April 7, 1953 E. N. GRISWOLD 2,634,036

COVER REMOVING MACHINE

Filed Aug. 7, 1951 3 Sheets-Sheet 1

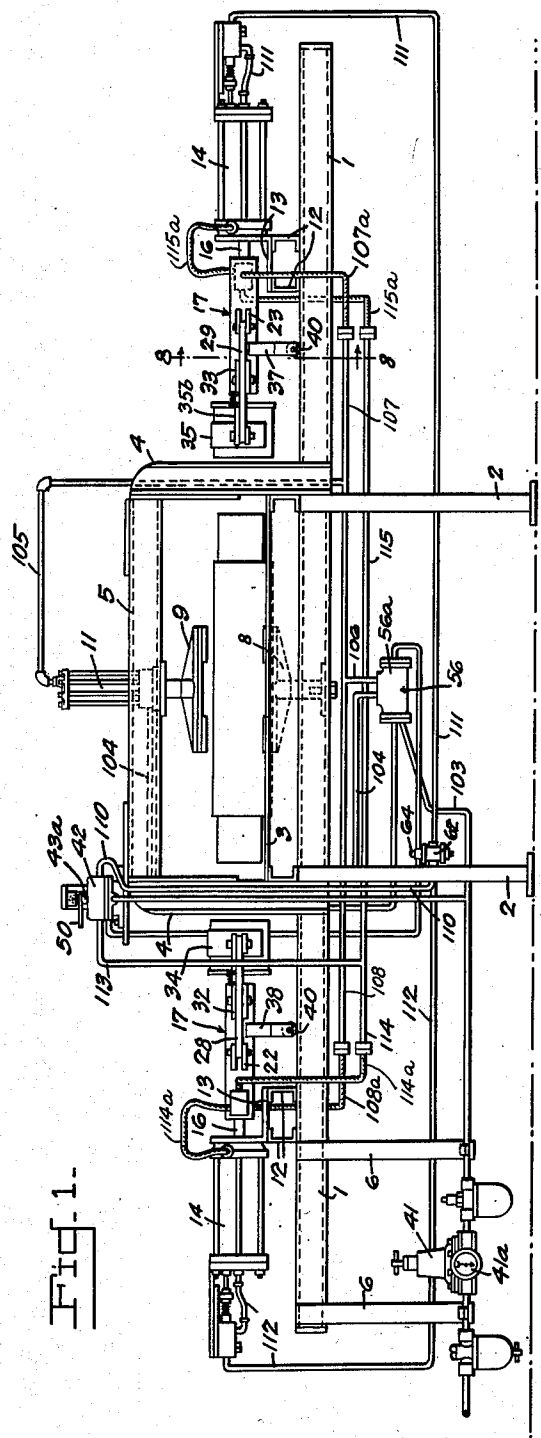


Fig. 1.

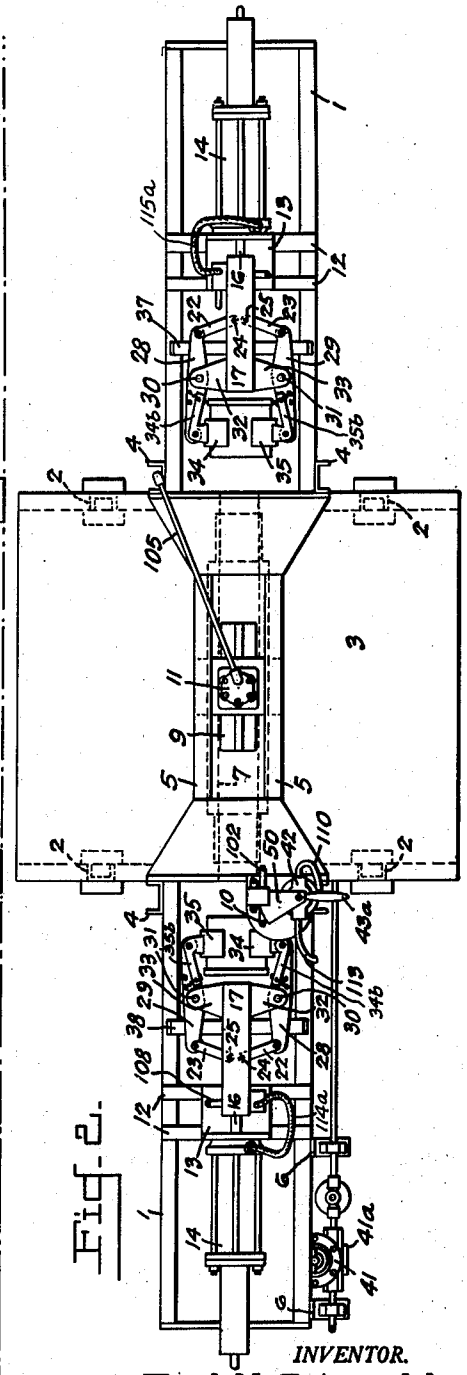


Fig. 2.

INVENTOR.
Earl N. Griswold
BY
J. J. Kessenich, A. W. Dew & S. J. Rotondi, Jr.
ATTORNEYS

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COVER REMOVING MACHINE

Filed Aug. 7, 1951 3 Sheets-Sheet 2

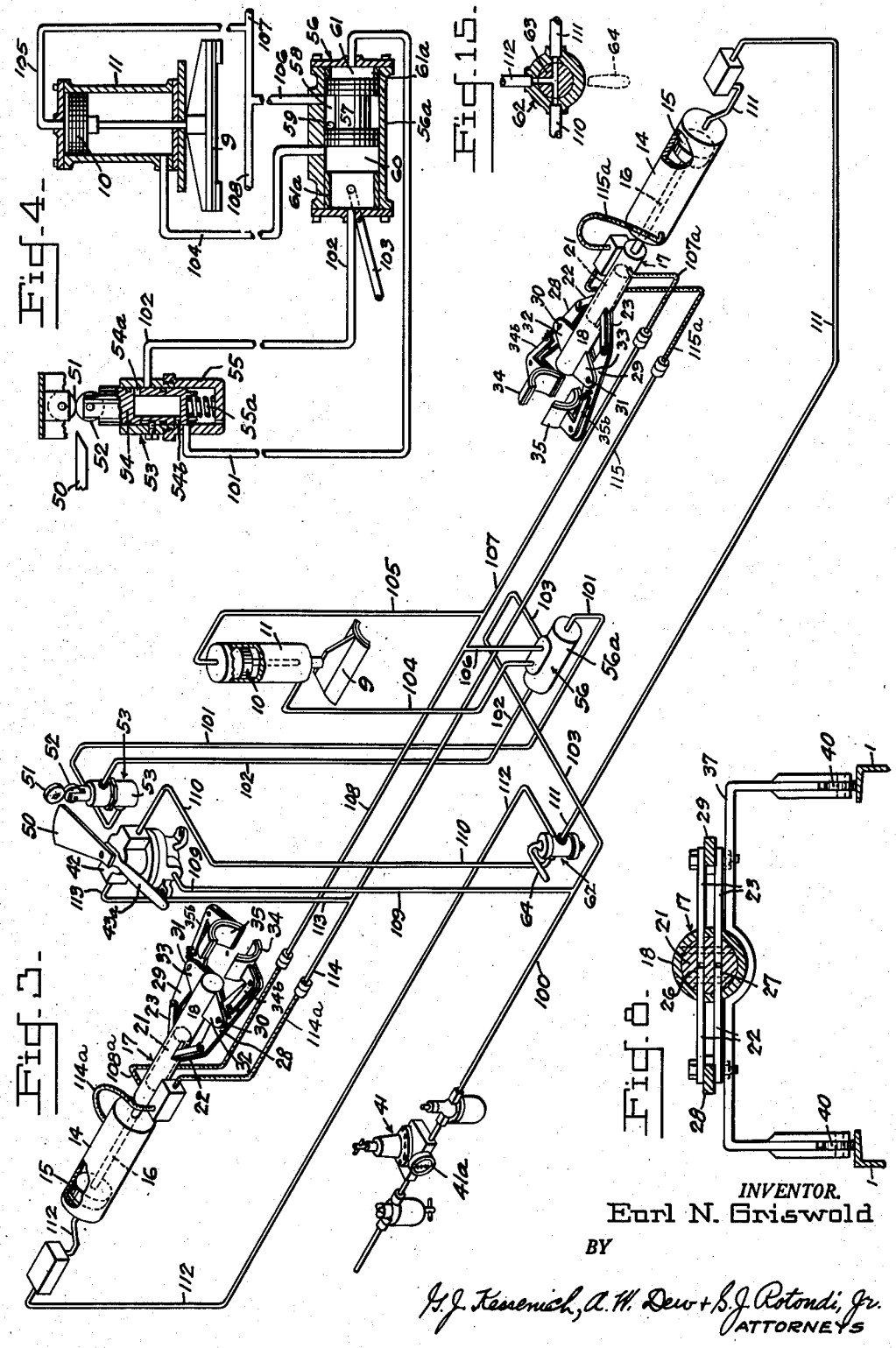


Fig. 4.

Fig. 15.

Fig. 3.

Fig. 8.

INVENTOR.
Earl N. Griswold

BY

J. J. Kesenich, A. W. Dew & S. J. Rotondi, Jr.
ATTORNEYS

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Fig. 6.

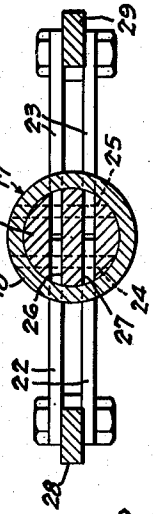


Fig. 7.

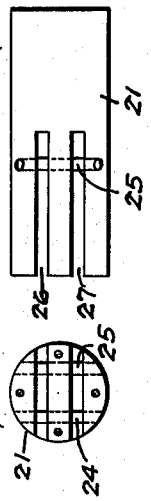


Fig. 14.

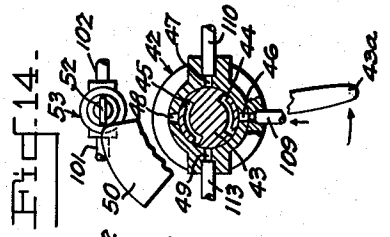


Fig. 13.

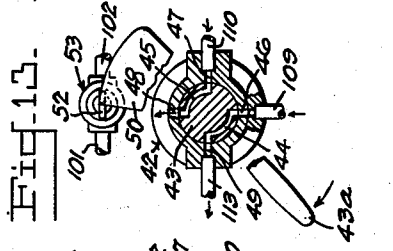


Fig. 12.

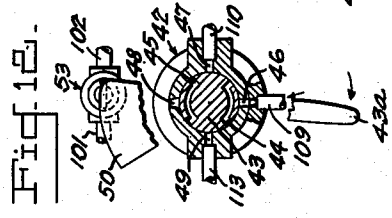


Fig. 11.

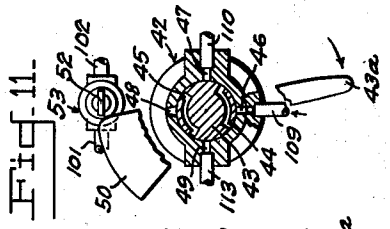


Fig. 10.

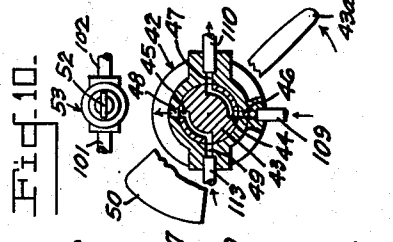


Fig. 9.

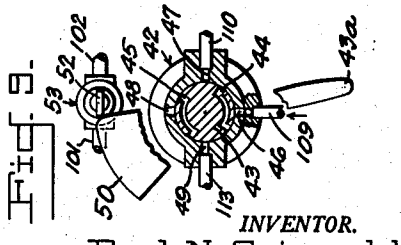
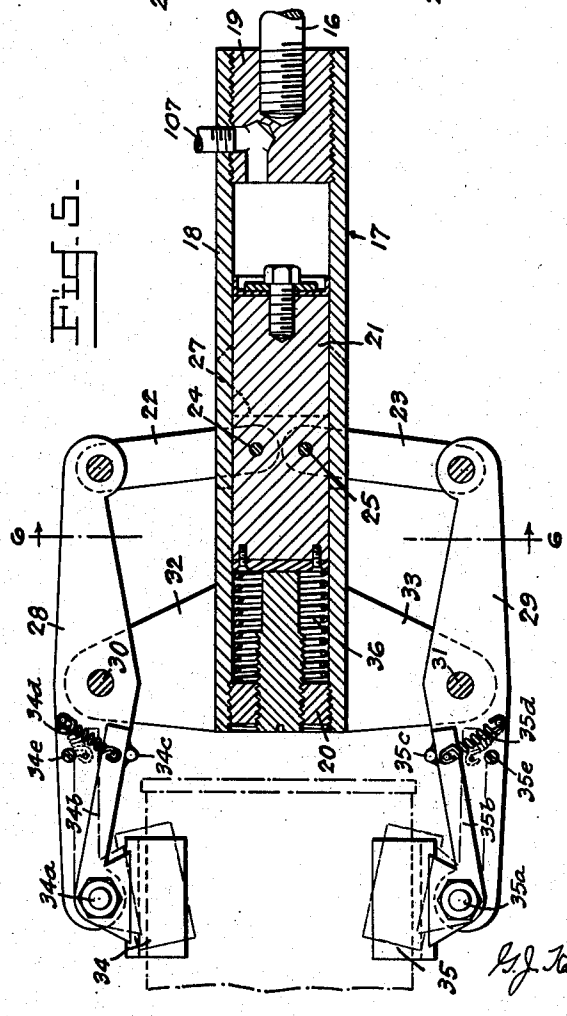


Fig. 5.



INVENTOR.
Earl N. Griswold
BY
G. J. Kasenick, A. W. Dew & S. J. Rotondi, Jr.
ATTORNEYS

Patented Apr. 7, 1953 2,634,036

UNITED STATES PATENT OFFICE

2,634,036

COVER REMOVING MACHINE

Earl N. Griswold, Savanna, Ill., assignor to the United States of America as represented by the Secretary of the Army

Application August 7, 1951, Serial No. 240,773

10 Claims. (Cl. 226—129)

(Granted under Title 35, U. S. Code (1952), sec. 266)

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The present invention relates to a machine and apparatus to remove covers from containers.

Individual rounds of ammunition such as the 105 mm. or the 90 mm. are shipped and stored in fiber containers. Since these containers need to be tightly sealed and moistureproof, covers are provided which are fitted over the ends of the container to tightly engage the container wall and thereby effect the necessary moistureproof fit. Great difficulty has been encountered in stripping these covers from the container because of the tight fit, when the need to gain access to the container contents has arisen. Also, previous stripping apparatus in addition to being cumbersome, unwieldy and time consuming, have so scored, dented and injured the container that it is no longer capable of reuse.

It is therefore an object of this invention to disclose an apparatus for stripping covers from a container which is simple in design, effective for the intended purpose and which can be handled by a single operator.

A further object of this invention is the disclosure of an apparatus combining a work table for handling the container, a movable clamp to hold the container steady in set position, and gripping or stripping fingers to grasp and strip the covers from the container body.

A still further object of this invention is the disclosure of fluid operated apparatus and system for the proper sequential operation of the various devices.

Yet another object of this invention is an arrangement of piping for transmitting fluid pressures to the various devices to be operated wherein hand operated valves to effect the various operations are within easy reach of an operator located at a central station.

A further additional object of this invention is the disclosure of similar but oppositely positioned gripping fingers which are simultaneously operable to strip off container covers secured to opposite ends of a container body.

With the foregoing and other objects in view, as will appear as the description proceeds, the invention consists of the novel construction, combination and arrangement of co-operating elements as hereinafter more specifically set forth, claimed and shown in the accompanying drawings forming a part of the present application and in which:

Figure 1 is a side elevation of the apparatus and fluid pressure system including conduits, valves, mounting structure and work table.

Figure 2 is a plan view of the apparatus of Figure 1.

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Figure 3 is a diagrammatic delineation of the fluid pressure system including the various valves, the movable clamp and cover strippers.

Figure 4 is a diagrammatic showing of a part of the fluid pressure system including the bleeder valve, air master control valve, clamping cylinder and clamps.

Figure 5 is a detail of the gripping jaws, cylinder and mechanism for operating the grippers.

Figure 6 is a view taken on line 6—6 of Figure 5.

Figure 7 is a view showing a detail of the movable plug housed in the gripping cylinder of Figure 5 and including the pivot pins for the gripping arm links and slots to permit movement of the links.

Figure 8 is a view taken on line 8—8 of Figure 1.

Figures 9–14 are views of the hand operated air valve and bleeder valve with the operating arm of the air valve in various positions of operation.

Figure 15 is a detail of a valve in the fluid pressure system which is actuated only when a "single cover" container is being stripped.

The present exemplification is disclosed as utilizing air pressure to operate the various devices of the apparatus, however it is within the intent of the disclosure to broadly include other media commonly known to be old in fluid pressure systems.

Referring to the drawing, the work table and supporting structure are of built up steel channel construction comprising a long rectangular frame 1, supporting legs 2 and table top 3. Uprights or standards 4 welded to the long frame members and including cross pieces 5 are provided to support the various conduits, valves and air cylinders. Additional supports 6 are also welded to the side members of frame 1 and extend downwardly therefrom to support other piping and valves. The work table comprises two halves which are arranged so that a rectangular slot 7 extending the entire length of the surface, is formed. Thus when a container is rolled onto the table surface it finally rests within the slot and is supported by a clamp 8 permanently secured to the underlying supporting structure and positioned within the space formed by the slot slightly below the work table surface. This clamp cooperates with the upper moveable clamp 9 to hold the container steady within the rectangular slot in the table surface. Clamp 9 connected by a rod to piston 10 is reciprocably movable in response to pressure acting on the piston 10 housed within a clamp cylinder 11.

Four transverse channel members 12 are welded to the top flanges of the longitudinal frame 1, two each of said channel members being located on opposite sides of the work table and at a distance substantially removed from the corresponding table ends. Brackets 13 are welded to the top flanges of each pair of channels 12, and end cylinders 14 are in turn bolted or secured in any convenient manner to these brackets so that the longitudinal axis of the cylinders are parallel to and a short distance above the longitudinal axis of frame 1. Pistons 15 are received within cylinders 14 and to each of the pistons 15 is connected by means of rods 16, gripping cylinders 17. The gripping cylinders are thus axially movable toward and away from the work table surface to move the cover stripping fingers toward and away from a container which is received within the slot in the work table surface. Axial movement of gripping cylinders 17 is permitted by the provision of flexible hose sections in the connecting conduits as later to be described.

Referring to Figure 5, the gripping cylinder and stripping finger organization comprises an annular tubular member 18 closed at one end by a plug 19 in which are formed bores to receive the air conduits of the pneumatic system. The other end of the annular member is closed by a plug 20, and movable within this member is a plug or piston 21. Two links 22 and 23 are pivotally joined to plug 21 by means of pins 24 and 25, slots 26 and 27 being provided in the movable plug to permit movement of the links about their pivot pins. Arms 28 and 29 are pin connected to links 22 and 23, and are mounted to pivot about pins 30 and 31 received in bores formed in brackets 32 and 33 welded to the outer wall of cylinder 17. Arcuate gripping segments 34 and 35 carried by the free ends of arms 28 and 29, are arranged to grasp the cover to be stripped off when the stripping cylinders are moved into grasping position. The gripping segments are pivotable upon pins 34*a* and 35*a* mounted on arms 28 and 29. Levers 34*b* and 35*b* which are an integral part of the gripping segments are slidable upon the faces of arms 28 and 29 between the solid and dotted line positions as seen on Figure 5. When the segments are in gripping position about the container, stops 34*c* and 35*c* mounted on arms 28 and 29 prevent further pivotal movement of the gripping segments. In this position the segments have a close and intimate fit about the grasped container. When a container is not being grasped tension springs 34*d* and 35*d* connecting levers 34*b* and 35*b* to the gripping arms will cause the segments to pivot about their pin connections until they encounter stops 34*e* and 35*e* which are also mounted upon arms 28 and 29. This arrangement provides a flexible connection to insure a tight fit about the container. A compression spring 36 is received in cylinder 17 between plug 20 and piston 21 and serves to bias piston 21 to the right in cylinder 17. When piston 21 is in this position the outer ends of links 22 and 23 will be inclined toward the left end of cylinder 17 forcing the gripping ends of arms 28 and 29 to swing outwardly about their pivots. It can thus be seen that when air pressure is admitted to the chamber formed by piston 21 and plug 19, piston 21 is forced to the left to cause the gripping means to be brought together for their intended purpose. Flat bars 37 and 38 are welded or secured in any convenient manner to the under sides of cylinders 17 and extend horizontally outwardly therefrom and downwardly to form right angles. Rollers or wheels 40 are rotatably mounted on the lower ends of the right angular members to ride on the horizontal flanges of the longitudinal members comprising frame 1, when the gripping cylinders are moved toward and away from the work table surface. To permit axial movement of gripping cylinders 17, the right cylinder is connected to the pneumatic system by conduit 115, provided with flexible hose connection 115*a* and conduit 107 with flexible hose connection 107*a* between the conduits and the gripping cylinder organization. In like manner the left cylinder pneumatic system connections provide conduit 114 and flexible nose section 114*a* and conduit 108 and flexible hose connection 108*a*.

Referring to Figures 3 and 4 the pneumatic system for operating the grippers and holding clamp comprises a hand actuated shut off valve 41 which may be of the ordinary ball valve type to turn the air pressure on and off. Included in this valve is a gage 41*a* to indicate the air pressure in the system. Also provided is a hand operated air valve 42 including a rotatable plug 43 shiftable to various positions by means of a handle 43*a* connected thereto. The plug 43 has passages 44 and 45 and the outer valve sleeve has 4 equiangularly spaced ports 46, 47, 48 and 49 which for various positions of operation are in communication with passages 44 and 45, as subsequently to be described. Rotatable with handle 43*a* and extending therefrom is a cam 50 which passes between rollers 51 and 52 to actuate a bleeder valve 53. Roller 51 is permanently secured to a bracket mounted on the frame structure, whereas roller 52 is secured to inner sleeve member 54 slidable in an outer sleeve member 55 of bleeder valve 53. The outer sleeve member has axially spaced conduits 101 and 102 leading into the inner chamber formed by the outer sleeve. The inner sleeve contains port 54*a* which is in registry with conduit 102 and port 54*b* which is in registry with conduit 101 when the inner sleeve member has been forced downwardly to thereby provide a direct path for air pressure from conduit 101 to conduit 102 for certain positions of operation. A compression spring 55*a* biases the inner sleeve member in an upward direction as seen in Figure 4 when the bleeder valve is not in operation. Cooperating with the bleeder valve is an air master control valve 56 comprising an outer closed cylinder 56*a* and a plug or spool 57 forming recess 58 therein with a port 59 so that when the piston is moved from a first position, air entering into a chamber 60 from a conduit 103 is exhausted by way of a conduit 104 into the bottom of clamp cylinder 11 below piston 10 to maintain clamp 9 in raised position. In this position the upper end of cylinder 11 is bled to atmosphere via conduit 105 and 106, and the ends of the gripping cylinders are exhausted to atmosphere via conduits 107, 108 and 106. Stops 61*a* are provided in cylinder 56*a* to limit movement of piston 57 to the left as seen in Figure 4. When inner sleeve 54 of the bleeder valve is pushed downwardly the air introduced into chamber 60 is permitted to travel by way of conduit 102 through the bleeder valve into conduit 101 and into a second chamber 61 formed by the right side of plug 57 and the right cylinder wall. Plug 57 is thus forced to the left against the stops provided, air is admitted to conduits 105, 107 and 108 by way of conduit 106, which is in communication with chamber 61, to move clamp 9 down-

wardly in clamping position and to actuate the cover strippers.

A valve 62 is also included in the pneumatic system having a movable plug 63 which is actuated by handle 64. The plug has 3 radial ports communicating with conduits 110, 111 and 112 respectively when a container having a cover on either end is in position on the work table. If a container having only one cover is being stripped, after the gripping fingers have been moved into position to grip the container, the valve 62 may be set to prevent bleeding of either the left or right end cylinder so that when one gripper is holding in conjunction with the fixed and movable clamps, the second gripper is being retracted to strip the cover from the container.

The complete sequence of operation of device follows. The container to be stripped of its covers is in position within the slot on the work table and is supported in this position by lower clamp 8. Valve 41 has been set to permit the required amount of air pressure in line 100, valve 62 has been set to the position shown in Figure 15 and the handle of hand operated air valve 42 is in neutral position designated as position 1. In this position the bleeder valve 53 is not affected and remains closed. Air pressure in conduit 100 cannot pass through the hand operated air valve into conduits 110, 111 and 112 leading to the outer end of cylinders 14, therefore the gripping fingers are withdrawn. Also no air pressure is admitted to or released from conduits 113, 114, flexible hose 114a, and 115 and flexible hose 115a. Air pressure from conduit 100, is transmitted through conduit 103 into chamber 60 moving plug 57 to the right. Since the bleeder valve is closed no pressure can travel from conduit 102 to conduit 101, however pressure will proceed via conduit 104 into the lower end of cylinder 11 below piston 10 to maintain clamp 9 in raised position. At the same time the chamber above piston 10 is bled by way of conduits 105, 106 and exhaust 59, and the ends of gripping cylinders are also exhausted to atmosphere by way of conduits 107, flexible hose 107a, 108, flexible house 108a, 106 and port 59, to cause the gripping fingers to remain open.

The operator now swings handle 43a of the hand operated air valve to the right as shown in Figure 10 to assume position 2. Again bleeder valve 53 remains unaffected, clamp 9 remains raised and the gripping fingers remain open. However, air pressure from conduit 100 passes into conduit 109, through passage 44 in the hand operated air valve, into conduit 110 and through valve 62 and into conduits 111 and 112. Air pressure is thus admitted into the outer ends of end cylinder 14 to force pistons 15 and consequently the gripper finger cylinder organization in position toward the work table so that the container covers are ready to be grasped. Also in this position the inner ends of end cylinders 14 are exhausted to atmosphere via conduits 115, 114, 113, passage 45 and exhaust port 48.

The operator now moves the handle 43a to neutral or position 3 as shown in Figure 11. The gripping fingers remain in position to grasp the container covers but, in every other respect the situation noted in position 1 obtains. Clamp 9 remains raised and the gripping fingers are open.

Handle 43a is now moved to position 4 as seen in Figure 12. The knife edge of cam 50 passes between the rollers 51 and 52 to open bleeder valve 53, however no air pressure can pass through the hand operated air valve, hence the

gripping fingers are not affected and they remain in the same position as seen in position 2. Air pressure proceeds by way of conduit 103 into chamber 60, thence to conduit 102 through the bleeder valve and into chamber 61. This air pressure moves plug 57 to the left and air is admitted to conduit 106, then into conduit 105, and to the top of cylinder 11 above piston 10 to lower clamp 9 to engage and to hold the container. At the same time pressure from conduit 106 proceeds into conduits 107, 108 and then into gripping cylinders 17 to cause the gripping fingers to grasp the container closures. The lower end of cylinder 11 is bled to atmosphere by way of conduit 104 and bore 59.

Handle 43a is now shifted to position 5 as seen in Figure 13. The bleeder valve is still open, clamp 9 is in lowered position and the gripping fingers remain closed about the container covers. Air pressure proceeds by way of conduit 109 through passage 44 in valve 42 into conduit 113, then into conduits 114 and 115, and is finally introduced into the inner ends of cylinders 14 to move pistons 15 outwardly as well as the gripping cylinders and gripping fingers. At the same time the outer ends of cylinders 14 are bled to atmosphere through conduits 111, 112, valve 62, conduit 110, and into passage 45 to atmosphere. The withdrawal of the gripping fingers while still in closed position will strip the covers from the container on the work table surface.

The operator then moves handle 43a to position 6 as seen in Figure 14 which is again the neutral position. Cam 50 is no longer in engagement with roller 52 wherefor spring 55a returns bleeder valve 53 to closed position. Air introduced into chamber 60 by way of conduits 100 and 103 will force plug 57 to the right in cylinder 56a in view of the bleeder hole provided in the lower end of sleeve 55 of bleeder valve 53. The air pressure in chamber 60 will proceed through conduit 104 into the lower end of clamp cylinder 11 to raise clamp 9. So also, clamp cylinder 11 will be exhausted through conduits 105, 106 and port 59, and the outer end of the gripping cylinders will bleed to exhaust by way of conduits 107, 108, 106 and port 59. When the gripping cylinders are exhausted, spring 36 in these cylinders will cause the fingers to open to thereby release and drop the covers into receptacles provided to receive them.

When it is desired to strip the cover off a "single cover" container, valve 62 is used. The first four steps in the sequence of operation is as outlined above. Before the operater moves handle 43a to position 5, he first moves handle 64 of valve 62 either clockwise or counterclockwise depending on whether the cover to be removed is either at the right or left end of the container. When position 5 of handle 43a is then assumed only one of the gripping cylinders will be withdrawn to strip the corresponding cover off the container. The next position 6, will cause both sets of fingers to open and clamp 9 to raise so that the container may be removed. Valve 62 may then be returned to its normal operating position, whereupon position 5 may again be assumed to withdraw the fingers which are still in gripping position. Turning handle 43a to the last or position number 6 will place the apparatus in condition to receive the next container.

Although the above disclosure is primarily concerned with fiber containers for the 105 mm. and 90 mm. rounds, it is obvious that with slight modifications to the apparatus, container for 76

mm., 75, and other size calibers may be accommodated. For example the grippers may be arranged to be bolted on to the gripping arms so that they are easily removable and interchangeable with grippers of varying sizes. Also, permanent clamp 8 may be adjustably movable in a vertical direction to cooperate with movable clamp 9 to accommodate different size containers. In addition, it is to be understood that the device is capable of use with other than fiber containers, such as metallic containers for storing and shipping guns, ammunition etc.

Numerous other modifications and alterations of the structure of the valves and parts which have been disclosed herein for purposes of illustration will be apparent to one skilled in the art, and it is obvious that the same may be made without departing from the spirit and scope of the invention as defined in the following claims.

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

I claim:

1. In a machine for stripping an end cover from a tubular container, means to support said container in horizontal position, means mounted above said support vertically movable toward and away from said support to clamp a container therebetween, a carrier, means mounting said carrier on said support for horizontal reciprocation toward and away from a container on said support means, a pair of oppositely-disposed grippers pivoted on said carrier, means mounted on said carrier operable to move said grippers simultaneously to grip an end cover therebetween, a single source of pressure fluid, means responsive to fluid pressure to actuate said carrier, said clamp and said grippers in operative movement, manually controlled valve means intermediate said source of pressure fluid, and said carrier, clamp and grippers operative to a first position to connect said source with said carrier, and means responsive to a predetermined continued movement of said valve means to simultaneously connect said source with said clamp and said grippers.

2. In a machine for stripping covers from opposite ends of a cylindrical container, means to support said container in horizontal position, means mounted above said support vertically movable toward and away from said support to clamp a container therebetween, a pair of opposed carriers mounted on said support, each of said carriers located axially outwardly of a corresponding end of said container and each actuable for horizontal reciprocation toward and away from said container on said support, a pair of oppositely-disposed grippers on each of said carriers, each pair of grippers operable simultaneously to grip an end cover therebetween, a singe source of pressure fluid, means mounted on said carriers, said clamp and said grippers responsive to fluid pressure to actuate said carriers, clamp and grippers in operative movement, conduit means connecting said single source to each of said fluid pressure responsive means, manually controlled valve means in said conduit means intermediate said source and said fluid pressure responsive means operative to a first position to connect said single source of fluid pressure with said fluid responsive means on said carrier, and means responsive to a predetermined continued movement of said valve means to simultaneously connect said single source of fluid pressure with the pressure responsive means for said clamp and said grippers.

3. In a machine for removing an end cover from a tubular container, a support, means on said support above said container vertically movable to clamp said container on said support, a carrier including a cylinder mounted on said support axially outwardly of the covered end of said container, pressure responsive means in said cylinder for translating said carrier toward and away from said container, a piston in said carrier, a pair of gripper levers, a gripper mounted on a corresponding end of each lever respectively, link means pivotally connecting each lever with said piston whereby movement of said piston moves said grippers into cooperative gripping relation, a single source of pressure fluid, conduit means connecting said source with said pressure responsive means and said piston, and valve means in said conduit means intermediate said source, and said pressure responsive means and said piston operable to connect said source with said pressure responsive means and said piston in succession.

4. In a machine for removing covers from opposed ends of a tubular container, a work table for supporting a container in horizontal position thereon, a clamp supported above said work table for vertical movement to clamp a container on said table, a pair of opposed carriers, each carrier mounted on said work table axially outwardly of a corresponding end of said cover, each of said carriers including a cylinder, a piston in each of said cylinders, pressure responsive means in each of said carriers, a pair of oppositely-disposed gripper levers, a gripper mounted on a corresponding end of each lever respectively, link means connecting each of said levers with said pressure responsive means whereby movement of said pressure responsive means moves said grippers into cooperative gripping relation, a single source of pressure fluid, conduit means connecting said source with said piston and said pressure responsive means, and valve means in said conduit means intermediate said source, said pressure responsive means and said piston operable to connect said source with piston and said pressure responsive means in succession.

5. In a machine for removing an end cover from a tubular container, a support, means for clamping a container in position on said support, a carrier, means mounting said carrier for translation axially of a container clamped on said support, first pressure responsive means connected with said carrier to so translate the same, a pair of grippers movably mounted on said carrier, second pressure responsive means on said carrier to simultaneously move said grippers into gripping relation, a single source of fluid pressure, conduit means adapted to connect said first and second pressure responsive means to said source of fluid pressure, and valve means in said conduit means operable to connect said source to said first and second pressure responsive means in sequence in the order named.

6. In a machine for removing covers from opposed ends of a tubular container, a support, means vertically movable for clamping a container in position on said support, a pair of opposed carriers, means mounting each of said carriers axially outwardly of a corresponding end of a container clamped on said support for simultaneous translation toward and away from said container, first pressure responsive means connected with each of said carriers to so translate

the same, a pair of oppositely disposed grippers movably mounted on each of said carriers adjacent each end cover, second pressure responsive means on each of said carriers to simultaneously move each of said pair of grippers into gripping relation about a corresponding end cover, a single source of fluid pressure, conduit means adapted to connect said first and second pressure responsive means to said source of fluid pressure, and valve means in said conduit means operable to connect said source to said first and second pressure responsive means in sequence in the order named.

7. In a machine for stripping covers from opposite ends of a cylindrical container, a work table having a rectangular elongated slot for receiving said container, a first fixed clamp supported on said work table below and within the space formed by said slot to support said container in horizontal position therein, a second clamp mounted above said work table and vertically movable to frictionally engage said container, first means on said second clamp responsive to fluid pressure to move said second clamp to container engaging position, two oppositely positioned stripping members mounted on said work table each stripping member positioned axially outwardly of a corresponding end of said container for axial movement toward and away from said container covers and having cover gripping fingers, second fluid responsive means on said stripping members to move said stripping members to cover engaging position, third fluid pressure responsive means on said gripping fingers to contract said fingers about said covers, a single source of fluid pressure, conduit means connecting said first, second and third fluid pressure responsive means with said source of fluid pressure, and hand operated valve means in said conduit means movable to first connect said source with said second pressure responsive means to move said stripping members to cover engaging position, then further movable to connect said first and third pressure responsive means with said pressure source.

8. The combination in claim 7 wherein said first pressure responsive means comprises a vertically elongated cylinder, a piston in said cylinder and means connecting said piston to said second clamp.

9. The combination in claim 7 wherein said second pressure responsive means comprises a pair of oppositely located horizontally elongated cylinders, a horizontally reciprocable piston in each of said horizontal cylinders, and a rod connecting each of said horizontally reciprocable pistons to its corresponding stripping member.

10. The combination in claim 9 wherein said third pressure responsive means comprises elongated plugs reciprocable in horizontal bores formed in each of said stripping members and means pivotally connecting each plug to its corresponding cover gripping fingers.

EARL N. GRISWOLD.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
640,091	Carr	Dec. 26, 1899
1,462,305	Snyder	July 17, 1923
1,633,593	Larbalester	June 28, 1927
1,692,274	Malloy et al.	Nov. 20, 1928

FOREIGN PATENTS

Number	Country	Date
984,937	France	Mar. 7, 1951