Oct. 30, 1962 P. A. VAN DE BILT 3,060,839

WIRE CLAMP OF A PACKAGING MACHINE

Filed Sept. 6, 1960 4 Sheets-Sheet 1

FIG. 1

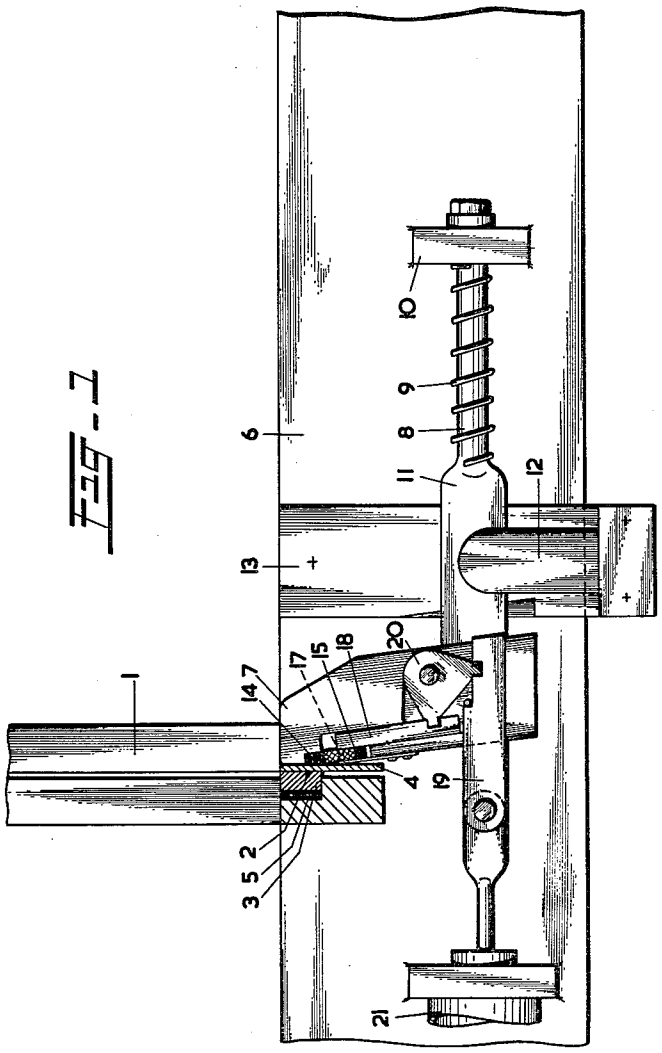

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FIG. 2

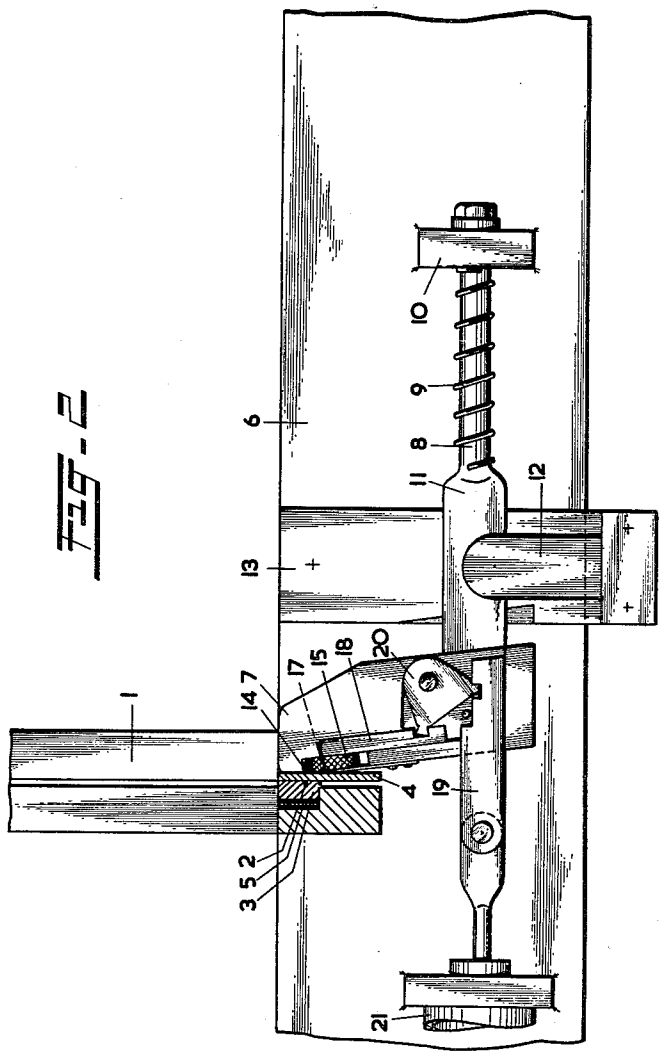

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FIG. 3

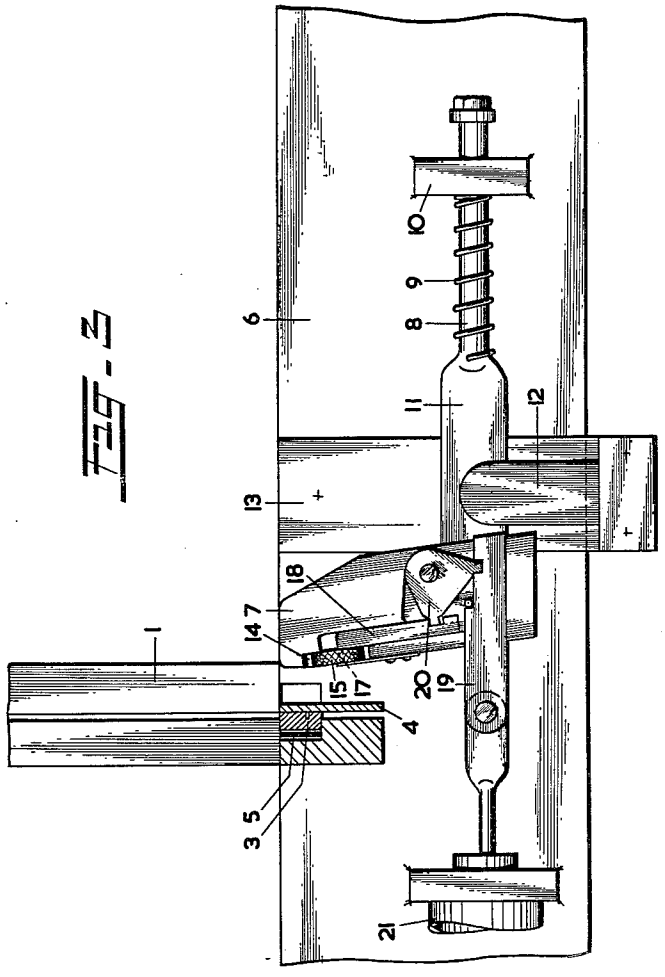

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FIG. 2

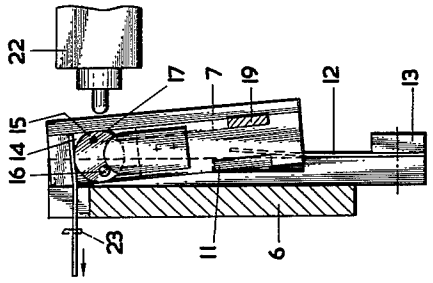


FIG. 3

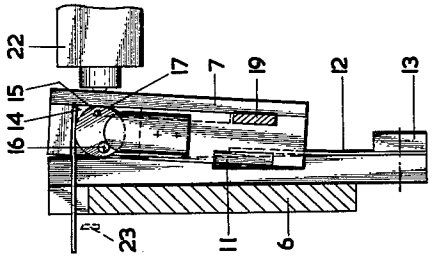


FIG. 5

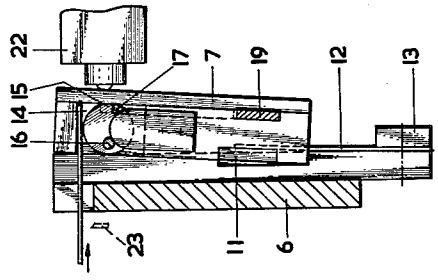
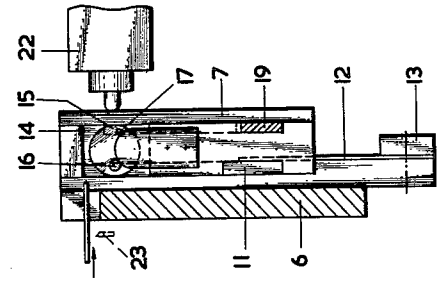


FIG. 4



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3,060,839

WIRE CLAMP OF A PACKAGING MACHINE

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Claims priority, application Netherlands Sept. 9, 1959
3 Claims. (Cl. 100—25)

The invention relates to a clamp for holding the end of a wire fed into a packaging machine via a guiding track. During its subsequent retraction and tightening the wire passed around the package via the guiding track has to be held, which is done by this clamp, which holds the end of the loop of wire. Such clamps are operated mechanically, the moment at which the clamp is shut usually being determined by the position of a cam disk, which forms part of a complicated transmission system which serves for the performance, in accordance with a given program, of the various operations to be carried out by the packaging machine, one of which consists in the seizing of the end of the wire passed around the package. Machines of this type are very complicated, and the present invention has for its object to furnish an improvement in this respect and to simplify the machine by so designing the said clamp for holding the end of the wire that it adjusts itself and is able at the same time to control other operations of the machine.

This object is attained according to the invention by the feature that this clamp is adapted to be moved in two opposite directions, viewed in the direction of feed of the wire, and to be displaced in a direction perpendicular thereto, the said clamp being kept in its center position and its initial position respectively by springs. The clamp therefore is mounted in such a way that it can be moved in the direction of feed of the wire, both in the direction of movement of the wire and in the opposite direction, and this movability of the clamp is utilized for the operation of a number of electric contacts, which affect the operation of the machine via electromagnetic switches.

Viewed in the direction of the wire, this clamp is able to take three positions, to wit (1) the neutral center position, (2) a position in which the clamp has been displaced in the direction of movement of the wire, and (3) a position in which the clamp has been displaced in the direction opposite to that of movement of the wire. With each position may be associated a given contact, which is closed in that position.

The movability perpendicular to the direction of the wire is of importance for the removal of the cut-off end of the wire from the clamp. According to the invention the jaws of the clamp may be open towards one side and may rest therewith against a fixed surface of the machine, while being adapted to be moved perpendicular to this surface and away from it by means of an actuating member which closes the jaws of the clamp when the movement is in the opposite direction. It is possible to shut the jaws of the clamp by means of a pneumatic or hydraulic cylinder or other driving member, by a movement perpendicular to the plane of the wire, the body of the clamp moving no further, and during a movement of this driving member in the opposite direction one may first of all open the jaws and subsequently displace the body of the clamp as a whole, in consequence of which the jaws of the clamp, which are open towards one side, are moved away from the fixed abutting surface of the machine, as a result of which the end of the wire that has meanwhile been cut off drops out of the machine.

The movability of the clamp is utilized, in the first place because the end of the wire passed around the package enters the clamp and there finds an abutment, as a result of which the clamp is displaced in the direction of the wire. This causes a contact to be closed, by which means the retraction of the wire is controlled. During this retraction the clamp is moved through the neutral position in the opposite direction, in consequence of which another contact again is closed, by which means the mechanism for the subsequent tightening of the wire is actuated, upon which the wires are tied together and subsequently cut off. Owing to this cutting operation, the clamp is cleared and accordingly returns to its neutral position again, thus closing a contact by means of which the direction of movement of the driving member operating in the direction perpendicular to that of the wire is reversed, in consequence of which the clamp opens and is pushed from the plane of the wire until the cut-off piece of wire, one end of which is still partly present in the guide for the wire, is released from the clamp and can drop out of the guide.

By means of the movability of the clamp in the direction of the wire the most important operations of the machine are controlled, while the clamp at the end of these movements adjusts itself because upon returning to the neutral position it causes a contact to be closed by means of which the clamp is opened. It thus also adjusts itself.

During the movement of the clamp from one extreme position to the other while the wire is being tightened the clamp passes through the neutral position, which need not, however, involve a short actuation of the clamp in the sense that it is opened, since it is very simple to make the circuit which controls the opening and forcing away of the clamp also dependent on a second contact or switch, which is closed only while the twisting mechanism is operating.

In view of the movability of the clamp it is possible to dispense with a complicated driving mechanism which has to cause the successive performance of the various operations to be carried out by the machine, while more independent, separate driving members can be used for each operation. The known part of the machine, which consists of cams, levers, and gear trains and controls the program, is thus really replaced by the movability of the clamp, which entails an essential simplification of the packaging machine.

The invention will now be elucidated further with reference to the drawings.

FIGS. 1, 2, and 3 are side elevations of the mechanism of the invention in various positions, the surrounding parts of the packaging machine having been omitted.

FIGS. 4, 5, 6, and 7 show diagrammatically the different positions the clamp may assume.

FIGS. 1, 2, and 3 show a part of the frame **1** for guiding the wire around the package, the guiding slot **2** for the leading end of the loop of wire being contained in the block **3**, which is supported in the frame **1**. This guiding block **3** rests with the mouth of the slot against a fixed plate **4**, and the block **3** can be moved away from the plate **4** against the action of the spring **5**, in order to release the wire from the guide as described in my application Serial No. 54,121, filed of even date.

The guiding frame **1** is fixed in the frame of the machine, in which the longitudinal beam **6** is also incorporated, the upper surface of which is situated approximately at the level of the working table of the machine. Fastened on the otuside of the beam or plate **6** is the clamp **7**, which is fitted at the end of a rod **8**, which is supported in bearings in the member **10**, fastened to the plate **6**, and is adapted to rotate and move against the action of the spring **9**. The end of the rod **8**, near the clamp **7**, is flat and this flat portion **11** is acted upon by a leaf spring **12**, which is fastened to the plate **6** with the interposition of the plate **13**. This leaf spring, by co-

operating with the flat surface **11**, constantly tends to keep the clamp **7** in its vertical center position, as appears most clearly from FIGS. 4 to 7 incl.

The clamp **7** is formed by a flat upper jaw member **14** and an upwardly movable round member **15**, which is rotatably supported at **16** and can be pressed upwards by the sliding member **18** fitted with a projection **17**, with a view to gripping the wire, said sliding member **18** being actuated by the rod **19** via the connecting member **20**. The rod **19** is connected with a reciprocating driving member **21**, e.g. a pneumatic cylinder. When the rod **19** is moved to the left in FIGS. 1 to 3 incl., the jaws of the clamp are shut, which position is illustrated in FIG. 2, while when the rod **19** moves to the right, the clamp is opened, and when this movement continues, the body of the clamp **7** as a whole, along with the rod **11**, **8**, is moved to the right, in consequence of which a cut-off end of the wire can drop out of the open clamp. This is promoted by the fact that a small piece of the cut-off end of the wire is still present in the wire guide in such a way that it is retained in the horizontal direction, in consequence of which it emerges from the open jaws of the clamp and drops down.

FIG. 4 illustrates the entry of the end of the wire, during which the clamp is still in the neutral position. Mounted by the side of the clamp is the switch **22** fitted with various contacts. As appears from FIG. 5, the end of the wire abuts against the side of the clamp, in consequence of which the latter swings around, thus bringing the switch **22** into another position. This results first of all in that the driving member **21** is actuated in such a way that the clamp is shut, which position is illustrated in FIG. 6, while further the reversal of the direction of movement of the wire with a view to its being passed around the package is initiated and at the same time the tightening might be initiated. Upon the reversal of the direction of movement the clamp **7** swings into the position shown in FIG. 7, because the wire is now pulled at, upon which the switch **22** assumes a different position again, which results in the initiation of subsequent operations. After the ends of the wire have been tied together, they have to be cut off, which is done by the knife **23**. However, this cutting has the result that the clamp **7** returns to the position illustrated in FIG. 4, the switch

22 thus returning to the neutral position again, and in consequence a contact can be closed, as a result of which the operation of the driving member **21** is reversed, which results in that the clamp **7**, as shown in FIG. 3, opens and moves to the right in FIG. 3, so that the end of the wire drops out of it. This clamp, being controlled by another mechanism, contact or the like, then returns again to its initial position, upon which wire can be fed again.

It will be obvious that the movements of the clamp take place very rapidly, thus producing very rapid control of the movements of the machine, which has a favorable influence on the number of packaging operations to be performed.

What I claim is:

1. A clamp for holding the end of a wire fed into a wire looping frame of a binding machine comprising a body, means mounting the body for rocking movement about an axis transverse of the direction of feed of the wire and for sliding movement axially of said axis, between an initial position and a displaced position, yieldable means urging the body to an intermediate position of rocking to enable the body to be rocked from said intermediate position by contact with the wire during feed of the wire, additional yieldable means urging the body axially of said axis to said initial position, and a wire gripper carried by said body.

2. A clamp according to claim 1 further comprising power atcuated means displaceable parallel to said axis for opening and closing said gripper and for displacing the body along said axis against said additional yieldable means.

3. A clamp according to claim 1 further comprising an electric switch, actuating means for said switch having three positions, said actuating means being positioned to engage and be shifted selectively to one of said three positions by said body in its rocking positions.

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