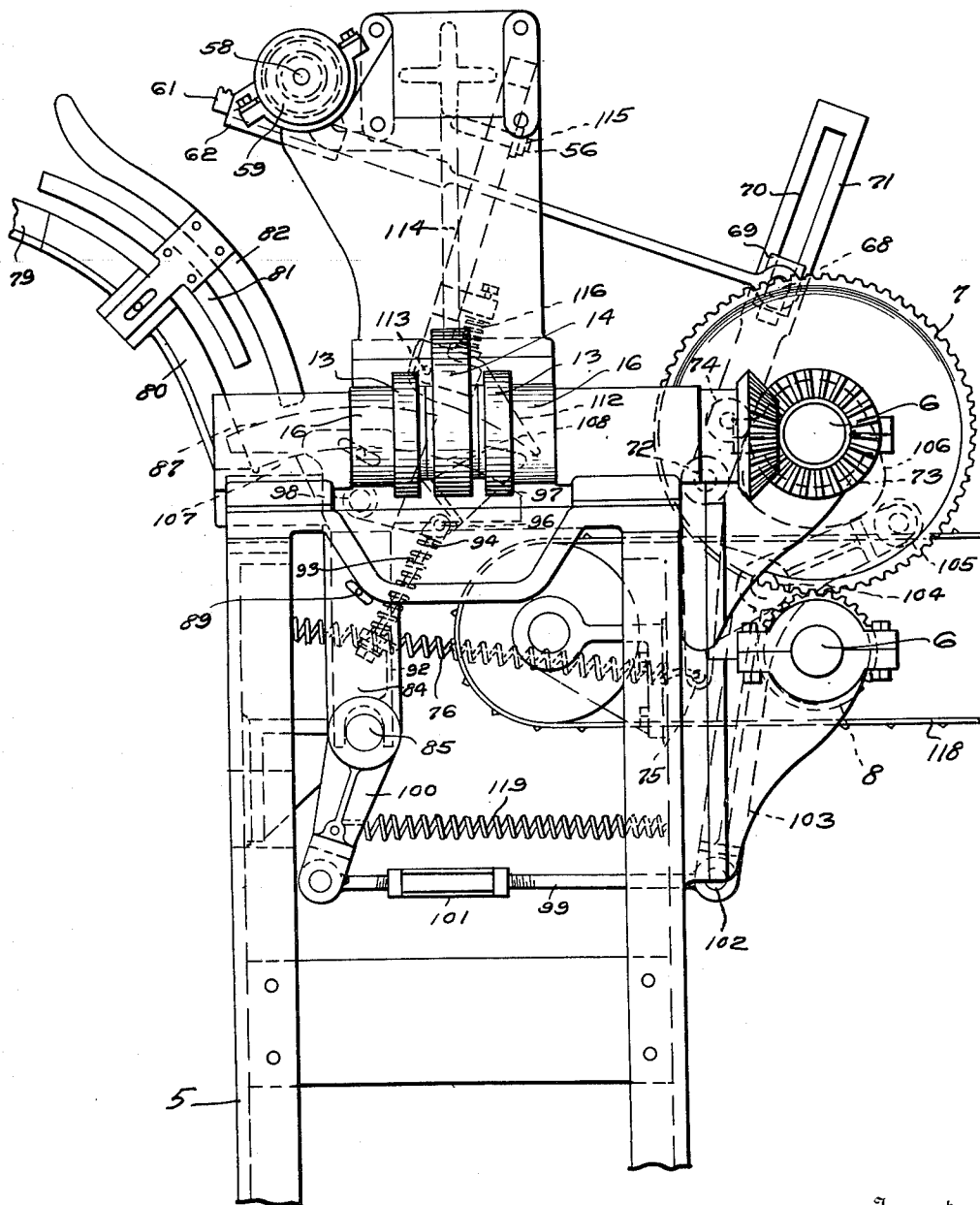


Fig. 3.

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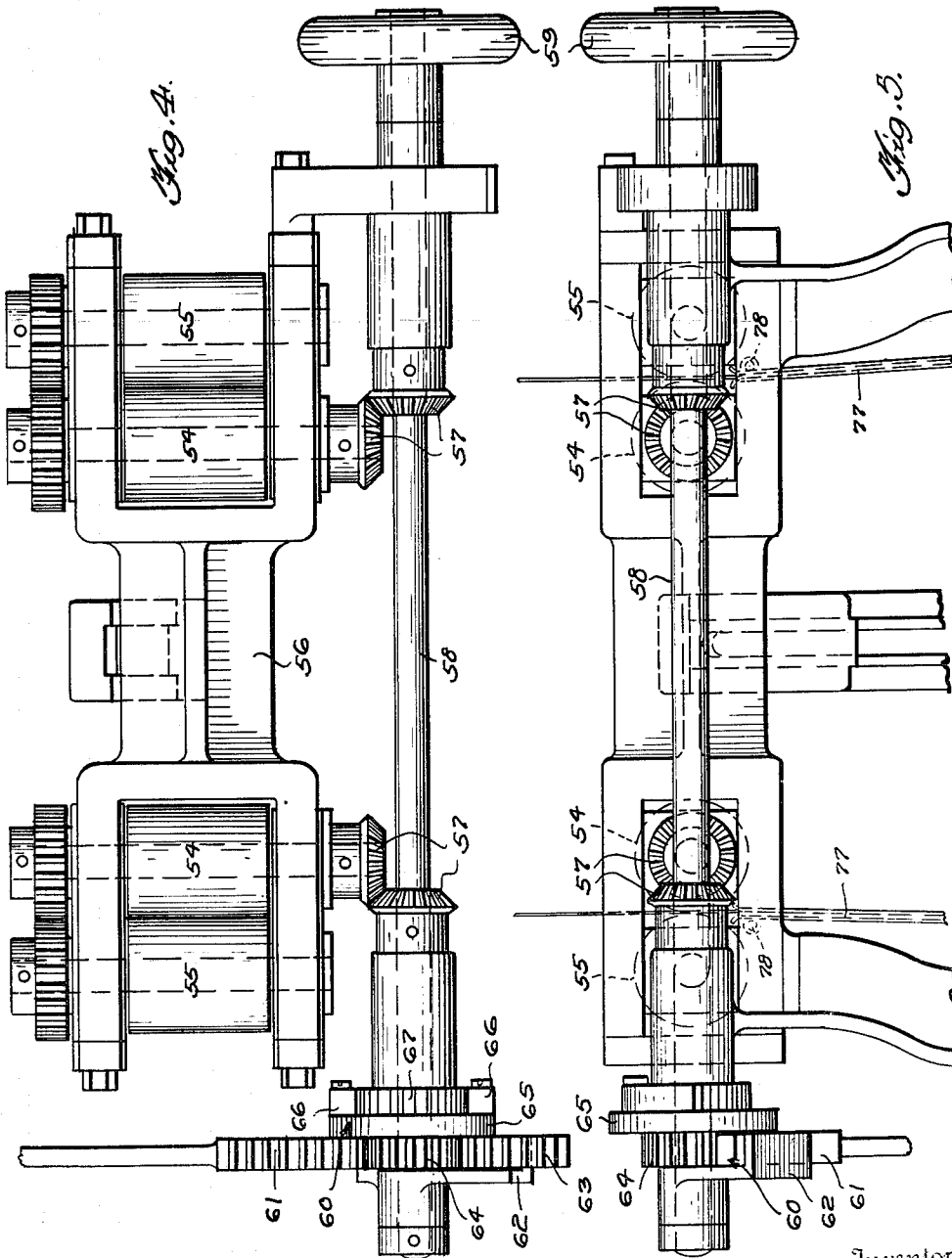
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WAD CUTTING AND PLACING MACHINE

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7 Sheets-Sheet 4



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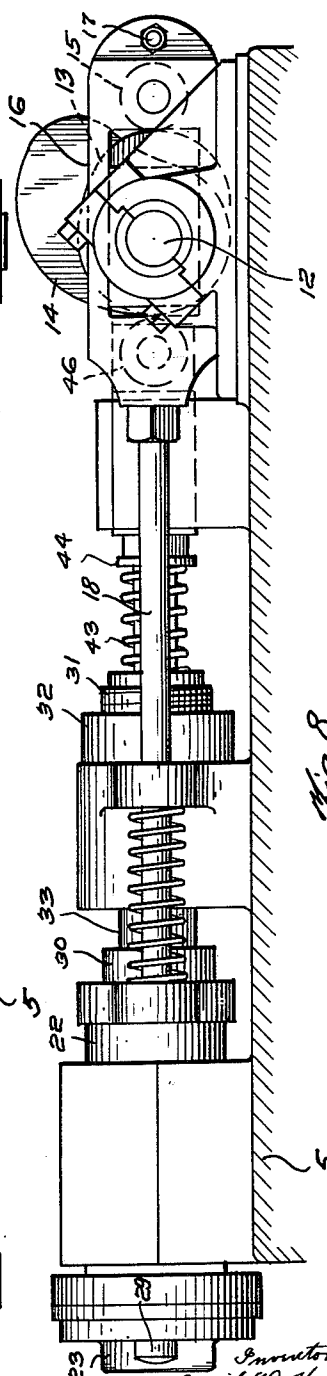
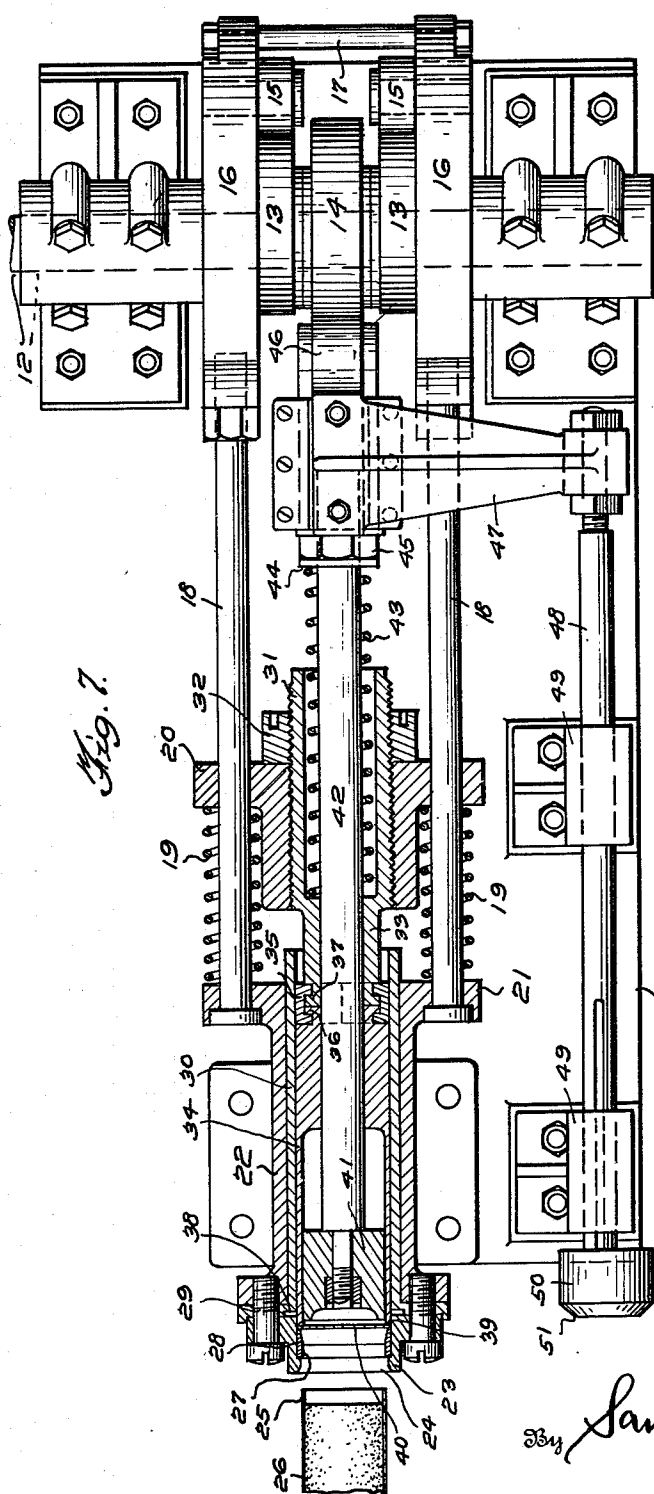
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WAD CUTTING AND PLACING MACHINE

Filed Jan. 30, 1933

7 Sheets-Sheet 5



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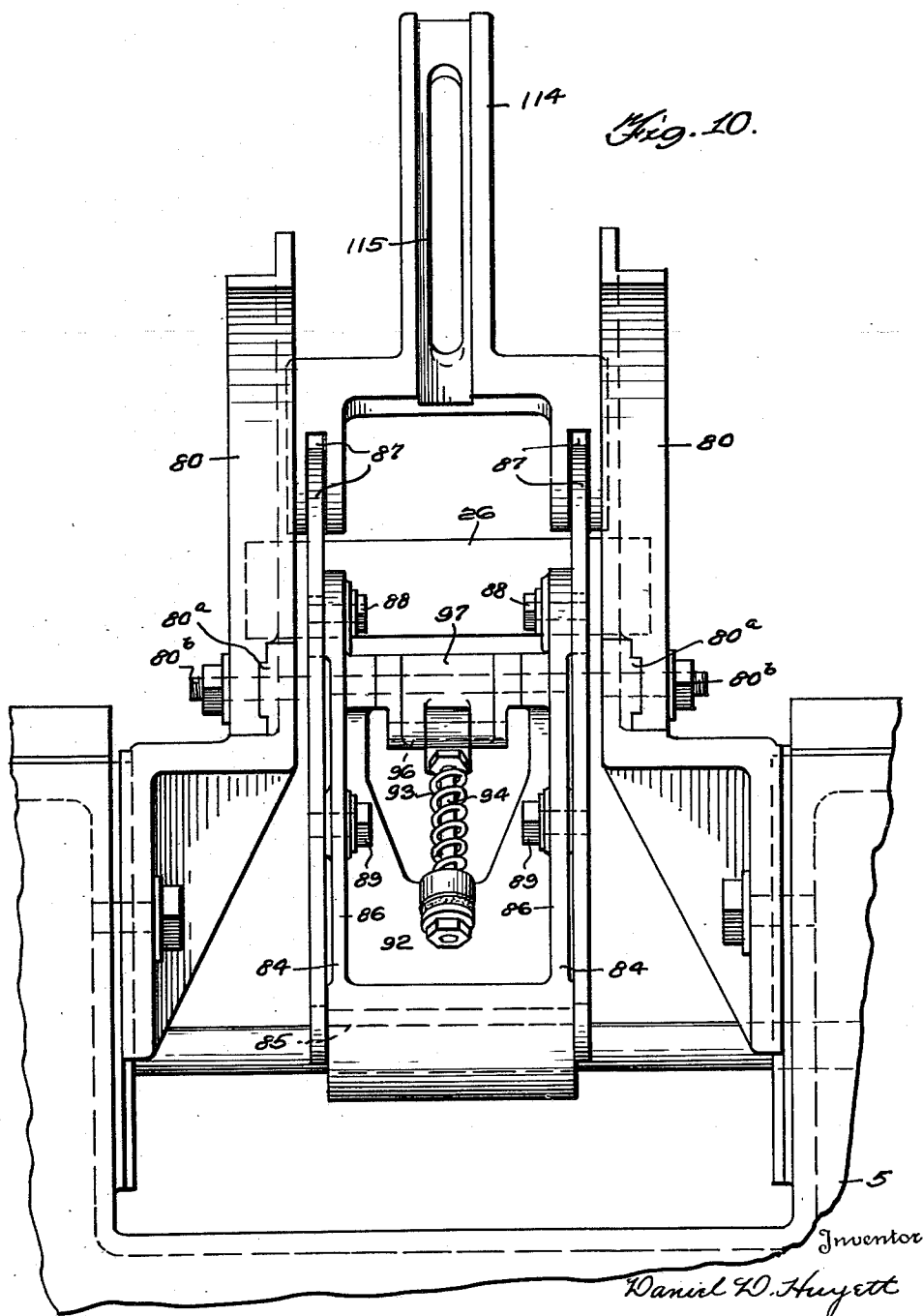
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WAD CUTTING AND PLACING MACHINE

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7 Sheets-Sheet 6



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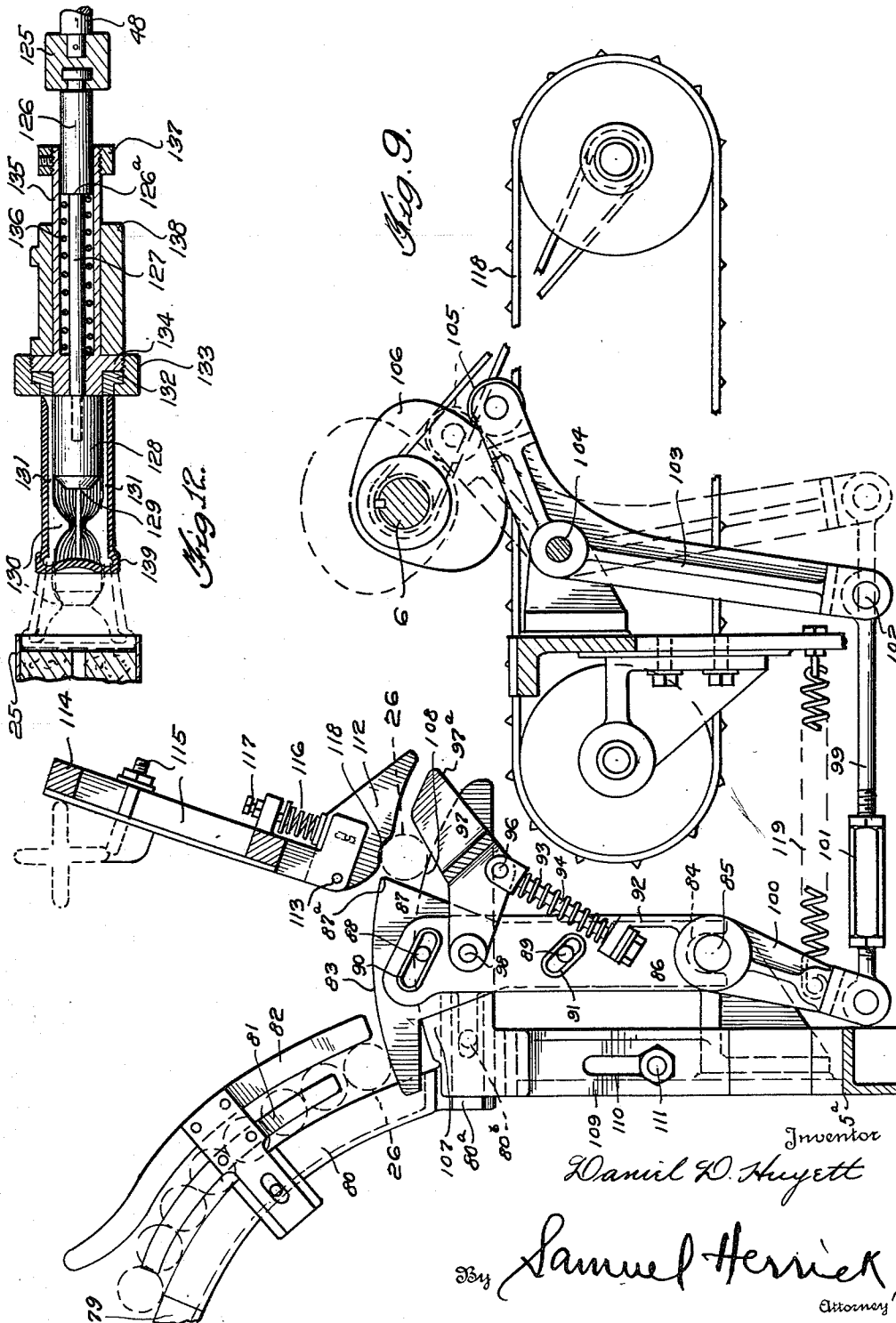
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2,061,576

WAD CUTTING AND PLACING MACHINE

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UNITED STATES PATENT OFFICE

2,061,576

WAD CUTTING AND PLACING MACHINE

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24 Claims. (Cl. 86—23)

This invention relates to a wad cutting and placing machine adapted to form and place wads simultaneously in the opposite ends of a simple paper tube constituting the carrier for an explosive substance, and it is a primary object of the invention to accomplish this result speedily and economically and also in such manner as to provide for the maximum of safety against possible explosions during such operation.

A very popular form of a cheap low explosive package is that marketed under the name "Blakstix". In the formation of this explosive package simple paper tubes open at both ends and formed of quite light weight paper are filled with black powder or like relatively low explosive; said powder being moist and more or less plastic when packed in said tubes. After the powder has been packed and levelled off in said tubes the packages are subjected to a drying operation under which the powder becomes quite hard. Wads or caps are then placed in each end of the paper tubes and the ends of the tubes are crimped over such wads to completely seal the packages.

Prior to my invention it has been necessary to place these wads in the ends of the tubes or packages, by hand. The machine of the present invention is designed to automatically cut the necessary material for the formation of wads, from strips of paper and place the wads in the ends of the tubes. The crimping of the ends of the tubes over the wads is not a function of the present invention but is performed at another point and after the packages have left the machine of this application.

Further objects and advantages of the invention will be set forth in the detailed description which follows:

In the accompanying drawings

Figure 1 is a plan view of the machine constructed in accordance with the invention.

Figure 2 is a side elevation thereof.

Figure 3 is an end elevation.

Figure 4 is a plan view of a feed mechanism hereinafter described.

Figure 5 is a side elevation of the feed mechanism.

Figure 6 is a detailed perspective view of a guide plate hereinafter described.

Figure 7 is a horizontal sectional view through the die and cutting mechanism hereinafter described.

Figure 8 is a side elevation of the die and cutting mechanism.

Figure 9 is a transverse sectional view through

the central portion of the machine illustrating the cartridge feeding mechanism.

Figure 10 is a side view, upon an enlarged scale, of the cartridge feeding mechanism.

Figure 11 is a detailed view of a pawl and ratchet mechanism hereinafter described and

Figure 12 is a sectional view of a modified form of expander.

Like numerals designate corresponding parts in all the figures of the drawings.

In the drawings, 5 designates the supporting frame upon which the several instrumentalities hereinafter described are mounted. A main drive shaft 6 is driven by gear 7, pinion 8, and pulley 9 from any suitable source of power. The drive shaft 6 carries bevelled pinions 10 at its opposite ends which act through bevelled pinions 11 to drive transverse shafts 12 of the wad cutting and forming members.

The wad cutting and forming mechanisms are substantially identical in construction and are mounted on the opposite ends of the machine so that the thrust of one of these mechanisms is balanced by the thrust of the other. That is to say, they act in opposition to each other to simultaneously thrust the cut wads into the opposite ends of the tubes of the explosive cartridges and, therefore, the description of one of these mechanisms will serve as a description of both.

By referring to Figs. 3, 7, and 8, it will be seen that the cross shafts 12 carry a pair of cams 13 disposed upon opposite sides of a central cam 14. The function of cams 13 is to thrust against rollers 15 that are carried by the cross head comprising side members 16, tie bar 17 and rods 18, to thrust these parts toward the right in Fig. 7 and against the tension of springs 19. The springs 19 bear between a fixed frame member 20 and the flange 21 of a die carrier 22.

The die 23 has a flaring mouth 24 adapted to receive and support the projecting end 25 of the tube 26 of the explosive cartridge; the tube entering the mouth of the die as the die moves toward the tube until the end of the tube abuts against the thimble 27. This thimble is rearwardly flared, as indicated at 28. The die and thimble are removably mounted upon the die carrier by screws 29; the die, die carrier and a sleeve 30 being mounted for reciprocation together.

A sleeve 31 adjustably mounted through the medium of a lock nut 32 in the fixed frame member 20 has its forwardly projecting portion 33 removably connected to the fixed annular cutter 34 by means of a split ring 35, said split ring being of channel formation and being adapted to en-

gage over the collars 36 and 37 of the cutter and extension 33, respectively. The rear face of the die 23 or the forward face of sleeve 30, as the case may be, or both of these elements, may be transversely channelled to provide a passage 38 for the strip of paper from which the wads are to be cut. The actual cutting is effected when the sharp rear edge 39 of the die moves over the sharp outer and forward edge of the annular cutter 34. This die functions as both a cutting and a forming element for the paper caps or wads, as herein described.

In Figure 7, the parts are shown in the position that they occupy after the cutting of the paper has been effected by the rearward movement of the die with respect to the annular cutter; the die having moved rearwardly past the forward cutting edge of the cutter and the severed piece of paper from which the wad is to be formed, being indicated at 40. In the rearward movement of the die under the influence of the cams 13, the rear edge of the thimble is brought close enough to the forward end of the cutter 34 to hold the paper disk 40 in place but not close enough to tightly bind said paper disk 40.

It is important to note that the cutting action takes place when the die is moving away from the explosive package. This makes for safety in that it minimizes the possibility of any particles of explosive being in a position to be set off during the cutting action.

A forming plunger head 41 is mounted within the cutter 34 and is actuated by a tubular rod 42 under the influence of cam 14. After the paper has been cut off by the action of cams 13, the springs 19 act to yieldingly thrust the die 23 toward the tubes or cartridges 26 to thereby cause the free ends of said tubes to enter the die to be supported by the same while the wads are being thrust into said tubes. At the same time that the die starts to move forwardly or toward the tube, the plunger 41 moves forwardly and the cams 13 and 14 are so shaped and arranged that the plunger moves somewhat faster than the die so that by the time the tubes are positioned and seated in the mouths of the dies, and said dies have come to rest, the plunger will have thrust the paper disk 40 forwardly in such manner as to cause the flared portion 28 of the thimble to cup the edge of the disk and to bring said disk into position to immediately enter the mouth or open end of the tube 26. It is also important to note that the flanged wad is moving forward through the drawing throat, as the shell or tube is positioned and seated in the mouth of the die. This assures against any loose particles of explosive, which may fall out at this point, dropping into the cutting and forming portions of the die. Any loose particles which may fall out of the shell will be, with complete safety, pushed back into the cartridge by the advancing wad.

It will be observed that the rearward or cutting action of the die is a positive one under the action of cams 13, while the forward movement of the die is a cushioned one under the action of springs 19. Conversely, the action of the plunger 41 forwardly is a positive one under the movement of cam 14, while the rearward movement of the plunger is a cushioned one under the action of a spring 43 which surrounds the rod 42 and bears between a shoulder of sleeve 31 and a washer 44 disposed in front of a forked element 45 which carries a roller 46 against which the cam 14 thrusts. A laterally extending arm 47 supported from the forked member 45 moves rod 48 that

is slidably disposed in bearings 49. This rod carries a block 50 having a tapered face 51 that is adapted to enter the open end of a tube which has not yet come into alignment with the dies, to straighten the ends of the tubes and bring them to truly circular formation so that when they enter the dies they will hug the same snugly entirely around the circumference of the dies. This insures that there will be no inwardly indented ends upon the tubes to prevent the ready entry of the wads into said tubes. The foregoing action of expanding block 50, in shaping the ends of the tubes, takes place at the time the tube is at the bottom of the guideway comprised by elements 79 to 82 (Fig. 9) and hereinafter described. That is, the expander acts upon the lowermost of the tubes feeding down, and still in, the guideway comprised by said elements 79 to 82.

The structure just described lends itself to the ready substitution of other sizes of dies, forming plungers and cutters, when desired; it being apparent that by the mere removal of the screws 29 the die and thimble may be removed and others substituted. Further, since the forming heads 41 are threaded upon the end of the rods 42, other sizes of heads may be substituted and other sizes of cutters may be substituted for those shown by moving the parts to such position that the split ring 35 is exposed beyond the rear end of sleeve 30. When this occurs the two halves of the split ring may be lifted out of engagement with the collars 36 and 37 to permit the substitution of a different size of cutter 34.

The paper rolls from which the wads are cut are indicated at 52, and the paper webs 53 from these rolls pass downwardly between the pairs of feed rollers 54, 55 that are supported in a feed mechanism frame 56. The roller 54 of each pair is driven by bevelled pinions 57 from a common drive shaft 58. Motion may be imparted to this shaft by hand, through the medium of a hand wheel 59; this being of convenience in the threading of the paper through the rolls. However, the drive of the shaft 58, when the machine is in operation, is through the medium of a pawl and ratchet mechanism 60 that is actuated by a rack bar 61. This rack bar slides through a housing 62 that is hung from the shaft 58, and its teeth 63 engage the teeth of a pinion 64. The pinion 64 is fast with a disk 65, said disk carrying pawls 66 which engage the teeth of a ratchet wheel 67 that is fast upon the shaft 58. Pinion 64 and disk 65 are loose upon said shaft 58.

The opposite end of the rack bar 61 is pivoted, at 68, to a block 69 that is slidably adjustable along a slot 70 of a swinging crank arm 71; the adjustment of the pivot point 68 along said slot determining the length of throw of the rack bar and consequently determining the extent of the feeding movement of the feed rollers. The crank arm pivotally mounted, at 72, upon the machine frame, is actuated by a cam 73 on shaft 6; said cam engaging a roller 74 on the crank arm.

A downward extension 75 of the crank arm is connected by a spring 76 with the opposite side of the machine frame, said spring acting to hold the roller 74 in engagement with the periphery of cam 73. From the feed rollers 54, 55 the paper passes downwardly through swinging guide plates 77, said guide plates being hingedly connected, at 78, to the feed mechanism frame 56 beneath the feed rollers. These guide plates comprise merely strips of sheet metal turned over at their opposite edges to channel formation and serve to guide and support the paper strips on

their way to the dies; this hinged mounting permitting said guide plates 77 to move back and forth as the dies move toward and from the tubes or cartridges.

5 The means for feeding the cartridges into alignment with the dies and for holding the cartridges in proper position during the wad seating action, and for ejecting the cartridges after the seating of the wads has been completed, is best illustrated in Fig. 9. The cartridges 26 roll down
10 an inclined table 79 and along a curved trackway 80 and between end guides 81, 82, until they come to rest upon the arcuate upper face 83 of a swinging member comprising a substantially U-shaped bracket 84, see Figs. 9 and 10, mounted
15 upon a rock shaft 85, and the upstanding legs 86 of which have trackway sections 87 adjustably connected thereto by means of bolts 88 and 89. These bolts pass through slots 90, 91, of the said
20 legs 86 and take into the trackway sections 87, said trackway sections having the arcuate upper faces hereinafter described.

This arrangement renders it possible to provide for any desired radial or lateral adjustment of the positions of the trackways 83. The U-shaped bracket 84 comprises a web 92 which serves to receive the thrust of a spring 93, said spring surrounding a rod 94 which passes through an inclined extension of web 92 and has a nut 95 upon
30 its lower end. The rod 94 in turn carries a bifurcated head having pivotal engagement, at 96, with a yieldable detent 97; the latter being pivoted, at 98, to the U-shaped bracket and swinging back and forth with said bracket and associated parts under the influence of a link 99
35 which engages a crank arm 100 on the shaft 85; said link being adjustable as to length through the medium of a turnbuckle 101. This link is pivotally connected, at 102, to a rocker arm 103; the latter being pivoted, at 104, and carrying a roller 105 which engages a cam 106 on main
40 shaft 6. This construction acts to swing the parts 87, 84 and 97 back and forth, and when in the swing of the part 87 toward the left, in Fig. 9, the forward corners 87a of the trackway sections 87 pass from beneath the lowermost cartridge in the group still retained in the guide ways 80, 81,
45 and 82, said lowermost package drops on to a fixed trackway composed of fixed trackway sections 107 having arcuate upper faces 108.

Vertical leg extensions 109 of these fixed trackway sections are slotted at 110 for the passage of adjusting bolts 111 by which they are held to the machine frame and by which said trackway sections may be given any desired adjustment to accommodate the particular diameter of
50 cartridges being operated upon.

When the lowermost cartridge drops upon the fixed trackway constituted by the arcuate faces 108 it lies between the forward face of the trackway sections 87 and the rear side of the yieldable detent 97, and when these parts again move forward or toward the right, in Fig. 9, the cartridge is caused to roll along the track 108 until it rides
55 beneath a pair of yieldable fingers 112; said fingers being pivotally mounted, at 113, upon a bracket 114, said bracket being adjustably mounted with respect to the feed roller frame by means of the bolt and slot construction, indicated at 115. Upward movement of the yieldable
60 detent fingers 112 is against the tension of springs 116, the tension of which may be adjusted by the screws 117.

When the package has been brought into engagement with and is seated in the indentation
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118 of the detent fingers, it then lies in alignment with the dies, and after the dies engage the ends of the package to hold it, and the feed mechanism parts again swing rearwardly preparatory to engaging and moving another
5 cartridge into said receiving position, the detent 97 yields downwardly so that it rides beneath the said cartridge and gets in the rear thereof. Then, when the feed mechanism again swings forwardly with the newly received cartridge, the forward face 97a of the yieldable detent acts against the cartridge which has had the wads placed therein, to thrust said cartridge
10 forwardly along the trackway and out of engagement with the fingers 112 and to and upon a conveyor 118 by which the packages are conveyed away from the machine and to a separate crimping mechanism.

A spring 119 is engaged with the machine frame and with crank arm 100 and tends to move the roller 105 into engagement with the cam 106. The pivot 102 consists of a readily removable pin so that when desired said pin may be quickly removed and the link 99 released to permit the feed mechanism to be swung outwardly and downwardly until it rests upon the frame member 5a, see Fig. 9. The guide consisting of the parts 80, 81, and 82 is held in engagement with the fixed trackways 107 by interengaging guide ways 80a and bolt and slot connections 80b. The fixed trackways are also readily removable; the result being that all necessary portions of the feed mechanism may be easily and quickly moved out of the way when it is desired to change dies and cutting mechanisms.

In Figure 12 I have illustrated and described another form of expander for the tubes, which may be employed in lieu of the tapered plugs 50. This modified form of expander is even more reliable than the tapered plugs in that, while the tapered plugs 50 are serviceable when the ends of the tubes are only slightly out of shape, badly bent tubes may be even further crushed by said plugs. To avoid this I may utilize a type of expander that is somewhat more expensive but which is very reliable in that it is caused to enter the open ends of the tubes or shells in a contracted condition and is thereafter expanded to straighten the ends of the said tubes.

In Fig. 12, 48 designates the reciprocatory shaft, hereinbefore described, said shaft being attached by a coupling 125 to a shaft 126. A reduced extension 127 of this shaft is threaded into an expander plug 128; the tapered end 129 of which is adapted to engage inwardly directed cam projections 130 of a plurality of expander fingers 131. The rear ends of these fingers are flanged, as indicated at 132, and these flanged portions are secured by a nut 133 to the collar 134 of a sleeve 135. A compression spring 136 bears between the forward end of this sleeve and shoulder 126a of the shaft 126. The function of this spring is to cause sleeve 135 to follow the expander plug 128 in its forward travel until a collar 137 upon said sleeve abuts the rear end of the bearing 138. Then the sleeve is held against further forward movement, but by this time the contracted end of a rubber expanding sleeve 139, which surrounds the fingers 131, has entered the open end 25 of the explosive package or shell. Continued forward movement of the plug 128 with respect to the
70

sleeve 135 results in the tapered end 129 of the plug acting against the projections 130 to expand the fingers 131 to the dotted line position illustrated, thereby straightening the end of the tube 25. The position of the bearing 138 may be adjusted laterally to center the expander with respect to the particular diameter of explosive shell being worked upon. The expander fingers 131 may be in one piece with the collar 132; this element being made from what is originally a tubular member sawed longitudinally at a plurality of points to provide any desired number of fingers separated from each other by such sawing and consequently rendered laterally yieldable at their free ends.

It is to be understood that the invention is not limited to the precise construction set forth but that it includes within its purview whatever changes fairly come within either the terms or the spirit of the appended claims.

Having described my invention, what I claim is:

1. A device of the character described comprising a die having a mouth shaped to receive and support the end of a paper tube, a fixed annular cutter with which the die coacts in its movement away from the position occupied by the tube when the latter is in wad receiving position, means for feeding paper across said die and cutter to supply the material necessary for the formation of a paper wad, and means for reciprocating the die with respect to said cutter.

2. A device of the character described comprising a die having a mouth shaped to receive and support the end of a paper tube, a fixed annular cutter with which the die coacts in its movement away from the position occupied by the tube when the latter is in wad receiving position, means for feeding paper across said die and cutter to supply the material necessary for the formation of a paper wad, means for reciprocating the die with respect to said cutter, and a plunger operable through the cutter and die for thrusting the cut paper through the die and into the open end of said tube.

3. A structure as recited in claim 1 wherein the movement of the die rearwardly in its cutting action is a positive one and its movement toward the tube is spring-actuated.

4. A structure as recited in claim 1 in combination with a plunger operated through the cutter and die to thrust the cut wad through the die and into the open end of the paper tube, the movement of the die rearwardly being a positive one and movement of the die forwardly being spring-actuated and the movement of the plunger forwardly being a positive one and the movement of the plunger rearwardly being spring actuated.

5. Means for feeding open ended paper tubes into alignment with wad forming and placing mechanisms comprising a trackway along which said tubes travel, a second trackway upon which said tubes are delivered and along which they are adapted to be rolled, a swinging member adapted to engage behind said tubes and roll them along the last named trackway, and a yieldable detent movable with said member which lies in front of said tubes until a tube reaches a position of alignment with respect to the wad forming mechanisms and thereafter rides beneath and engages behind said tube, and means for actuating said swinging member through such distance that on its next succeeding

stroke its forward side engages the tube already worked on and thrusts it out of alignment with the said forming and placing mechanism.

6. A structure as recited in claim 5 in combination with yieldable members disposed above said tubes which engage with the tubes and bind them between said yieldable members and the second named trackway at the forward limit of movement of the swinging member to thereby hold said tubes against movement during the time that the wad-forming and cutting members are moving into engagement with said tubes.

7. A structure as recited in claim 5 in combination with yieldable members disposed above said tubes which engage with the tubes and bind them between said yieldable members and the second named trackway at the forward limit of movement of the swinging member to thereby hold said tubes against movement during the time that the wad-forming and cutting members are moving into and out of engagement with said tubes, said yielding members being forwardly elongated to maintain their engagement with the said tubes and to exert a retarding influence thereon during the time that the yieldable detent is acting to thrust the tubes from said receiving position to the point at which it leaves the second named trackway.

8. A machine of the character described comprising a pair of opposed wad-cutting and forming mechanisms, a pair of feeding mechanisms supported thereabove and acting to feed strips of material to and across the wad forming mechanisms, an inclined trackway disposed substantially centrally of the machine and delivering open ended paper tubes horizontally into the machine at one side thereof, a conveyor leading away from the machine at the opposite side thereof in substantial alignment with said trackway, and a feeding mechanism disposed between the trackway and the conveyor comprising a pair of fixed trackway members spaced from each other and having convex upper faces over which the said tubes are adapted to roll, a swinging member swinging back and forth along the last named or convex trackway and projecting thereabove, said swinging member likewise having a convex upper face adapted to ride beneath said tubes, said tubes being adapted to drop from the convex upper face of the said swinging member upon the convex upper face of the fixed members when said swinging members move rearwardly from beneath said tubes, a yieldable detent travelling with the swinging member and projecting forwardly with respect to the same to provide a space into which said tubes drop, the forward face of said swinging member acting against the rear side of the tube to thrust the same forwardly along the fixed trackway to a position of alignment with the said wad-forming and cutting mechanisms, said detent yielding to permit it to ride beneath the cartridge in reverse movement of the swinging member and said detent acting to thrust the tubes along the fixed trackway in the next forward movement of the swinging member.

9. A structure as recited in claim 8 in combination with a pair of yieldable fingers disposed above the said fixed trackway and engaging the upper sides of the tubes to hold them against movement until said tubes are thrust from beneath said yieldable fingers under the action of the said detent.

10. An expander for the ends of explosive

filled paper shells comprising an expansible structure, a plug for expanding the same, a longitudinally movable shaft, spring means causing the expander to follow the movement of said shaft and plug until the expander has entered the open end of a shell and for moving the plug to expand the expander independently of the endwise movement of said expander after said expander has been seated in the open end of said shell.

11. A machine of the character described comprising a pair of wad cutting and forming mechanisms disposed in alignment with each other and movable toward and from each other, and means for feeding paper tubes open at both ends into alignment with said mechanisms, said mechanisms acting to cut and form wads and thrust them simultaneously and in opposition to each other into the open ends of said tubes and means for effecting the cutting of the wads during the movement of said mechanisms away from the tubes.

12. A machine of the character described comprising a pair of mechanisms disposed in a line with each other, means for simultaneously moving said mechanisms toward each other and from each other, each of said mechanisms comprising a fixed annular cutter, a die mounted to reciprocate with respect to said cutter and a wad forming and forcing plunger operable through said die, said dies being shaped to receive and support the open ends of paper tubes, means for feeding tubes into alignment with said dies, means for feeding strips across the dies and cutter, and means for actuating the said dies and plungers in such timed relation and in such manner that the strips are cut to form wads during the movement of the dies away from the tubes and the plungers advance with the dies toward the tubes but at a faster rate than said dies so that the formed caps thrust into the tubes by said plungers are being moved toward the tubes during the time that the dies are moving into alignment with the ends of said tubes whereby any loose particles of the contents of said tubes are moved away from the dies simultaneously with the seating of the latter upon the ends of the tubes.

13. A machine of the character described comprising a pair of mechanisms disposed in a line with each other, means for moving said mechanisms bodily toward and from each other, means for feeding filled tubes open at both ends laterally into alignment with said mechanisms, said mechanisms comprising elements for forming and cutting wads and thrusting them simultaneously and in opposition to each other into the open ends of said tubes, and a member for straightening an end of said tubes prior to their movement into alignment with the adjacent mechanisms; comprising an expander located to one side of the said mechanisms and acting in substantial parallelism therewith, said expander comprising portions adapted to enter an end of said shells, means for maintaining the expander in contracted condition during its entry into the end of a shell, and means for automatically expanding said expander after its entry into the end of said shell to thereby bring the ends of the shell to truly circular formation to adapt said ends for engagement by the wad cutting and forming mechanisms, said expander being so located as to act upon the tubes after their entry into the feeding means of the machine, and prior to the arrival of said tubes at wad-placing position.

14. A device of the character described comprising a die having a mouth shaped to receive and support the end of a paper tube, a fixed annular cutter with which the die co-acts in its movement away from the position occupied by the tube when the latter is in wad receiving position, means for feeding a web of wad material across said die and cutter to supply the material necessary for the formation of a wad, means for reciprocating the die with respect to said cutter, and means for feeding a paper tube into alignment with the die after the cutting off of the wad has been effected.

15. A machine of the character described comprising a pair of wad cutting and forming mechanisms disposed in alignment with each other and movable toward and from each other, and means for feeding paper tubes open at both ends into alignment with said mechanisms, said mechanisms acting to cut and form wads and thrust them simultaneously and in opposition to each other into the open ends of said tubes and means for effecting the cutting of the wads during the movement of said mechanisms away from the tubes and prior to the bringing of the paper tubes into alignment with said mechanisms.

16. A machine of the character described comprising a pair of wad cutting and forming mechanisms disposed in alignment with each other, and movable toward and from each other, means for feeding paper tubes open at both ends, into alignment with said mechanisms, said feeding means comprising track ways along which the tubes roll, and means for moving the tubes along said track ways, the wad cutting and forming mechanism acting to cut and form wads and thrust them simultaneously and in opposition to each other into the open ends of said tubes, and tube straightening members shaped and dimensioned to enter the open ends of the tubes, said straightening members being positioned to act upon the tubes after their entry into the feed track ways of the machine, and prior to their arrival at capping position, and actuating means for said straightening members moving in synchronism with the tube feeding means and acting to move the said members into and out of the ends of said tubes at a time when the said tubes are at rest.

17. A machine of the character described comprising a pair of wad cutting and forming mechanisms disposed in alignment with each other and movable toward and from each other, means for feeding paper tubes open at both ends into alignment with said mechanisms, said mechanisms acting to cut and form wads and thrust them simultaneously and in opposition to each other into the open ends of said tubes, the said feeding means imparting step-by-step movement to said tubes to bring them to cap receiving position, a pair of reciprocating plugs movable toward and from each other and disposed in the path of travel of said tubes and at a point to act upon said tubes after they enter into the feeding means of said machine and prior to their arrival at capping position, said plugs having end portions shaped to enter the ends of the tubes and straighten them, and actuating means for said plugs moving in synchronism with the feeding means of the tubes to cause said plugs to enter and leave the tubes when said tubes are in a position of rest.

18. A machine of the character described comprising a wad cutting and forming mechanism, means for feeding paper tubes into alignment with

said mechanism, said mechanism acting to cut and form wads and thrust them into the open ends of said tubes, the feeding means comprising mechanism for imparting step-by-step movement to said tubes to bring them to wad-receiving position, a tube straightening member positioned to enter the ends of said tubes after said tubes have entered the feeding mechanism of the machine and prior to the arrival of said tubes at wad-receiving position, and actuating mechanism for said tube straightening member moving in synchronism with the tube feeding means and causing the straightening member to enter and leave said tubes while they are at rest.

19. A device of the character described comprising a die, a fixed annular cutter with which the die coacts in its movement away from the position occupied by a tube when the latter is in wad-receiving position, means for feeding paper across said die and cutter to supply the material necessary for the formation of a paper wad, and means for reciprocating the die with respect to said cutter.

20. A device of the character described comprising a die, a fixed annular cutter with which the die coacts in its movement away from the position occupied by a tube when the latter is in wad-receiving position, means for feeding paper across said die and cutter to supply the material necessary for the formation of a paper wad, means for reciprocating the die with respect to said cutter, and a plunger operable through the cutter and die for thrusting the cut paper through the die and into the open end of said tube.

21. The combination with a machine for forming and placing paper wads into the open ends

of cylindrical tubes, of a feeding mechanism comprising a trackway along which the tubes are rolled upon their sides into alignment with the cap placing mechanism, means for imparting step by step movement to said tubes along said trackway, an expander adjacent said trackway, actuating means for the expander synchronized with the feeding mechanism to move the expander into the open ends of the tubes during their period of rest to thereby bring said tubes to truly circular form after their entry into the feeding mechanism and prior to their arrival at cap placing position.

22. A wad cutting and placing machine for explosive containing receptacles, said machine comprising means supporting an explosive containing receptacle, and means adjacent said supporting means for cutting a wad, said second means moving away from the first means during the cutting operation.

23. A wad cutting and placing machine for explosive containing receptacles, said machine comprising means supporting an explosive containing receptacle, means adjacent said supporting means for cutting a wad, said second means moving away from the first means during the cutting operation, and means for placing the cut wad in the end of the receptacle.

24. A wad cutting and placing machine for explosive containing receptacles, said machine comprising means supporting an explosive containing receptacle, and a movable cutting die adjacent said supporting means for cutting a wad, said cutting die moving away from the supporting means during the cutting operation.

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