Dec. 15, 1970 K. A. KLENZ 3,546,766

VALVE FOR CLIPPING APPARATUS

Filed Sept. 16, 1968 2 Sheets-Sheet 1

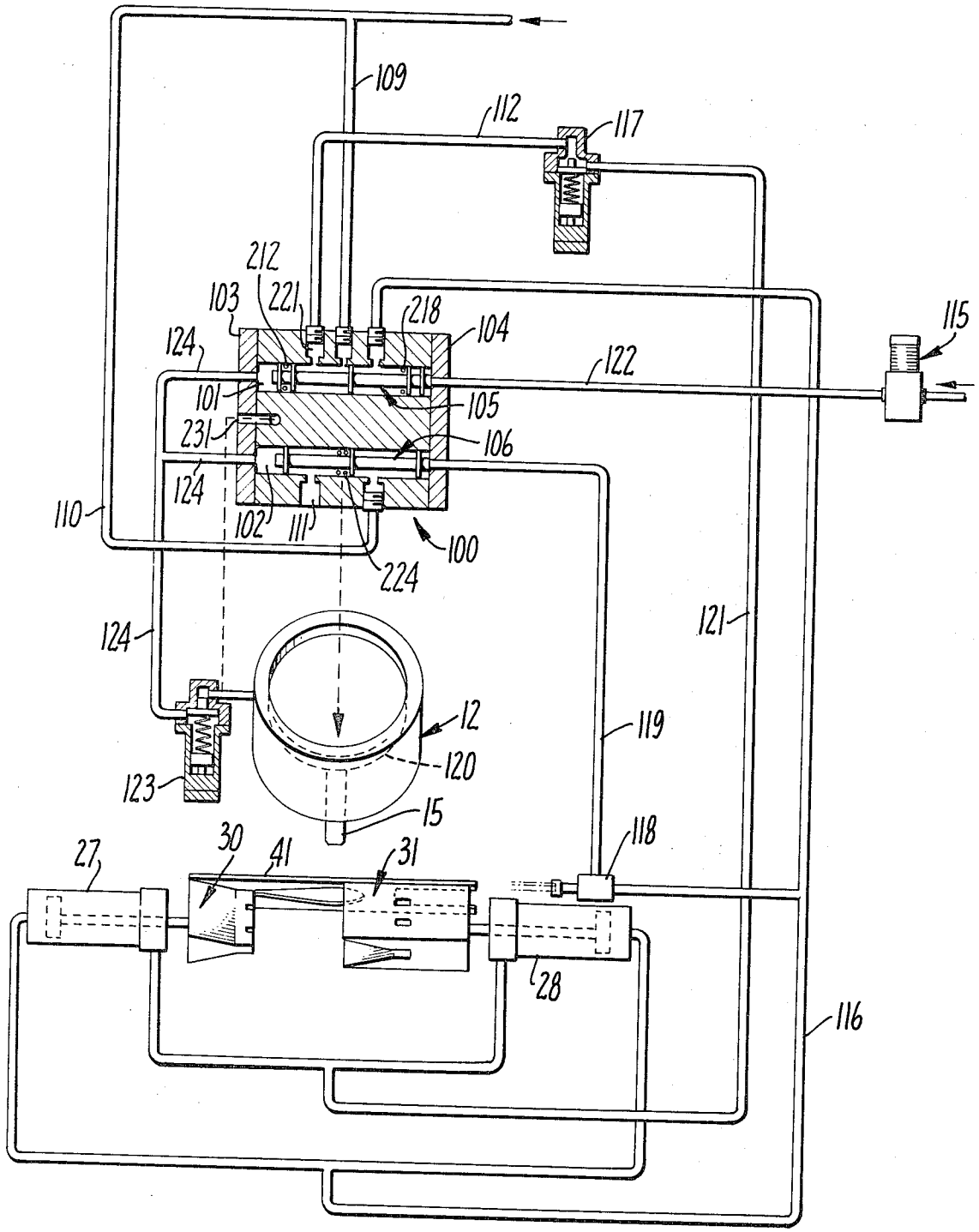


FIG. 1.

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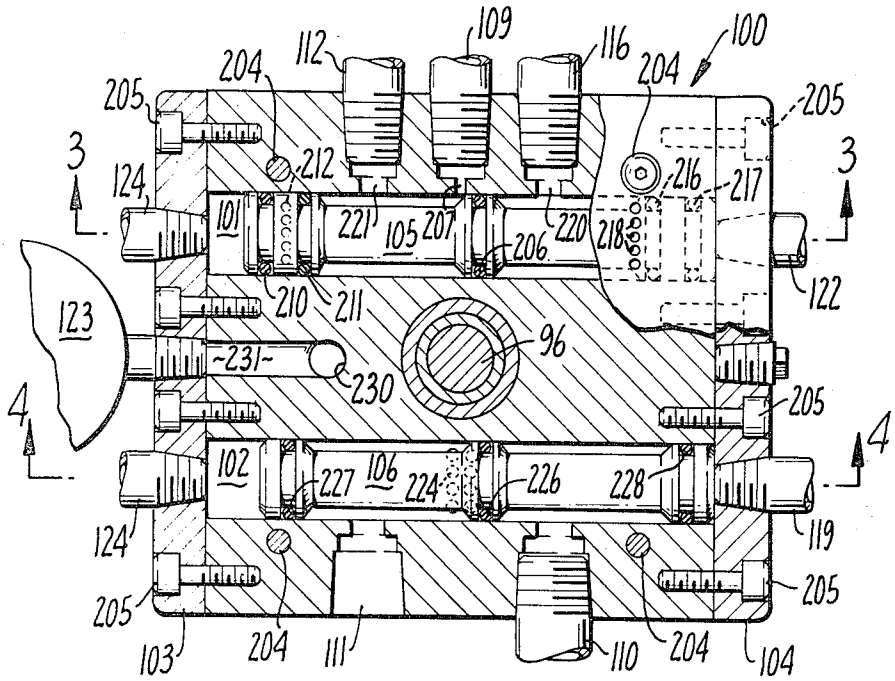


FIG. 2.

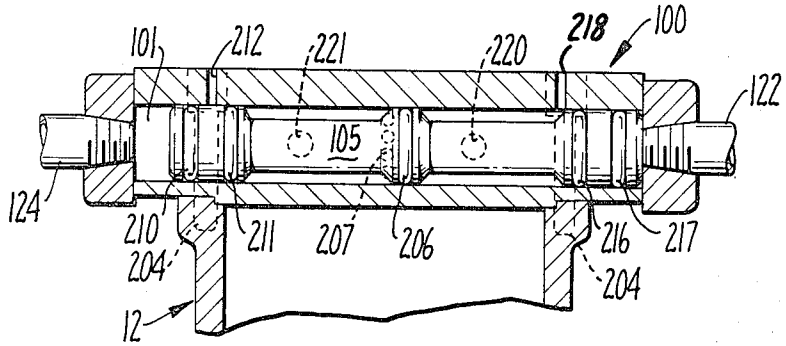


FIG. 3.

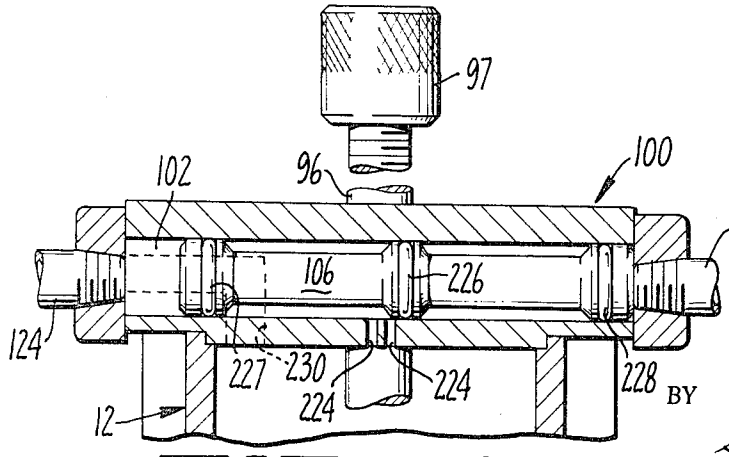


FIG. 4.

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United States Patent Office 3,546,766
Patented Dec. 15, 1970

3,546,766

VALVE FOR CLIPPING APPARATUS

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Filed Sept. 16, 1968, Ser. No. 762,288
Int. Cl. B23p 11/00, 19/04
U.S. Cl. 29—208 5 Claims

ABSTRACT OF THE DISCLOSURE

A cylinder head constituting a valve for use with a clipping cylinder having a fluid driven punch for deforming a U-shaped clip about an article to be sealed, such as a flexible bag or sausage casing. Valve elements are provided within the cylinder head to effect economies in cost and to increase the speed and response of the apparatus by reducing the required piping and eliminating fittings.

This invention relates to a clipping apparatus adapted to deform a U-shaped clip around an article such as a sausage casing or the mouth of a flexible bag in order to provide a seal. More particularly the invention is directed to a clipping cylinder provided with a piston which urges a punch into engagement with the clip for deforming the latter. Heretofore it has been customary in clipping apparatus of the subject type to provide an air driven cylinder for forming the sealed clip and, in addition, to provide various types of valves and pressure controls for actuating the cylinder in timed relation to some other step in the sealing process. Since speed of operation is an important consideration in apparatus of the subject type it is desirable to reduce the time of each cycle as much as possible so that a maximum output may be provided for any time period. In many instances it is desirable to program the stroke of the clipping cylinder with air actuated members having other functions. For example, in U.S. Patent No. 3,237,366 there is disclosed an apparatus for vacuum sealing casings and the like which includes a gate actuated by air pressure prior to the actuation of the clipping cylinder. The apparatus of the above noted patent requires a considerable length of conduit and numerous valves which cause the speed of the operations to be sluggish and requires the entire apparatus to be less compact than is desirable. Also in U.S. application Ser. No. 762,289 filed Sept. 16, 1968 a clipping apparatus is disclosed wherein the closing of a gate and the translation of the clipping punch are programmed so that certain steps occur in timed sequence without human intervention. These devices usually require three or more valves external of the clipping cylinder itself and a substantial amount of conduit to carry out the steps to be performed, thus complicating the apparatus, increasing the number of fittings required, and resulting in slow operation since a relatively great volume of air must be moved through the conduits during each cycle.

The main object of the present invention is to generally improve clipping apparatus of the subject type and particularly to speed up the clipping operation and related functions and at the same time reduce the number of parts and expense of manufacture.

Other objects and advantages will be apparent from the specification and from the drawings.

FIG. 1 is a schematic view of a clipping cylinder showing the head in a horizontal cross section and indicating a related function which in this case is the constriction of a sausage casing prior to the actual clipping step.

FIG. 2 is an enlarged horizontal cross section of the cylinder head.

FIG. 3 is a vertical cross section taken in a plane indicated by lines 3—3 of FIG. 2.

FIG. 4 is a vertical cross section through the head as taken in the plane indicated by lines 4—4 of FIG. 2.

The clipping cylinder, indicated schematically in FIG. 1, is generally designated **12** and this cylinder includes a piston **120** which is driven downwardly by air pressure and carries a punch **15** for deforming the sealing clip. More complete details of the clipping cylinder **12** may be seen in U.S. application Ser. No. 758,998 filed Sept. 11, 1968. The clipping cylinder includes a generally rectangular head generally designated **100** which is secured in airtight relationship to the top of cylinder **12** by means of four bolts indicated at **204** (FIG. 2).

The head **100** is formed from a substantially rectangular block of metal and is provided with a pair of horizontally extending parallel through bores **101, 102** in which are slidably received spool valves **105, 106**, respectively. The opposite ends of the head **100** are closed by a pair of end plates **103, 104** secured to the head by bolts **205**.

High pressure air is conducted to bore **101** by conduit **109** and is conducted to bore **102** by means of conduit **110**. The head **100** is provided with threaded holes for receiving said conduits and the diameter of said holes is reduced adjacent the bores as indicated.

Spool valve **105** is provided, centrally of its length, with an O-ring **206** which, upon actuation of the spool valve **105** is adapted to be positioned on one or the other side of a row of relatively small holes **207** which are drilled between the threaded hole of conduit **109** and the bore **101**. By making the holes **207** small the movement of O-ring **206** past the same is facilitated and the sealing effect of said O-ring is not impaired.

At one of the opposite ends of the spool valve **105** the same is provided with a pair of spaced apart O-rings **210** and **211** which, in the right hand position of spool **105** shown in FIG. 2, straddle a row of holes **212** which extend from bore **101** upwardly through the top of head **100** (FIG. 3) thus acting as a vent to atmosphere when the spool **105** is moved to the left hand position of FIG. 2.

Similarly, the opposite end of spool **105** is provided with a pair of spaced apart O-rings **216, 217** which in the right hand position of the spool **105** in FIG. 2 permit the bore **101** to be vented to atmosphere through vertically extending holes **218** drilled through the head **100** into bore **101**. In FIG. 2 it will be seen, when the spool **105** is translated to its left hand position against the end plate **103**, that O-rings **216, 217** straddle the vent openings **218**. In the position of the spool **105** shown in FIG. 2 the right hand end of bore **101** is connected by port **220** to a conduit **116** and the left hand end of bore **101** is connected by port **221** to a conduit **112**. In the position shown it is seen that high pressure air from conduit **109** is connected by head **100** to conduit **112**.

Referring now to bore **102** in head **100**, a pair of parallel rows of relatively small vertically extending holes **224** are provided between bore **102** and the interior of cylinder **12** at a point centrally of the length of bore **102**. Spool valve **106** is provided at a point centrally of its length with an O-ring **226** which is adapted to be positioned on one or the other side of holes **224** depending on the position of said spool valve. Adjacent the opposite ends of spool valve **106** the same is provided with single O-rings **227, 228** respectively. As can be seen from FIG. 2 spool valve **106** operates to connect the interior of cylinder **12** with either exhaust outlet **111** or conduit **110**. In the position shown in FIG. 2 cylinder **12** is vented through outlet **111** and when the spool valve **106** is shifted to its left hand position the cylinder **12** is connected by conduit **110** with the high pressure air as seen in FIG. 1.

At this point it will be noted that the valved head **100** provides a means for alternatively venting or applying air pressure to cylinder **12**. The present invention is particularly suitable for use in a clipping apparatus in which there is performed one or more related functions in addition to the actuation of cylinder **12**. In the particular arrangement shown schematically in FIG. 1 the related function is the actuation of means for constricting a sausage casing prior to the application of the sealing clip. A mechanism for carrying out this related function may be seen in detail in U.S. Ser. No. 758,998 filed Sept. 11, 1968. However it will be understood that the related function may be the closing of a gate as in the above noted Patent No. 3,237,366 or some other function related to the clipping operation.

The essential elements of the related apparatus as shown in the copending application are a gate structure **30** which carries one or more guide plates **41** and a die support structure **31**. Said structures are translated from the outer position shown in FIG. 1 to an inner constricting position by means of air driven cylinders **27, 28**. The inner ends of cylinders **27, 28** are connected by means of a conduit **121** with a pressure control valve **117** which in turn communicates with port **221** in bore **101** by means of conduit **112**. In the position of the valve shown in FIG. 2 it will be seen that the air under pressure is applied through bore **101** and regulator valve **117** to the inner ends of said cylinders **27, 28** thus normally holding the gate structure **30** and the die support structure **31** in spaced opposed relationship. These structures **30, 31** are urged toward each other to their operative position by introducing air to the outer ends of cylinders **27, 28** through conduit **116** which communicates with bore **101** in valve head **100** through port **220**.

The cycle of actuating the constricting means **30, 31** and thereafter the cylinder **12** may be carried out in any desired manner such as by a manually actuated valve. However in the example shown in FIG. 1 a solenoid actuated valve **115**, operated by a conventional stuffer (not shown), initiates the cycle by opening and introducing air pressure to the right hand end of bore **101** through conduit **122**. This disconnects the high pressure air from the inner ends of cylinders **27, 28** and at the same time vents said inner ends through valve **117** and applies air pressure to the outer ends of cylinders **27, 28** through conduit **116**. As the related mechanism **30, 31** is driven to its inner working position the guide plate **41** actuates a normally closed valve **118** thus signalling the readiness of said structure to receive a clip by actuation of cylinder **12**. Opening of valve **118** introduces air pressure through conduit **119** to the right hand end of bore **102** thus shifting the spool **106** from its cylinder venting position shown in FIGS. 1, 2 to the left hand end of bore **102** thus permitting air under pressure to be introduced into cylinder **12** through conduit **110** and vertically extending apertures **224** (FIG. 4).

Head **110** is formed with a conduit having a vertically extending portion **230** (FIG. 4) and a horizontally extending portion **231** (FIG. 2) leading through end plate **103** to a pressure regulator valve **123**. When the pressure in cylinder **12** has attained a predetermined amount valve **123** connects said cylinder **12** with conduit **124** thereby applying pressure to the left hand ends of bores **101** and **102** returning the apparatus to its original condition to await the initiation of the next cycle by actuation of the valve **115**.

As stated above, details of the structures **30, 31** not disclosed herein may be found in copending application Ser. No. 758,998 filed Sept. 11, 1968.

The head **100** lends itself to the incorporation of a clip control mechanism which includes a shaft **96** (FIG. 4) carried by the piston **120** and an adjustable nut **97** for varying the effective stroke of the piston. Reference is made to said copending application for details of the crimp control and other features not shown in detail herein.

It will be apparent that the above described invention results in an extremely compact clipping apparatus wherein most of the valving operations take place within the head of the cylinder thus obviating lengths of conduit which would otherwise reduce the speed of response of the device and result in sluggish action. Furthermore the simplicity of the above described cylinder head results in economies in view of the fact that numerous external valves and other fittings are obviated.

I claim:

1. In a clipping device of the type that includes a fluid actuated clipping cylinder having a piston connected with a punch at one end of said cylinder for driving a clip through a clipping stroke into sealing relationship with an article such as a casing or the like,

a cylinder head sealing the opposite end of said cylinder, said head being formed to constitute a housing for a valve formed therein and adapted to alternatively connect said cylinder with a source of fluid under pressure and with an exhaust port.

2. A device according to claim **1** wherein said valve includes a port communicating with said cylinder, a port connected to said source, and a port connecting said cylinder with exhaust; and a two-position valve element for alternatively connecting said cylinder with said source and with said exhaust.

3. A device according to claim **2** wherein said cylinder is normally exhausted by said valve, means for shifting said valve element to a position connecting said cylinder with said source for initiating the clipping stroke, and means actuated by a predetermined pressure in said cylinder for returning said element to cylinder exhausting position.

4. A device according to claim **1** wherein said device includes a second cylinder for performing another function, and said head is formed to provide a second valve for actuating said second cylinder.

5. A device according to claim **4** wherein said second cylinder is connected to a constricting element adapted to constrict the cross sectional extent of said article prior to the clipping step, and wherein means responsive to movement of said constricting element actuates said first valve to connect said clipping cylinder with said source.

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U.S. Cl. X.R.

29—243.57