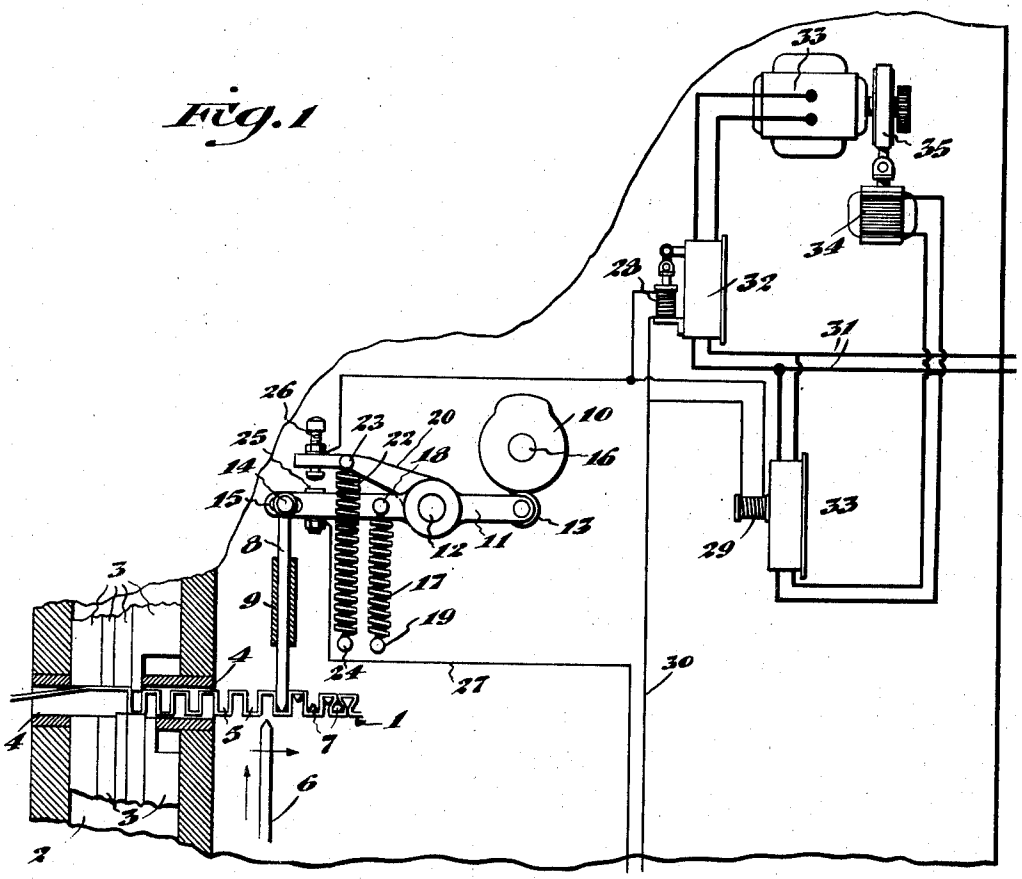
Nov. 12, 1940. V. F. ZAHODIAKIN 2,221,464

AUTOMATIC STRIP FEED CONTROL MECHANISM

Filed June 23, 1939

Fig. 1



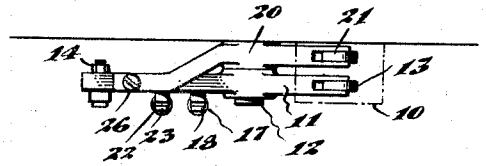


Fig. 2

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AUTOMATIC STRIP FEED CONTROL MECHANISM

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7 Claims. (Cl. 192—127)

This invention relates to machinery for forming lengths or strips of metal into articles such as piston rings or the like. More particularly, the invention is directed to a device operating relative to the strip for controlling the circuit to the main driving motor in the event of failure of the machine to feed or form the strip properly.

The improvements concerned here are shown in relation to a machine for forming a piston ring of the type shown in my previous Patent 1,957,927 granted May 8, 1934. Reference may also be had to my Patent 2,152,128 granted March 28, 1939, disclosing a method of making the ring from strip steel.

As the strip of steel is being formed it is first bent into open corrugations, and thereafter these corrugations are drawn together to form substantially closed cross passageways. The slides or dies which perform these operations are compactly arranged and are extremely sensitive in their operation. Accordingly, the machine should be stopped instantly in the event that the feed of the strip does not take place properly or in the event the formation of the strip is not correct. Otherwise the machine will jam badly and the dies will be damaged.

Accordingly, it has been my object to provide a testing device synchronized with the forming and feeding mechanism and adapted to enter each corrugation as it passes through the forming mechanism so as to test the accuracy of the position of the strip and to determine whether or not the advance of the strip has been proper. Provision is made for discontinuance of the power and prompt stopping of the mechanism in the event that the pilot device fails to enter a corrugation.

More specifically described, one embodiment of the invention consists of cooperating arms carrying circuit closing means through which contact is made in the event that the control parts are blocked in their periodic testing movement. The contact arrangement is disposed in a control circuit effective for disconnecting the power to the motor and for operating a breaking mechanism simultaneously.

Thus it has been the broad objective to provide a power interrupter actuated by a testing or pilot device acting upon the strip periodically to test its position.

Other objects and certain advantages will be more fully apparent from a drawing in which:

Figure 1 is a partially diagrammatic view showing the device of the invention acting on the strip and showing the circuits and electrical devices controlled thereby.

Figure 2 is a view looking at the top of the cooperating arms of the circuit closing means showing the overhanging arrangement.

In the drawing the strip is indicated at 1. The die chamber 2 at the left of Figure 1 includes a plurality of dies 3. The strip of metal 1 is delivered or fed through the die chamber through aligned transverse openings 4. As the strip of metal passes through the die box, the dies 3 are effective for forming the corrugations 5. After the formation of each corrugation, the strip is advanced a distance equal to the distance between the centers of corrugations.

This intermittent advance is procured by means of a finger 6 which moves into the corrugations successively and is then propelled laterally the distance between the centers of corrugations. It is believed unnecessary here to describe the synchronized motion of the various dies since this is not concerned in this invention, but is fully described and claimed in my previously issued method Patent 2,152,128.

After the corrugations are formed and the strip is advanced sufficiently, a series of folding dies 7 enter the corrugations crosswise of the strip and by relative lateral motion close the throats of the corrugations to form substantially closed cross passageways. These forming and folding motions occur in synchronism. In order for the machine to operate perfectly this synchronism must be maintained perfectly. Furthermore, the strip must pause in perfect registery with the folding dies. If anything should happen to destroy the perfect registry the machine would be badly damaged before the operator could stop the motor. The strip would be badly mangled and it would take a great deal of time to remove it and repair the dies.

A reciprocating pilot pin 8 is slidably mounted in a guide 9. When the strip is properly positioned after feed, the tapered end of this pilot pin will register with and enter the corrugation. This pin is reciprocated by means of a cam 10. A lever 11 is pivotly mounted on a stud 12 and carries a roller 13 on one end in contact with the cam. The other end of the arm is connected with the outer end of the pilot pin 8 by means of a bolt 14 traversing a longitudinal slot 15 in the arm. Thus swinging motion of the arm is delivered for reciprocating the pilot pin without binding at the connection. The cam is driven

by a shaft 16 through mechanism driven in synchronism with the die operating mechanism.

A coil spring 17 under tension between a pin 18 on the arm or lever, and a pin 19 on the frame of the machine draws the pilot pin into testing or registering position when relieved by the cam. The cam is effective for retracting the pilot pin.

Now in order to accomplish the circuit closing action, a second lever or arm 20 is provided. This arm is mounted on the stud 12 alongside of the arm 11 and has a roller 21 engaging the cam 10 in the same manner as the roller 13. The cam is wide for this purpose. The other end of the lever 20 extends laterally and over or into the same plane as the pilot pin operating end of the lever 11 (see Figure 2). A coil spring 22 is disposed under tension between a pin 23 on the overhanging end of the arm and a pin 24 carried by the machine frame. This spring holds the roller 21 against the cam.

The contact 25 is fixed on the side of the arm 11 adjacent to the overhanging arm 20. An adjustable contact 26 is fixed in the overhanging arm in axial alignment with the contact 25. One of the control leads, namely 27, extends through these contacts. The contacts are normally spaced and maintain this lead in open circuit. The contacts are suitably insulated from the arms in any conventional manner. The lead 27 extends to both the motor switch control solenoid 28 and the brake magnet control switch solenoid 29. The other control lead 30 connects to the other side of these solenoids respectively. The main power lines 31—31 are connected through the motor switch 32 to the motor 33. Also the leads 31—31 are connected through the brake control switch 33 to the magnet 34 for the brake 35.

The device operates in this manner. If the strip is not correctly positioned, the pilot pin 9 will not register and the spring 17 will be unable to move it into position. Accordingly, the arm 11 will remain stationary. Since the arm 20 has also been relieved by the cam at this time, its spring 22 will be effective for pulling it toward the arm 11 and accordingly the contacts 25—26 will engage and the circuit is completed.

Completion of the control circuit will, through the switch 32, stop the motor and, through the switch 33, apply the brake. Thus the machine is stopped instantly and no damage to the dies will occur. Thereupon an inspection may be made to determine the cause of the failure of registry of the pilot pin in the appropriate corrugation.

Having described my invention, I claim:

1. Means for testing the feed of a corrugated strip; comprising, a pilot pin normally spring urged into registry with each succeeding corrugation, actuating means for said pilot pin, a cam actuating said means for raising said pilot pin from the corrugation and, a member actuated by the cam, said pilot pin actuating means and said member including cooperating contacts, said member spring urged in the same direction as said means whereby when movement of the pilot pin actuating means is blocked said member moves to establish the contacts, said contacts disposed in the control lines for stopping the motor and applying the brake of the machine.

2. A device for testing the accurate advance of a corrugated strip; comprising, a cam driven in synchronism with the strip feeding means, a pair of independently movable levers spring urged against the cam and including contacts normally spaced, one of said levers carrying a pilot pin normally registering with each progressively presented corrugation whereby the contacts are engaged by relative movement of the levers in the event the pilot pin is blocked and, means controlled by the circuit thus established for immediately stopping the machine.

3. A control device for stopping the power in a material bending machine consisting of means intermittently engaging the formations of the material, means for operating said first means in synchronism with the strip advancing mechanism, said first named means consisting of normally spaced independently movable contacts, said operating means moving said contacts normally in spaced relationship, means carrying one contact adapted to engage the strip whereby when said means carrying the contact does not register with the formations of the strip, said contacts are closed to control the circuit to the power for the machine.

4. A testing device adapted to test the position of a corrugated strip, consisting of means engaging each successively advanced corrugation, said means carrying a contact means synchronized with the strip advancing, means for operating said first means, and means carrying a second contact movable relative to said first means for establishing contact with the first contact if movement of the first contact is blocked and thereby completing the circuit to a motor stopping switch.

5. A device for testing the feed of a corrugated strip consisting of a pilot pin normally spring urged into registry with succeeding corrugations, means for retracting said pilot pin from each corrugation and a second member actuated by said means, said pilot pin and said last named member including cooperating contacts, said last named member spring urged in the same direction as the pilot pin whereby when movement of the pilot pin is blocked the second named member establishes the contacts, said contacts disposed in the control line for stopping the motor.

6. A device for testing the accurate advance of a corrugated strip; comprising, an actuator driven in synchronism with the strip feeding means, independently movable means spring urged against the actuator and including contacts normally spaced, one of said means carrying a pilot pin normally registering with each progressively presented corrugation whereby the contacts are engaged by relative movement of the means in the event movement of the pilot pin is blocked.

7. In a device for testing the advance of a corrugated strip of steel, a pilot pin, means for urging said pilot pin into each corrugation as the strip progresses through the machine, means operated in synchronism with the strip advancing means for retracting said pin after each testing operation, and contacts interposed between said pilot pin and said retracting means, one of said contacts movable independently of the pilot pin and engaging the other in the event the pilot pin is blocked and the other contact does not move.

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