May 23, 1944. F. E. COSTELLO 2,349,248

CARTRIDGE DISASSEMBLING MACHINE

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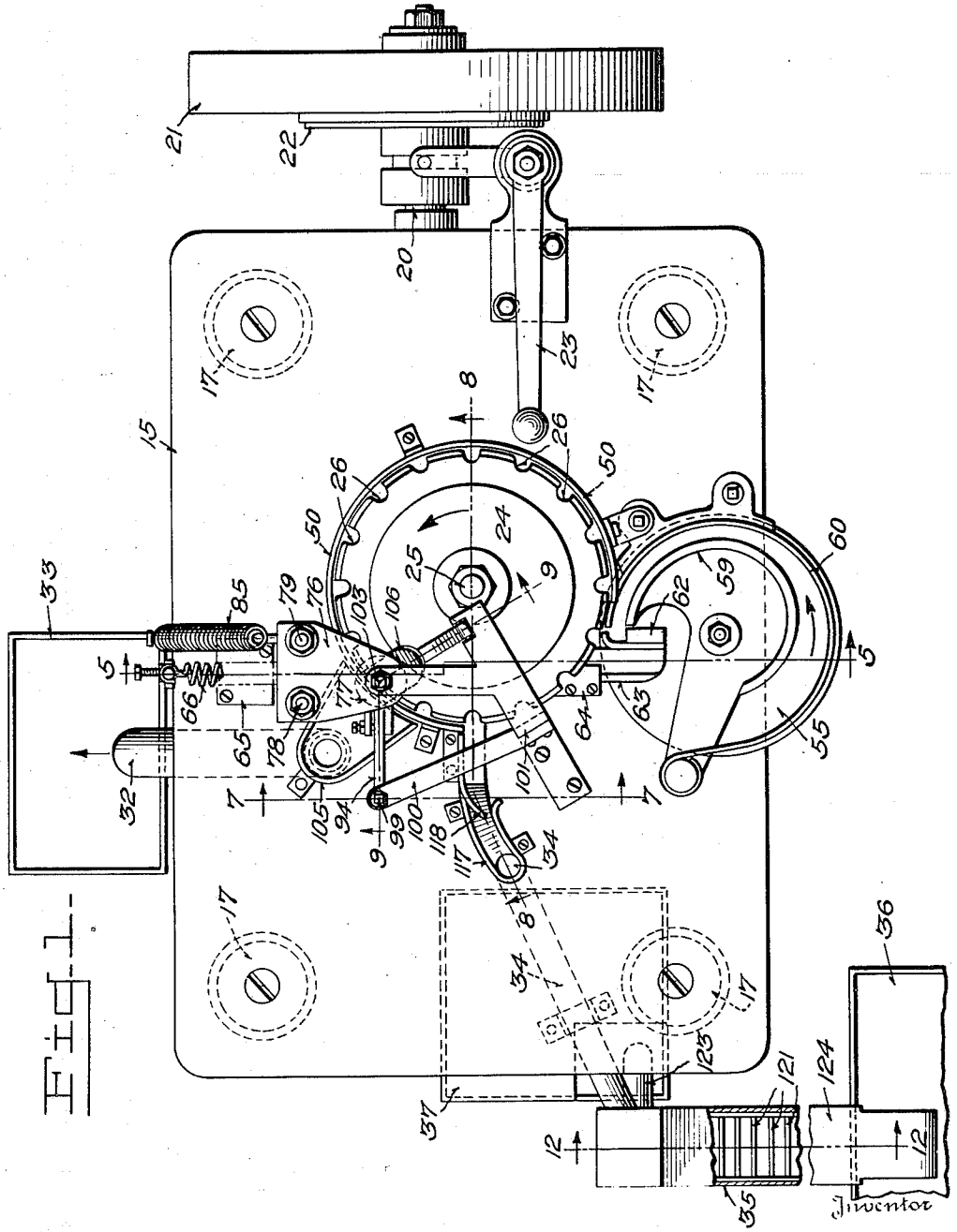


Fig. 1.

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CARTRIDGE DISASSEMBLING MACHINE.

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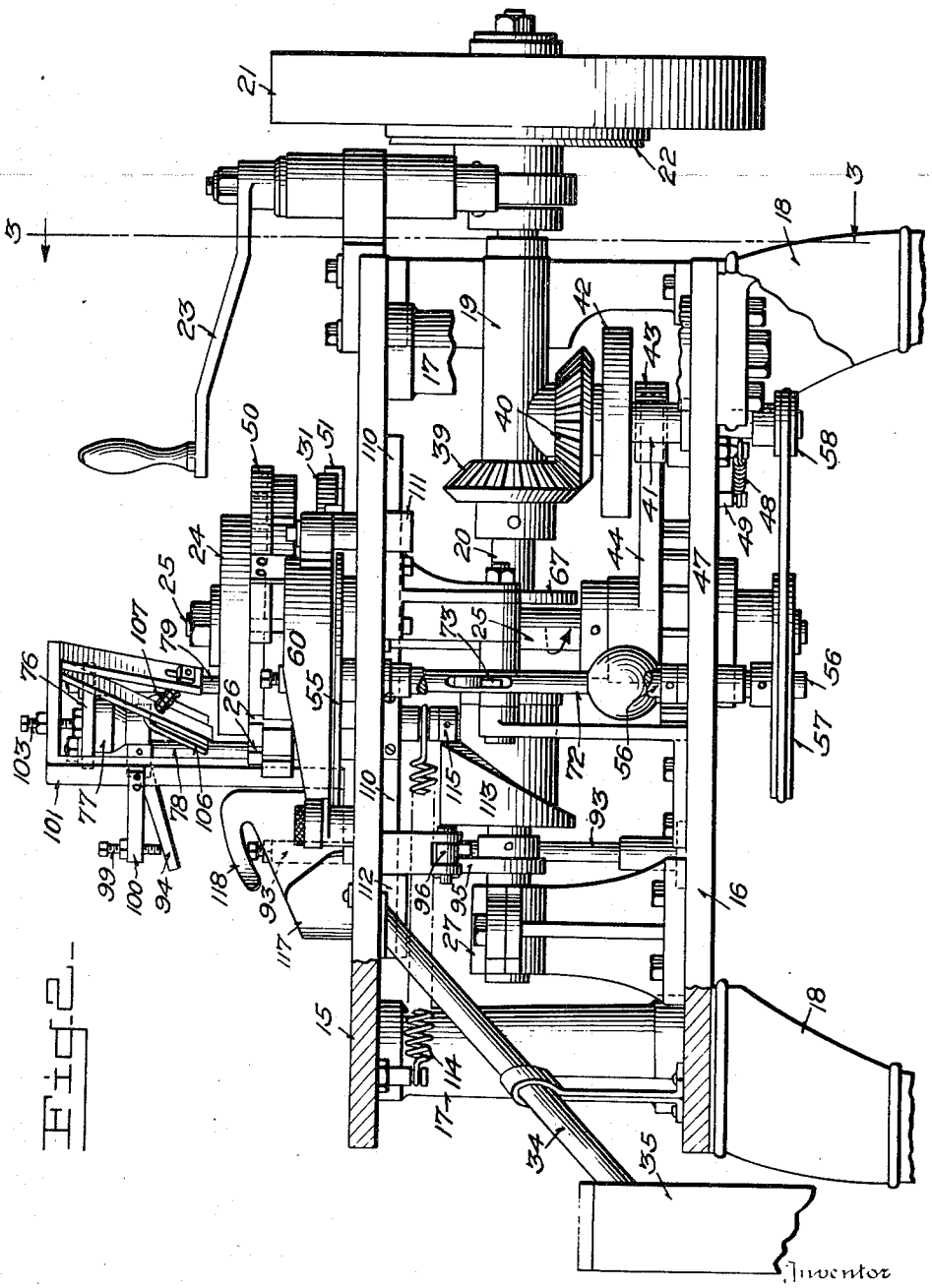


Fig. 2.

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CARTRIDGE DISASSEMBLING MACHINE

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Fig. 3.

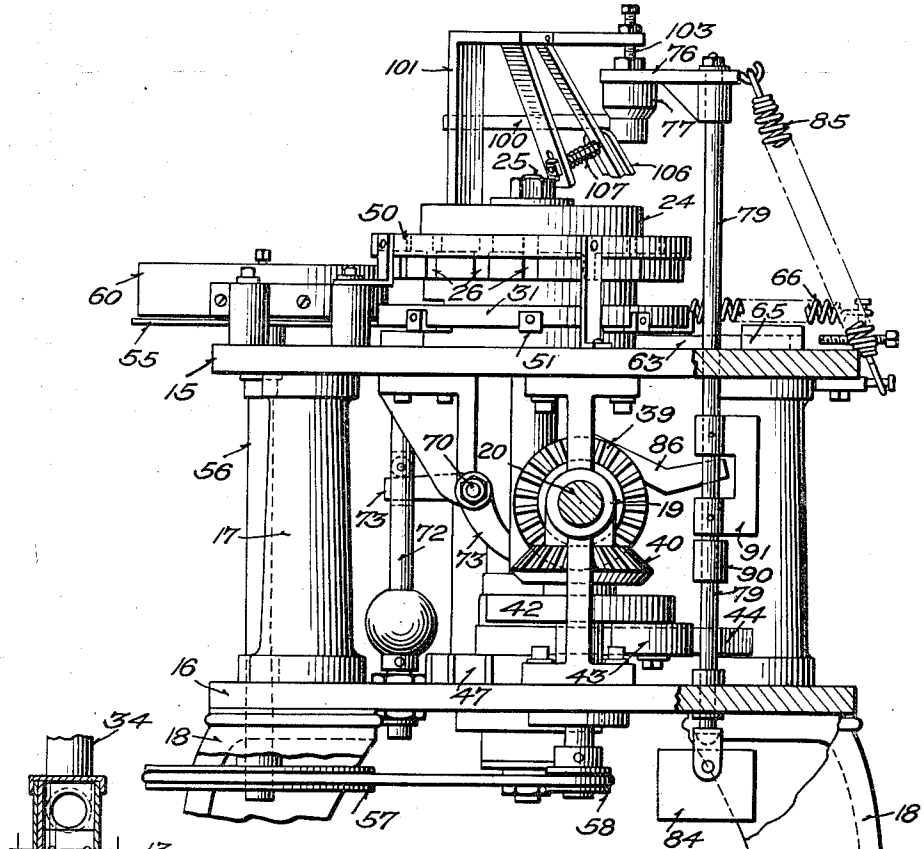


Fig. 12.

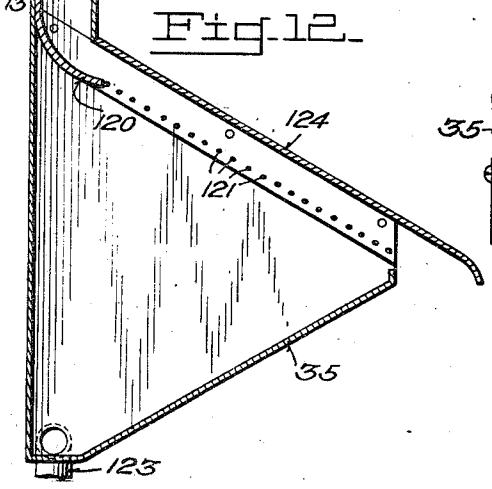
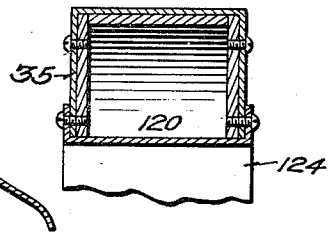


Fig. 13.



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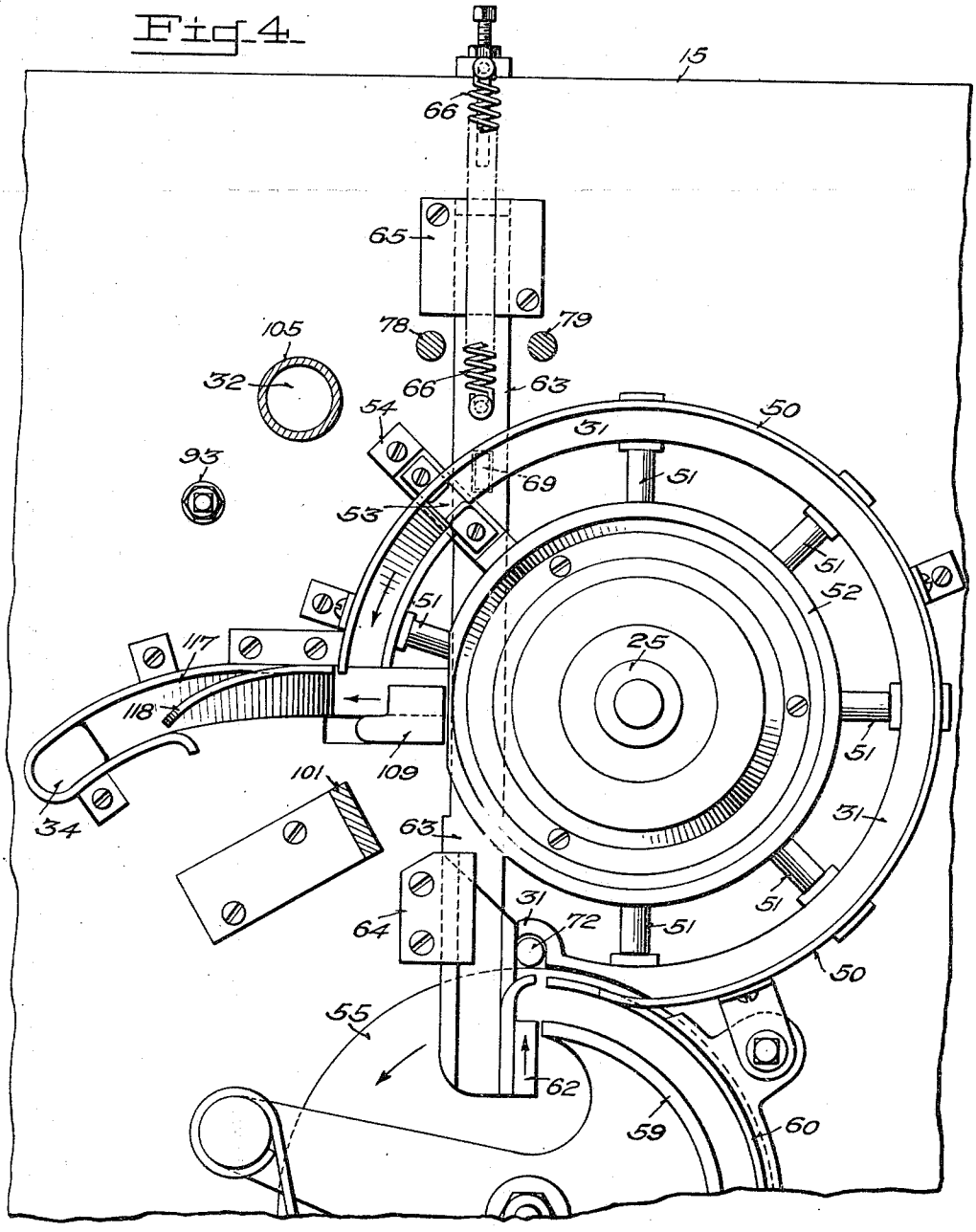
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CARTRIDGE DISASSEMBLING MACHINE

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Fig. 4.



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CARTRIDGE DISASSEMBLING MACHINE

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Fig. 5.

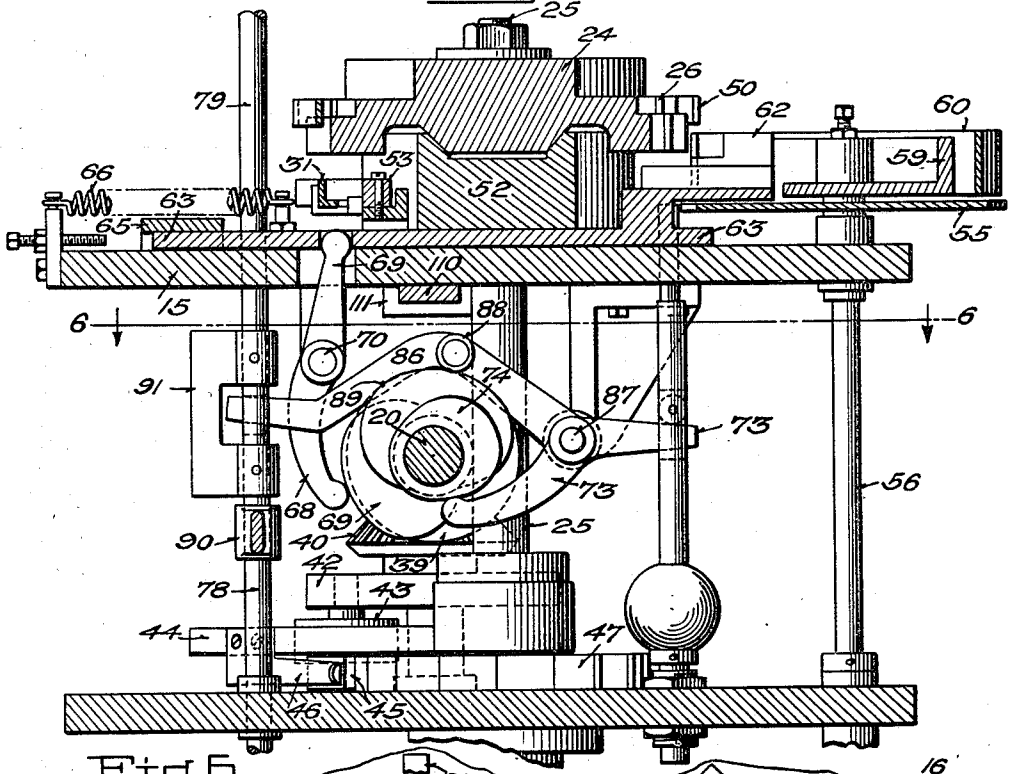
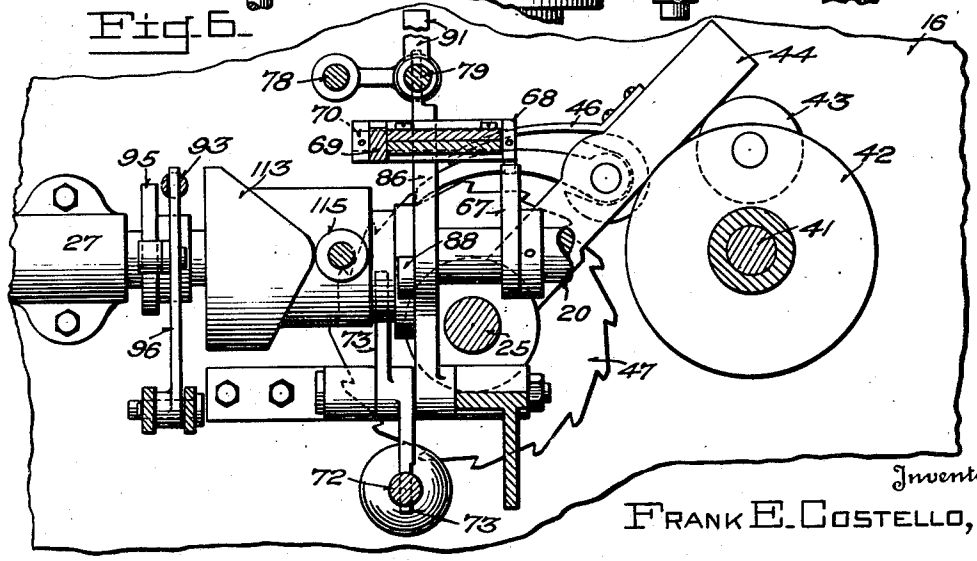


Fig. 6.



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Fig. 7.

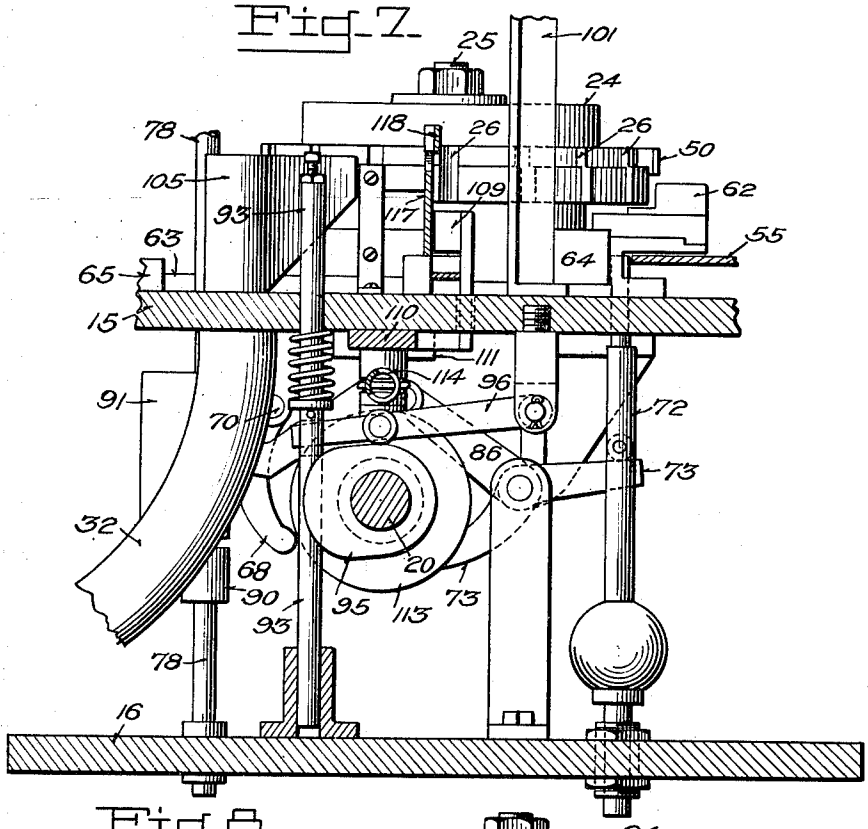
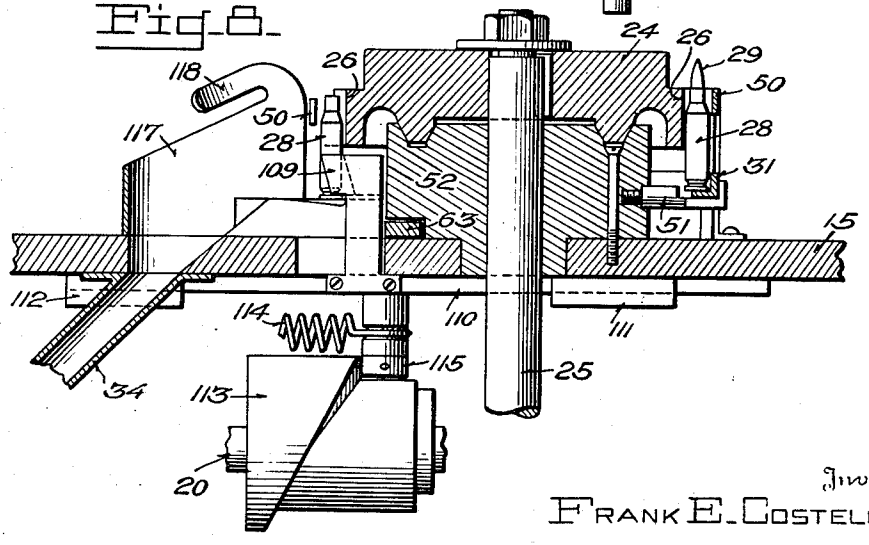


Fig. 8.



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CARTRIDGE DISASSEMBLING MACHINE

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Fig. 9.

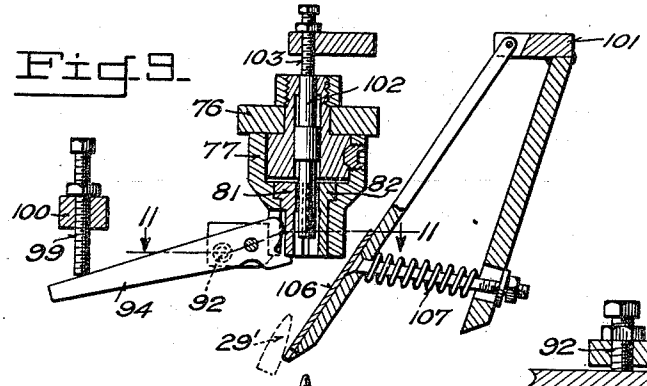
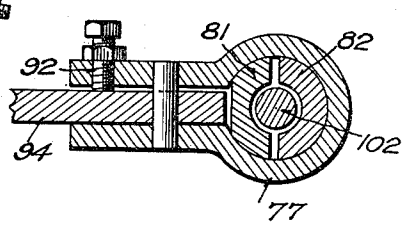


Fig. 11.



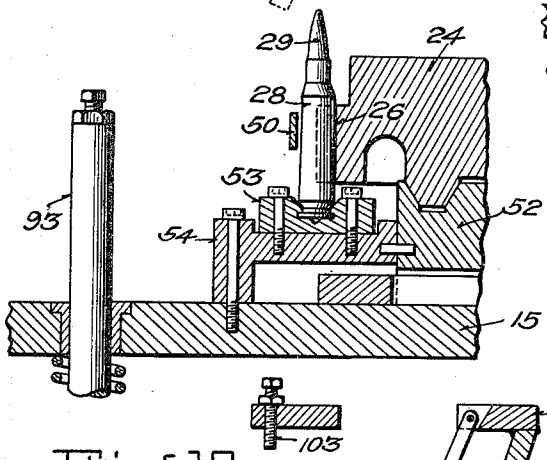
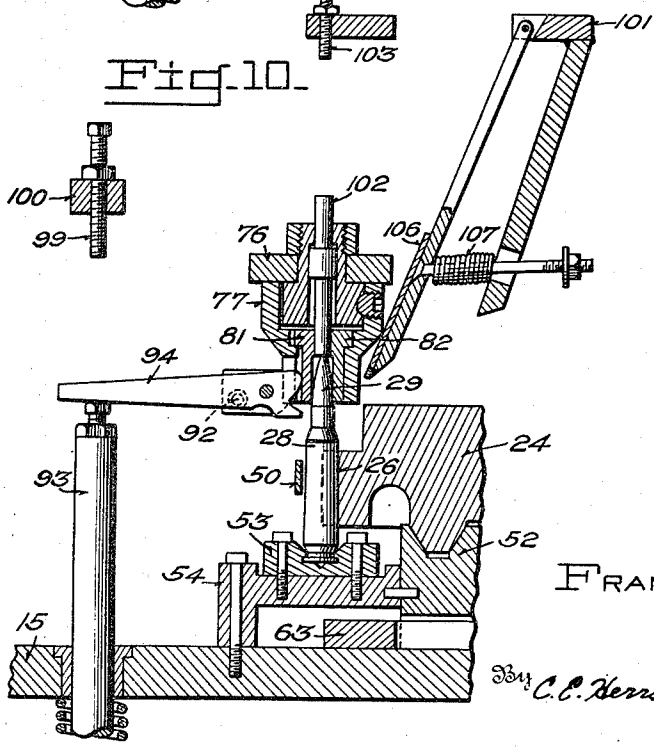


Fig. 10.



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Patented May 23, 1944 2,349,248

UNITED STATES PATENT OFFICE

2,349,248

CARTRIDGE DISASSEMBLING MACHINE

Frank E. Costello, Philadelphia, Pa.

Application January 25, 1944, Serial No. 519,630

15 Claims. (Cl. 86—1.5)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

The invention described herein may be manufactured and used by or for the Government for governmental purposes, without the payment to me of any royalty thereon.

My invention relates to the disassembly of firearms cartridges, and it has special relation to machines for separating such cartridges into the case, projectile and powder components of which each is made up.

One object of my invention is to provide an improved machine which is capable of disassembling cartridges of all types, including ball, incendiary, tracer and armor piercing.

Another object is to disassemble "rejected" and other cartridges in such improved manner that substantially 100% salvage of the cases, projectiles and powder can be had.

A further object is to increase the speed and decrease the labor with which cartridges may be so disassembled.

An additional object is to safeguard the cartridges against mechanical injury and accidental explosion during disassembly by the machine.

A still further object is to increase the safety of the machine operators and to decrease the skill and effort that is required of those operators.

In practicing my invention I attain the foregoing and other objects by providing a cartridge disassembling machine of unique construction and superior performance. One preferred form of such a machine is shown by the accompanying drawings wherein:

Fig. 1 is a top plan view of a machine which incorporates my improvements and which is designed for the disassembly of caliber .30 cartridges;

Fig. 2 is an elevation view of the front or "operator's" side of the machine of Fig. 1;

Fig. 3 is an elevation view, partly in section on line 3—3 of Fig. 2, of the right or "power-drive" end of the same machine;

Fig. 4 is an enlarged partial plan view, partly in section, of the top of the machine with the cartridge dial removed;

Fig. 5 is a section view taken along line 5—5 of Fig. 1 to show certain details of the machine's construction;

Fig. 6 is a horizontal section view taken along line 6—6 of Fig. 5 and partially broken away for greater clarity;

Fig. 7 is a view taken along section line 7—7 of Fig. 1 to show further details of certain of the machine's cams;

Fig. 8 is a lengthwise vertical section view taken along line 8—8 of Fig. 1 through the machine's cartridge dial;

Fig. 9 is a section view taken along line 9—9 of Fig. 1 and showing the cartridge immediately before the pull head is lowered onto the projectile;

Fig. 10 is a similar section view showing the pull head after it has been lowered over the projectile;

Fig. 11 is a horizontal section on line 11—11 of Fig. 9 showing further details of the pull head;

Fig. 12 is a longitudinal section on line 12—12 through the powder separating chute of Figs. 1 and 2; and

Fig. 13 is a horizontal section taken on line 13—13 through the upper end of the chute of Fig. 12.

The complete machine

The improved cartridge disassembling machine which these drawings illustratively show will be seen from Figs. 1–2–3 to comprise upper and lower frame plates 15 and 16 interconnected through corner spacers 17 and supported by floor legs 18.

A main power shaft 20 drives into gear and cam mechanism mounted between frame plates 15—16. This main shaft 20 is supported by right and left bearings 19 and 27. It is rotated by any suitable source of power, such as an electric motor (not shown), through a main drive pulley 21 carried on the shaft's end and rotatively coupled with the shaft by a clutch 22. This clutch has a handle 23 by which the machine operator selects between engaged and disengaged positions and thereby starts and stops the machine at will.

A cartridge dial 24 is rotatively mounted above the upper frame plate 15 and there fixed to the upper end of a vertical shaft 25 in a manner best shown in Fig. 8. Around the outside of this dial are a series of notches 26 (see Fig. 1) into which the cartridges to be disassembled are fed for progressive rotation with the dial and subsequent separation into their component parts.

One such cartridge positioned in a dial notch is shown in Figs. 9–10 as comprising a case 28 and a projectile 29; another cartridge held in a similar notch on the opposite side of the dial 24 is shown in Fig. 8. Each of the represented cartridge cases 28 contains a quantity of powder (not shown), and it is the function of my improved machine to separate the projectiles 29 from the cases 28 and the cases from the powder.

In the improved machine here disclosed the cartridges to be so disassembled are fed one by

one into the dial notches 26 from a "feeding station" on the front or operator's side of the machine (see Fig. 2); each is carried by the dial counterclockwise around a circular track 31 (see Figs. 1 and 4) to a "pulling station" on the opposite or back side of the machine; there the projectile 29 is separated from the cartridge case 28 and dropped through a chute 32 into a projectile box 33 (see Fig. 1) beneath the machine; each powder-containing case 28 then is further moved by dial 24 to a "discharge station" on the left side of the dial; there each case is toppled mouth down through a chute 34 into a case and powder separator 35; and from this separator the cases are discharged into a case box 36 (see Fig. 1) and the powder into a powder can 37, also beneath the machine.

The cartridge dial

The particular machine represented has its dial 24 and cooperating parts designed to accommodate and disassemble caliber .30 cartridges of the conventional shape shown at 28—29. In this caliber .30 machine a speed of rotation of about 80 R. P. M. is found to be satisfactory for the main drive shaft 20.

The represented machine dial 24 is illustratively shown as having sixteen cartridge notches 26, and with each rotation of drive shaft 20 the dial is moved counterclockwise by an angular distance equal to the spacing between notches. This "stepping" movement is imparted from the main drive shaft 20 through a pair of bevel gears 38—39 of one-to-one ratio, a shaft 41 driven by gear 40 and carrying a disc 42, a roller 43 so mounted on the disc as to push an arm 44 away from shaft 41 upon each rotation thereof, a tension spring 48 (beneath frame plate 16) which through a downwardly protruding pin 49 holds arm 44 continuously against roller 43, a pawl 45 carried by arm 44 and having a backing spring 46, and a ratchet wheel 47 engaged by the pawl and secured to the lower end of dial shaft 25.

Ratchet wheel 47 is illustratively shown as having sixteen teeth (one for each notch 26 of cartridge dial 24), and by the mechanism just described dial 24 is moved one notch forward upon each rotation of the main drive shaft 20. Whenever, moreover, the dial is at rest three of its notches 26 are in register with the "feeding," "pulling" and "discharge" stations earlier named.

For holding the upright cartridges in the dial notches, use is made of a guide strip 50 (see Fig. 8) positioned around the dial above the outer upright flange of the circular track 31. Holding that track in place are supports 51 (see Figs. 4 and 8) extending radially from a central member 52. That member 52 further serves as a thrust or support bearing for the cartridge dial 24.

Each cartridge thus brought by the dial 24 into the "pull station" position has the head of its case 28 moved into engagement with a stripper fixture 53 (see Figs. 9–10). That fixture is secured to the upper frame plate 15 through a support 54 in a manner best shown by Figs. 9–10. It is mounted at the level of circular track 31 and serves to restrain the cartridge case head from upward movement during the projectile pulling operation later to be described.

The cartridge feed mechanism

The cartridges to be disassembled are placed head end down on the exposed surface of a feed plate 55 mounted as shown on the front or operator's side of the cartridge dial 24. This feed plate is continuously rotated in a counterclockwise direction by any suitable means, such as the represented shaft 56 (see Fig. 2) and belt-connected pulleys 57—58.

The so-placed cartridges are carried between inner and outer feed strips 59—60 (see Figs. 1 and 4) which arrange them in a single row and guide them one by one into the receiving recess of a feed fixture 62 (see Fig. 4). This fixture is carried by a feed slide 63 which extends beneath the dial 24 for lengthwise movement within guides 64—65.

A tension spring 66 urges feed slide 63 toward the rear of the machine (away from the operator), while movement in the opposite direction (toward the operator) is effected by a cartridge feed cam 67 plus cam and slide arms 68—69 (see Fig. 5) interconnected by a shaft 70.

During one portion of each revolution of main drive shaft 20 this feed slide 63 is held by cam 67 in the cartridge receiving position shown by Figs. 1, 4 and 5; during the remaining portion of the drive shaft revolution it is moved by spring 66 into the feed position wherein the cartridge is drawn into the dial slot 26 which is in register with the top of a cartridge lift rod 72 (see Fig. 5).

The purpose of this lift rod 72 is to raise each cartridge so introduced into the dial 24's "feeding station" notch 26 to a level where subsequent movement of the dial will carry the cartridge head upon the circular track 31. For imparting the required lifting action to rod 72 use is made of a lift arm 73 and a cooperating cam 74 mounted on main drive shaft 20, as shown in Fig. 5.

This lift rod 72 is essential to a successful operation of machines having the disclosed design wherein the circular track 31 is at a higher elevation than the surface of cartridge feed plate 55. Were, however, elements 31 and 55 to have the same elevation the functions of lift rod 72 would no longer be required and that rod could then be dispensed with.

The projectile pull mechanism

Withdrawal of the projectiles 29 from the cartridge cases 28 is effected at the "pulling station" on the back side of cartridge dial 24 by a pull head 76 supported by lift rods 78—79 and including a clamp fixture 77 which is provided with a pair of dies 81—82 (see Figs. 9–10–11). These dies are separable one from the other and are axially held within the fixture 77 by the represented top flanges which engage with a shoulder inside the fixture. If desired the lower edge of each die may be provided with a slight lip (not shown) which serves to give a more effective grip on a projectile.

Projecting from one side of fixture 77 is a lock lever 94 by which dies 81—82 may be forced from the expanded position of Figs. 9 and 11 to the projectile-gripping position of Fig. 10. Accomplishing this is a cam shaped end on lever 94 which bears against the side of die 81.

When the lever is downwardly inclined as shown in Fig. 9, the dies are freed and can expand sufficiently to receive a cartridge projectile 29; when, however, lever 94 is horizontal as shown in Fig. 10 its cam shaped end forces the dies together and causes them tightly to grip the projectile 29. This release and clamping action at the die's lower ends is observed to produce a

slight rocking or "hinge" action at the die's upper ends.

Supplementing the pivotal connection of lock lever 94 with the pull head 77 is a friction screw 92. This screw is so adjusted that the effort required to move lever 94 downwardly is greater than the gravity force which the lever's weight exerts. Once placed in the horizontal or "lock" position of Fig. 10 lever 94 thus so stays until physically pushed down to the inclined or "unlock" position of Fig. 9.

Under the action of lift rods 78—79 this pull head 76 is moved between the upper position of Fig. 9 and the lower position of Fig. 10. Urging the head into that lower position are a lift-rod weight 84 (see Fig. 3) and a tension spring 85; moving the head into its upper position is a pulling cam 89 which acts upon lift rod 79 through a roller 88 (see Fig. 5) and a pulling arm 86. This arm is pivoted at 87 and its free end engages with an opening in lift rod 79.

Serving to reinforce this lift rod around that opening is a strengthening fixture 91, and further assuring that both lift rods 78—79 move in unison is a lower connector 90 which supplements the upper connection between the two rods which pull head 76 effects.

The pulling cam 89 is carried on main drive shaft 20, as shown in Fig. 5. During one portion of each revolution of shaft 20, that cam holds the pull head 76 in the upper position of Figs. 2, 3 and 9; during the remaining portion of each drive shaft revolution it allows a return of the head to the lower position of Fig. 10, where the dies 81—82 surround the cartridge projectile 29.

For then locking those dies upon the projectile, use is made of a lock rod 93 positioned in the machine immediately beneath the end of lock lever 94. This rod 93 is appropriately moved up and down under the action of a lock cam 95 carried by the main drive shaft 20 (see Fig. 7), a cooperating cam arm 96, and a compression spring 97.

During one portion of each revolution of the drive shaft 20, cam 95 holds the lock rod in the upper position of Fig. 10 where it forces lock lever 94 into the horizontal or "lock" position; during the remaining portion of each drive shaft revolution the cam allows spring 97 to return lock rod 93 to the lower position of Figs. 7 and 9.

The projectile discharge mechanism

For unlocking the dies 81—82 from the projectile 29 after it has been pulled by head 76 from the cartridge case 28, use is made of an upper lock release shown in the form of a screw 99 positioned immediately above the end of lock lever 94 and there supported by a stationary arm 100. That arm, in turn, extends from a bracket 101 secured to the top of frame plate 15.

Upon advancement of the pull head 76 to its uppermost position, the end of lock lever 94 contacts this release screw 99 and is by it moved to the downwardly inclined or "unlock" position which Fig. 9 shows. By that movement the cam end of lever 94 allows dies 81—82 to free the projectile 29 for downward release therefrom.

To assure that such release will be positive in all instances the pull head 76 is further equipped with a central ejecting stem 102 and a cooperating ejecting screw 103 positioned immediately thereabove. This stem 102 slides loosely up and down in the upper portion of pull head 76 but is restrained within the head by an enlarged central shoulder.

As the head moves down over a projectile this stem 102 thus is pushed upwardly ahead thereof as shown in Fig. 10. Upon return of the head to its upper position and the accompanying freeing of the projectile 29, screw 103 contacts stem 102 and causes it to force the projectile from between the dies 81—82. Each projectile so ejected now drops completely out of the pull head 76.

For directing each so freed projectile 29 into the throat 105 of the projectile chute 32 and thence into the projectile box 33 beneath the machine, use is made of a paddle 106 urged underneath the pull head 76 by a compression spring 107. Upon each downward movement of head 76 this paddle 106 is pushed to the side, as shown in Fig. 10, and thus in no way interferes with the projectile pulling actions earlier described.

Upon return of the pull head to its upper position, spring 107 forces the paddle back underneath the dies 81—82 where it constitutes a sloping baffle effective to deflect each released projectile (see the dotted representation at 29' of Fig. 9) into the projectile chute throat 105 at the side of the cartridge dial 24.

The case and powder discharge and separating mechanism

From the "pulling station" the cartridge cases 28 (from which the projectiles have now been separated) and their powder charges are further advanced by dial 24 to the "discharge station" for toppling, mouth end first, down the case chute 34.

For affecting the latter action there is provided a case ejector 109 (see Figs. 4 and 8) carried by a slide 110 mounted in guides 111—112 for endwise movement immediately beneath the top frame plate 15. Such movement is effected by a transverse or "wobble" cam 113 carried by shaft 20 (see Figs. 2 and 8) and a tension spring 114 which holds a slide roller 115 against the cam's face.

During one portion of each revolution of main drive shaft 20 the case ejector 109 thus is held by cam 113 in the extreme right position shown in Fig. 8; during another portion of the same shaft revolution it is pulled by spring 114 to the left to the other extreme in its range of travel.

In its said right position it receives a cartridge case 28 moved by dial 24 along circular track 31 into register therewith. The pushing face of this ejector slopes inwardly from top to bottom, and because of such slope each cartridge pushed out of the dial notch 26 by the ejector is at the same time tipped over.

Such ejection and tipping occurs upon movement of the ejector slide 110 to the left. That movement is appropriately timed with all other actions in the machine, and in consequence each powder-containing case that arrives at the "discharge station" is toppled mouth end first into a throat fixture 117 of the case chute 34.

Should a case reach this point without having the projectile 29 separated therefrom, the named toppling causes that projectile to engage an inwardly bent separator strip 118 at the throat's upper edge. Such engagement topples the cartridge to the side and out of the throat onto the machine's top frame plate 15.

All cartridge cases from which the projectiles have been pulled tumble mouth end first down through chute 34 and thence into the case and

powder separator 35. Here the cases are deflected, still mouth down, by a baffle plate 120 onto a series of spaced baffle rods 121 between which the powder freely falls. Upon reaching the lower end of this series the separation of the powder from the cases is complete.

From the separator the cases 28 are discharged into a suitable case box 36 beneath the machine. Meanwhile the powder falls upon separator 35's sloping bottom from which it is directed through a powder chute 123 into a suitable powder can 37 also beneath the machine.

For keeping the powder all within the separator 35 use of a cover 124 for the separator top is found desirable.

Operation of the complete machine

The manner in which the complete machine operates will have become more or less evident from the foregoing description of the machine's component parts.

The coordination among the several cams and other mechanisms driven from the main drive shaft 20 is such that the cycle of each operating mechanism has the proper timing with respect to all cooperating mechanisms and parts. Each of these cycles completes itself during one full revolution of the main drive shaft and in this manner the desired cartridge disassembling is effected by the complete machine.

In each of the cartridge dial 24's sixteen "at rest" positions: (*a*) one of the dial notches 26 is in register with the "feeding station" to receive a cartridge from the feed plate 55; (*b*) another dial notch is in register with the "pulling station" where its head is engaged by stripper fixture 53 and where its projectile 29 is directly beneath the pull head 76; and (*c*) a third dial notch 26 is in register with the "discharge station" where a cartridge case 28 and powder therein contained can be pushed by ejector 109 down case chute 34.

Early in each of these "at rest" positions of the dial 24, feed fixture 62 draws the cartridge from its upright position on feed plate 55 into the dial notch directly over lift rod 72 now in its lower position. That rod then raises the cartridge to the level of circular track 31 thus conditioning it for movement thereon when the cartridge dial is advanced to its next position.

At the "pulling station," meanwhile, the cartridge standing upright in stripper 53 is approached by pull head 76 moving downwardly over projectile 29 from the position shown in Fig. 9 to that shown in Fig. 10.

All during this movement lock lever 94 is tilted downwardly for "unlock" so that dies 81—82 slip over the cartridge projectile without friction or binding. Originally in its lower position, lock lever 93 now moves upwardly forcing lock lever 94 to the horizontal or "lock" position in which dies 81—82 firmly grip projectile 29.

The pull head 76 is now moved upwardly by pull cam 89 acting through lift rods 78—79. This movement pulls projectile 29 from the mouth of cartridge case 28 exerting as much force as the separation may require. For caliber .30 cartridges this pull force is observed to vary from only a few pounds to as high as over 400 pounds.

In approaching the upper position shown in Fig. 9 pull head 76 brings lock lever 94 into contact with lock release 99 and shortly thereafter brings ejecting stem 102 into contact with ejecting screw 103. These two actions respectively unlock the dies 81—82 and push the now pulled projectile 29' completely out of the pull head.

It now falls upon the sloping surface of paddle 106 and is thereby deflected outwardly from dial 24 into the throat 105 of projectile chute 32 and thence into the projectile box 33 beneath the machine. As earlier explained, this paddle 106 is pushed out of the pull head path on the pull head's down stroke (see Fig. 10) and is returned beneath the pull head by spring 107 upon the pull head's up stroke.

All during this pulling operation the cartridge dial 24 continues in a given "at rest" position.

At the "discharge station" meanwhile the cartridge case 28, from which the projectile 29 was previously pulled, has been pushed in front of the case ejector 109 now in its inner or right position.

Early in the same "at rest" position of the cartridge dial this ejector 109 is moved to the left. This movement causes the sloping face of the ejector first to contact the upper part of the cartridge case 28 and thereby tip and then push the case outwardly from the cartridge dial 24 and into the throat 117 of the case chute 34.

This tipping causes the case to slide down the chute 34. This sliding is open end first so that even while the case is within chute 34 the powder starts to roll out of the case mouth. Both case and powder then enter separator 35 where the open end of the case strikes baffle 120. This causes the case to slide over the series of separated rods shown at 121.

The incident bouncing causes all remaining powder to leave the case and fall down between rods 121 into the lower part of the separator 35. Thus completely emptied the case moves out of the separator, as indicated Fig. 12, and falls into a suitable box 36, placed as shown in Fig. 1. The powder meanwhile flows from the lower part of separator 35 through chute 123 and into a suitable powder box 37 also placed beneath the machine.

All of the cartridge disassembling operations just described take place within a single "at rest" period of the cartridge dial 24. Once these operations have been completed the machine advances the dial 24 counterclockwise to its succeeding "at rest" position where different notches are in register with the "feeding," "pulling," and "discharge" stations around the dial.

Here the sequence of actions just described repeats itself. In consequence, another cartridge is fed into an empty dial notch from feed plate 55; the projectile 29 is pulled from another cartridge case 28 by pull head 76; and another case 28 containing powder is sent down chute 34 by ejector 109.

As earlier stated, a satisfactory running speed for main drive shaft 20 of the represented caliber .30 disassembling machine is of the order of 80 R. P. M. This means that in the machine disclosed cartridges are disassembled at the rate of approximately 80 per minute.

Summary

My improved machine here shown and described is capable of disassembling cartridges having projectiles of all types, including ball, incendiary, tracer and armor piercing. Although differing in material and internal construction, all of these projectiles have the same general contour and hence they may inter-

changeably be passed through the machine for separation from their cartridge cases by the dies 81—82 of the pull head 76.

In the event of misalignment of the cartridge underneath pull head 76, there is no possibility of the projectile being forced down into the case therebeneath since in the improved machine here disclosed the downward movement of the pull head is effected by the weight 84 (see Fig. 3) and the tension spring 85. The force which these elements exert is so small that mechanical damage to the cartridge is not possible.

The same is true of the feed mechanism 62—63 and of the case-ejecting mechanism 109—110. The cartridge-moving force applied to each of these originates in a spring and is too small to do mechanical damage to the cartridge or case in the event of misalignment or jamming.

My improved machine further disassembles cartridges in such a way that substantially 100% salvage of the cases, projectiles and powder can be had. The pull dies 81—82 have a configuration which closely matches that of the projectile contour and are so designed that no objectionable mark is left on the projectile as a result of their contact therewith.

Moreover, the cases 28 are at no point in the disassembling operation subjected to mechanical strain sufficient to cause deformation, and so they too come out of the machine totally undamaged and unmarked.

The powder quite obviously is not subjected to damaging action of any kind so that it comes out of the machine in exactly the same condition as introduced in the assembled cartridges.

All of these factors combine to reduce the hazards of accidental explosion. This is proved by the fact that during months of intensive operation of the disclosed caliber .30 disassembling machine not one single explosion has occurred despite that fact that not only "ball" type cartridges but also "incendiary," "tracer" and "armor piercing" projectiles have been passed therethrough.

The speed with which disassembly takes place is relatively high, being of the order of 80 cartridges per minute or nearly 40,000 cartridges for an 8-hour day. This speed is accompanied by high reliability of operation and further contributes to the successful performance which my improved machine has strikingly demonstrated in actual use.

Further advantages include a marked decrease in the skill and effort that is required of the machine operators. The manual placement of the cartridges on the feed plate 55 and their guiding between feed strips 59—60 is an extremely simple operation and can be performed without previous training or experience. The bringing of the assembled cartridges to the machine and the carrying of the separated components away from the machine is even more simple.

Machines designed for the disassembly of cartridges of other calibers can make use of the improved design here disclosed, and substantially the only changes necessary are in the selection of machine part sizes suited to the caliber and other dimensions of the cartridges to be disassembled.

My inventive improvements are therefore extensive in their adaption and are not to be restricted to the specific form here disclosed by way of illustration.

I claim:

1. In a machine for disassembling cartridges, the combination of a rotatable dial having cartridge-receiving notches equally spaced around its periphery, means repeatedly effective at spaced time intervals for advancing said dial through the angular distance between notches whereby each notch successively occupies "at rest" positions spaced all the way around said dial periphery's rotative path, a feeding station along said path in register with a given one of said "at rest" positions, means at said feeding station for so placing a cartridge in each of the said dial notches there coming to rest that the projectile of said cartridge protrudes from the dial, a pulling station also along said path but in register with another one of said dial notch "at rest" positions that is beyond said feeding station, means at said pulling station for there securing in the machine the case head of each cartridge that is brought thereto by said dial, further means at said pulling station effective then to grip the projectile of each of said cartridges and pull it completely free of the cartridge case for subsequent ejection from the machine, a discharge station likewise along said path but in register with a third one of said dial notch "at rest" positions that is beyond said pulling station, means at said discharge station for pushing from said dial each cartridge case that is brought to the discharge station by the dial, and means then effective for emptying the powder from each of said cases and for thereafter ejecting the so separated cases and powder from the machine.

2. In a machine for disassembling cartridges, the combination of a fixture wherein there is secured the case head of a cartridge to be disassembled, a pull head carrying separable dies that are shaped to match the contour of said cartridge's projectile, a lever extending from said head and having a cam-shaped end by which said dies are freed for separation when said lever is in an "unlock" position and are forced together when said lever is in a "lock" position, mechanism operable while said lever is in its "unlock" position to position said pull head over said projectile, a member next operable to shift said lever to its said "lock" position and thereby cause said dies to grip said projectile, mechanism thereafter operable to move said pull head and fixture away from each other and thereby pull said projectile out of said cartridge case, and a member still later operable to return said lever to its said "unlock" position and thereby release said projectile from said dies.

3. In a machine for disassembling cartridges, the combination of a fixture for so securing in said machine the case head of a cartridge to be disassembled that said cartridge stands substantially upright with its projectile on top, a pull head carrying separable dies shaped to match the contour of said cartridge projectile, a lever extending from said head and serving in an "unlock" position to free said dies for separation from one another and further serving in a "lock" position to force said dies towards one another, mechanism operable while said lever is in its said "unlock" position to lower said pull head over said projectile in such a way that said dies are closeable in gripping relation thereon, a lock rod now operable to shift said lever to its said "lock" position in which said dies grip said projectile, mechanism next operable to raise said pull head away from said fixture and thereby pull said projectile from said cartridge case, a lock release thereafter effective to return said lever to said "unlock" position and thereby drop

said projectile out of said head, and a throw-out paddle now so projected under said raised pull head as to deflect said dropping projectile outwardly away from said cartridge case therebeneath.

4. In a machine for pulling projectiles from cartridge cases, the combination of a fixture for so securing in said machine the case head of a cartridge to be disassembled that said cartridge stands substantially upright with its projectile on top, a pull head lowerable over said projectile and having dies which securely grip the projectile therebetween, a throw-out paddle positioned in the path of said downward movement and being resiliently mounted so as to be pushed out of said path by said pull head, mechanism for raising said pull head whereby to pull said projectile from said cartridge case and also to allow said paddle to resume an inclined position beneath said head, and means for releasing said projectile from said pull head dies whereby to drop it on said inclined paddle and thereby deflect it outwardly away from said cartridge case therebeneath.

5. In a machine for pulling projectiles from cartridge cases, the combination of a fixture wherein there is secured the case head of a cartridge to be disassembled, a pull head carrying separable dies having internal contours which substantially match the external contour of said cartridge's projectile, a lever extending from said head and having a cam-shaped end by which said dies are freed for separation when said lever is in an "unlock" position and are forced together when said lever is in a "lock" position, means operable while said lever is in said "unlock" position so to position said projectile in said pull head that said dies are closeable in gripping relation thereon, mechanism effective after said lever has been placed in said "lock" position to move said fixture and said pull head away from each other and thereby pull said projectile out of said cartridge case, and an ejecting stem carried by said pull head and effective after return of said lever to said "unlock" position then to push said projectile from between said dies and thence out of said head.

6. In a machine for pulling projectiles from cartridge cases, the combination of a fixture for securing in said machine the case head of a cartridge to be disassembled, a pull head carrying separable dies having internal contours which substantially match the external contour of said cartridge's projectile, a lever extending from said head and being effective in an "unlock" position to free said dies for separation from one another and further being effective in a "lock" position to force said dies towards one another, means operable while said lever is in its said "unlock" position so to position said projectile in said pull head that said dies are closeable in gripping relation thereon, and mechanism operable after said lever has been placed in its said "lock" position to move said pull head away from said fixture and thereby pull said projectile from said case.

7. In a machine for pulling projectiles from cartridge cases, the combination of a fixture wherein there is secured the case head of a cartridge to be disassembled, a pull head carrying separable dies having internal contours which substantially match the external contour of said cartridge's projectile, a lever extending from said head and being effective in an "unlock" position to free said dies for separation from one another and further being effective in a "lock" position to force said dies towards one another, means operable while said lever is in its said "unlock" position so to position said projectile in said pull head that said dies are closeable in gripping relation thereon, and mechanism operable after said lever has been placed in said "lock" position to move said fixture and said pull head away from each other and thereby pull said projectile out of said case.

8. In a machine for separating cartridges into the projectile, case and powder components of which each is made up, the combination of a rotatable dial having cartridge-receiving notches spaced around its periphery, means at a "feeding station" for placing cartridges in said notches with their case heads down and their projectile ends up, means at a "pulling station" for separating said projectiles from said cartridge cases while latter are still in said dial notches, means at a "discharge station" for pushing each of said cartridge cases from the dial notch by which it is carried, and means then effective for emptying the powder from each of said cases and for thereafter ejecting the so separated cases and powder from the machine.

9. In a machine for separating cartridges into the projectile, case and powder components of which each is made up, the combination of a rotatable dial having cartridge-receiving notches spaced around its periphery, means at a "feeding station" for placing cartridges in said notches with their case heads down and their projectile ends up, means at a "pulling station" for separating said projectiles from said cartridge cases while latter are still in said dial notches, and an ejector at a "discharge station" having a push face outwardly inclined from bottom to top and being effective to push each of said cartridge cases out of the dial notch by which it is carried in such a way that the case falls from the notch mouth end down and thereby spills out of the case mouth the powder within the case.

10. In a machine for separating cartridges into the projectile, case and powder components of which each is made up, the combination of a rotatable dial having cartridge-receiving notches spaced around its periphery, means at a "feeding station" for placing cartridges in said notches with their case heads down and their projectile ends up, means at a "pulling station" for separating said projectiles from said cartridge cases while latter are still in said dial notches, an ejector at a "discharge station" for pushing each of said cartridge cases from the dial notch by which it is carried in such a way that it falls mouth-end-down out of said notch, and a series of spaced rods forming an incline over which each of said cases slides mouth-end-first and within the length of which all of the powder therein falls out of the case and downwardly between said rods.

11. In a cartridge disassembling machine, the combination of a rotatable dial having cartridge-receiving notches spaced around its periphery, means at a "feeding station" for placing cartridges in said notches with their case heads down and their projectile ends up, means at a "pulling station" for separating said projectiles from said cartridge cases while latter are still in said dial notches, an ejector at a "discharge station" for pushing each of said cartridge cases from the dial notch by which it is carried and at the same time giving a forwardly tipping movement thereto, a conduit for receiving said so ejected cases and

having a side wall along which the top of each case passes after leaving said ejector, and an inwardly inclined extension along said side wall placed at a height slightly greater than the case length and being effective to permit free passage into said conduit of all cases from which the projectiles have been separated but to deflect sidewardly out of said conduit mouth each and every case in which the projectile may still remain.

12. In a machine for separating cartridges into the projectile, case and powder components of which each is made up, the combination of a rotatable dial having cartridge-receiving notches spaced around its periphery, means at a "feeding station" for placing cartridges in said notches, means at a "pulling station" for separating said projectiles from said cartridges while latter are still in said dial notches, means at a "discharge station" for ejecting each of said cartridge cases from the dial notch by which it is carried, and means operating on each so ejected case for emptying therefrom the powder contained therein.

13. In a machine for disassembling cartridges, the combination of means for securing the case of a cartridge to be disassembled, a pull head carrying separable dies shaped to grip said cartridge's projectile, a lever extending from said pull head and serving in an "unlock" position to free said dies for separation and further serving in a "lock" position to force said dies towards one another, means operable while said lever is in its "unlock" position to advance said pull head over said projectile, means next operable to shift said lever to its said "lock" position and thereby grip said dies upon said projectile, and means thereafter operable to move said pull head and said secured cartridge case away from each other and thereby draw said projectile out of the mouth of said case.

14. In a machine for pulling projectiles from cartridge cases, the combination of means for securing the case of a cartridge to be disassembled, a pull head carrying separable dies shaped to grip said cartridge's projectile, a lever extending from said pull head and serving in an "unlock" position to free said dies for separation and further serving in a "lock" position to force said dies towards one another, means operable while said lever is in its said "unlock" position so to position said pull head over said projectile that said dies are closable in gripping relation thereon, and means operable after said lever has been placed in its said "lock" position to move said pull head and said secured cartridge case away from each other and thereby draw said projectile out of the mouth of said case.

15. In a machine for pulling projectiles from cartridge cases, the combination of a fixture for so securing in said machine the case head of a cartridge to be disassembled that the projectile of said cartridge protrudes upwardly therefrom, a pull head lowerable over said projectile and having dies which securely grip the projectile therebetween, a deflector member inclinedly positioned in the path of said downward movement and being resiliently mounted so as to be pushed out of said path by said pull head, means for raising said pull head whereby to draw said projectile from said cartridge case and also to allow said deflector member to resume its inclined position beneath said head, and means for releasing said projectile from said pull head dies whereby to drop it on to said deflector member and thereby incline it outwardly away from said cartridge case therebeneath.

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