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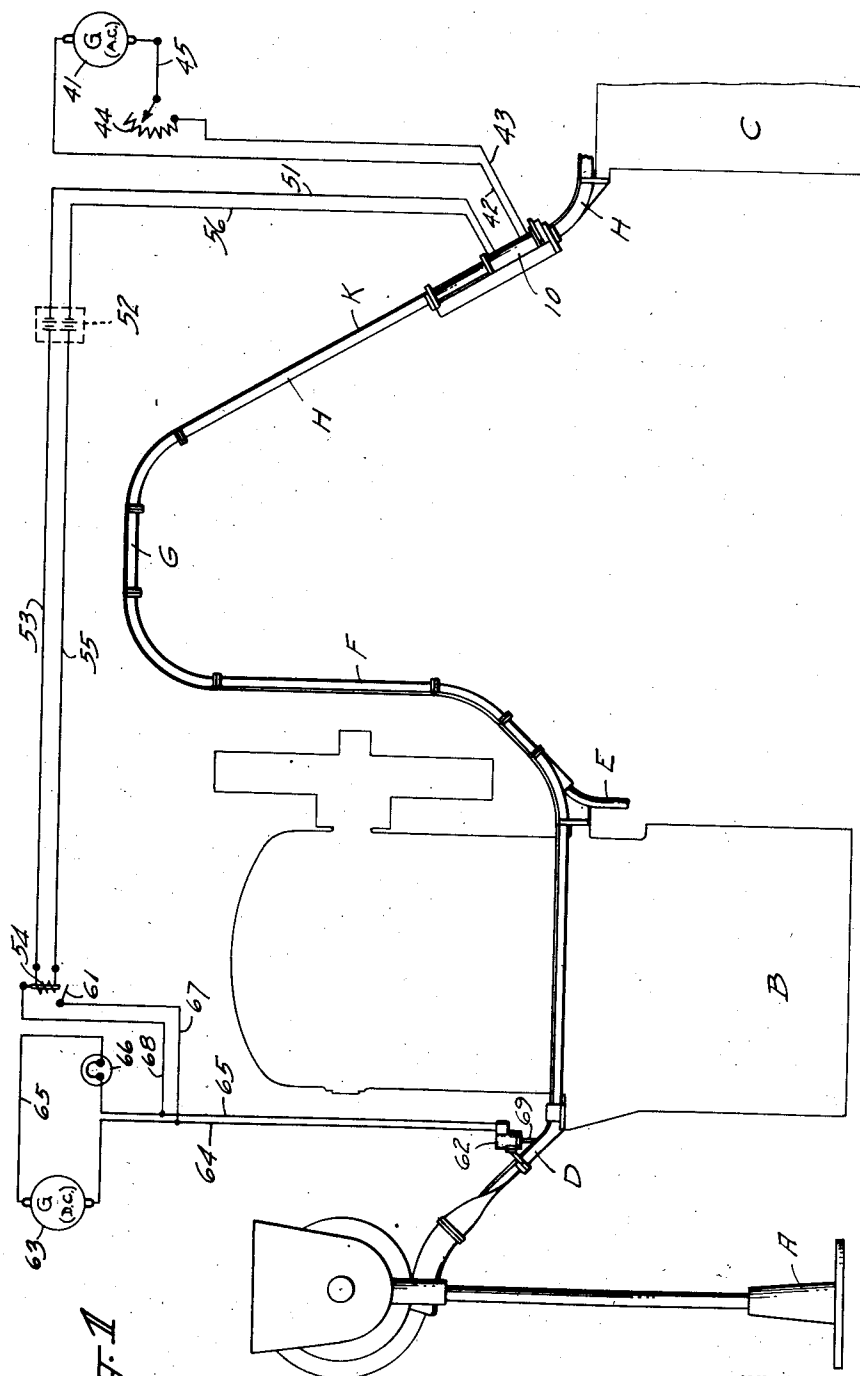
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CONTROL FOR CAN MAKING MACHINERY

Filed April 13, 1935

2 Sheets-Sheet 1



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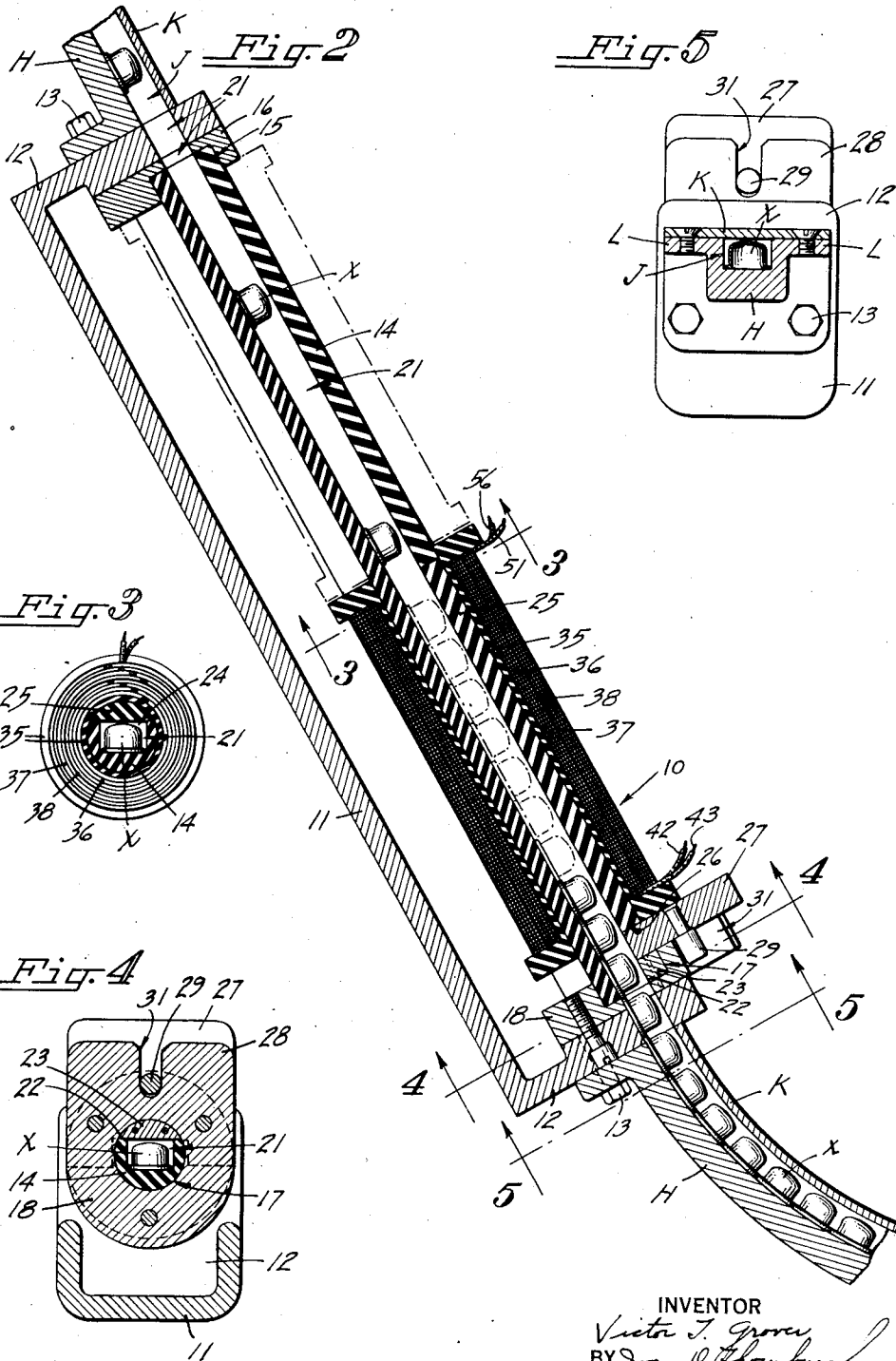
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CONTROL FOR CAN MAKING MACHINERY

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2 Sheets-Sheet 2



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CONTROL FOR CAN MAKING MACHINERY

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10 Claims. (Cl. 193—32)

The present invention relates to a feed control for can making machinery and the like and has particular reference to runway magnetic control devices utilizing the change of magnetic flux brought about by the presence of articles passing in and through a runway or other conveyor, such devices governing the feeding of the articles.

An object of the invention is the provision of an electric control for governing the feeding of articles in a can making machine or the like wherein the feeding is influenced by a change in the magnetic flux of an associated magnetic field of the control devices.

Another object is the provision of such a control device wherein the magnetic flux is changed by the presence of can parts or the like in a runway or other conveyor associated with the machine.

A further object is the provision of a control of the character described wherein its governing action is effected by utilizing the magnetic conductivity of the articles without physically engaging them.

Yet another object is the provision of such a feed control wherein its governing action may be regulated, while the apparatus is in operation, to adapt it to the magnetic conductive property of the articles being fed.

Numerous other objects and advantages of the invention will be apparent as it is better understood from the following description, which, taken in connection with the accompanying drawings, discloses a preferred embodiment thereof.

In the electric feed control illustrated in the drawings, the feeding of articles to a runway is terminated by their accumulation in the runway under adverse conditions and their presence in such a case operates to change the flux of a magnetic field associated with said articles and with the control devices. Where the articles have magnetic properties they may pass directly through the field, the article serving as the required conductor for effecting the change in the magnetic flux of the field and for controlling the feeding. In the drawings this form of construction is used in connection with articles possessing magnetic conductivity.

Referring to the drawings:

Figure 1 is a diagrammatic view indicating in outline a line of can making machinery with connecting runways and chutes and showing feed controls in which the instant invention is embodied, the view also illustrating a wiring dia-

gram of the electrical elements associated with the controls;

Fig. 2 is an enlarged fragmentary longitudinal section of the chute illustrated in the right hand part of Fig. 1, the section showing a part of the feed control device; and

Figs. 3, 4, and 5 are transverse sectional views taken substantially along the lines 3—3, 4—4 and 5—5, respectively, in Fig. 2.

The drawings illustrate a preferred form of the instant invention and show it embodied in a synchronized line of can making machinery comprising a can part feeding machine unit A (Fig. 1) and a pair of subsequent operation machine units B, C for successively performing operations on metallic articles such as can parts X (Fig. 2). Obviously any desired number of machine units can be used in accordance with the number of operations required on the can part.

The machine units are interconnected by runways or chutes for transferring and carrying the can parts in a continuous procession from one machine unit to the other. The machine unit A is thus shown as being connected to the machine unit B by a chute D which inclines down toward the latter unit and along which can parts are moved by gravity from unit A to unit B.

The machine unit B after performing its operation preferably passes the can parts individually into the path of a compressed air blast, which may be introduced through a pipe line E, which blows them upwardly through a substantially vertical runway F the lower end of which connects with the machine unit B. The lifting force of this air blast carries the can parts into and along a curved top runway G from whence they fall into an inclined chute H. The parts G and H may be considered as part of the runway F. The can parts move by gravity down chute H into the machine unit C.

All the runways and chutes are formed with a channel J (Figs. 2 and 5) for guiding the can parts in their passage therethrough, the channel being enclosed to prevent their escape. A cover plate K is used for this purpose and is secured to flanges L formed on both sides of the runways and chutes this being on the sides of the channel J.

The electric feed control mechanism which synchronizes the various machine units for maximum output, is designed to provide minimum interruption of feeding upon the establishment of adverse conditions in the machine unit C or other subsequent units if more than one control mechanism is used in the line. For this purpose

a detecting unit or device 10 (Fig. 2) is disposed in the chute H at a point adjacent its connection with the machine unit C.

This device comprises an inclined U-shaped frame 11 (see also Fig. 4) which is interposed between the sections of the chute H and this frame has end members 12 which are bolted to the adjacent chute sections by bolts 13. The frame 11 carries a hollow cylindrical tube 14 which forms a continuation or passage connection for the inclined chute parts. This tube is of insulating material and is supported at its upper end in a circular recess 15 formed in a plate 16 which is secured to the inside surface of the upper frame end 12. The lower end of the tube is supported in a circular recess 17 formed in a plate 18 secured to the inner face of the lower frame end 12.

The tube, the plates and the end members of the frame 11 are cut through with longitudinally disposed connecting rectangular openings or channels 21 which align with and form an intermediate connecting passage for the channels J in the chute H. The can parts moving down the chute thus normally have unrestricted movement through the detector device parts.

To prevent turning of the tube 14 in its supporting recesses 15, 17 and to keep its channel 21 in alignment with the channels J, the lower end of the tube is cut away in a flat section 22 (Figs. 2 and 4). A segmental block 23 is pinned in the recess 17 and rests against the flat surface and this block forms a key or anchor for the tube.

One side of the tube 14 is cut away for approximately the lower half of its length and this forms a side opening 24. This side is closed by a loose fitting cover 25 (Figs. 2 and 3) which has a cross-section identical with the cross-section of the key block 23. The cover is shorter than the length of the opening thus providing a space 26 at its lower end. This space allows for the insertion of the finger or a suitable tool to facilitate removal of the cover when it becomes desirable to gain access to the channel as will be further described.

The space 26 is normally filled up by an insert member 27 which is supported by an extension 28 of the plate 18. The insert member is held in place by a pin 29 which it carries and which projects into a slot 31 formed in the plate extension as shown in Figs. 2, 4, and 5.

When adverse conditions prevail in the machine unit C, such as for example, when a jam of can parts occurs therein, the can parts begin to back up or accumulate in the chute H and in the detector tube 14. This condition causes a change in the detector 10 and an electric impulse is immediately relayed through a series of electric circuits which include devices for stopping the flow of can parts at their source and further feeding action is thereupon held up until this congested condition is relieved.

The detector 10 includes certain electric instrumentalities which are carried on an insulating spool 35 which in turn is slidably mounted on the tube 14. The spool normally encircles the lower half of the tube, as shown in Fig. 2, and when so positioned the tube cover 25 is held on the cut away portion of the tube. Spool 35 may be slid up and along the tube 14 into an upper position as indicated in dot and dash lines in the same figure. When so raised the tube cover 25 may be lifted off and the inclosed passage exposed.

The electric instrumentalities on the spool 35

comprise a primary coil 36 which is wound directly on the spool and a secondary coil 37 which surrounds the primary coil. The two coils are insulated from each other by a layer of insulation 38.

The primary coil 36 constitutes an element through which a continuous flow of alternating current passes, such current being supplied from a generator 41 (Fig. 1). One side of the coil is connected by a lead wire 42 to one side of the generator, the other side of the coil being connected by a lead wire 43 to one terminal of a rheostat 44. The opposite terminal of the rheostat is connected by a wire 45 to the other side of the generator. The electric energy passing through this circuit sets up a magnetic field which surrounds the spool 35 and extends into the tube channel 21 so that can parts passing through the tube also pass through the magnetic field.

An electric current is thus induced in the secondary coil 37, which current flows through a lead wire 51 connecting one side of the secondary coil to one terminal of a suitable rectifier 52 which may be for example, a copper oxide rectifier.

An extension 53 of the wire 51 connects one side of the rectifier to a solenoid 54. The other side of the same solenoid is connected to the rectifier by an extension 55 of a wire 56 which in turn connects the rectifier to the secondary coil on the side opposite to the wire 51. Alternating current of the secondary coil thus flows through the solenoid 54 as direct current.

When current of high enough voltage passes through the solenoid 54 the latter is sufficiently energized to close a switch 61 which is associated with it. The switch forms a part of a shunt circuit which is associated with an independent solenoid circuit. This latter circuit includes a solenoid-operated, can part stop feed device 62 of suitable construction which is disposed in the feed chute D and controls the feeding of can parts therethrough.

The solenoid circuit is normally closed and includes a generator 63 which normally supplies direct current to the solenoid of the feed device 62. The solenoid of the feed device is thus normally maintained energized to permit the continuous feeding of can parts through the chute D but when adverse feeding conditions obtain or when there is a failure of current from the generator the solenoid is deenergized. The transmission of current to the feed device is effected by a main service wire 64 one end of which is connected to one side of the feed device while its other end is connected to one side of the generator. The opposite side of the feed device is connected to a return service wire 65 which connects with the opposite side of the generator, a resistance lamp 66 being joined in this line.

When adverse conditions obtain in the machine unit C the feed device 62 is deenergized by the shunt circuit which includes the switch 61. This circuit comprises a wire 67 which connects one side of the switch 61 with the main service wire 64 and a wire 68 which connects the return service wire 65 with the other element of the switch 61.

Under normal operating conditions of the can line and during normal movement of the can parts through the detector tube 14 the magnetic field of the tube is not sufficiently disturbed to affect the feeding action. However, when a number of can parts accumulate in the magnetic field in the tube, which is an abnormal condition, as during a jam in the machine unit C, the presence

of additional metal in the field changes the magnetic flux and the magnitude of the induced current in the secondary coil.

This action increases the voltage of the current induced in the secondary coil and through-out its associated circuit. Actual voltage values may be so set by adjustment of the rheostat 44 that the increased voltage current passing through the secondary circuit will be just sufficient to energize the solenoid 54 when a given predetermined number of can parts enter the magnetic field or when a predetermined mass of metal is interposed in the field.

Energizing of the solenoid closes the switch 61 and holds it closed as long as that predetermined number of can parts remain in the detector tube and this closes the shunt circuit just described. The flow of current through the shunt circuit deenergizes the solenoid of the can stop feed device 62.

This device may include a suitable element for interposition into the path of the moving can parts in the chute D. An extension 69 of the sliding core of the solenoid will produce the desired results where the solenoid core is held extended under spring action when the solenoid is not energized. Such a spring action is overcome to permit passage of can parts in the chute D when the solenoid is energized.

As soon as the abnormal condition has been remedied and the can parts have moved out of the magnetic field in the detector device 10, the solenoid 54 in the secondary circuit is deenergized which action opens the switch 61 and the shunt circuit. This permits reenergizing of the solenoid of the feeding device 62. The core extension in the solenoid is thereupon raised against the resistance of the spring and this action permits the resumption of feeding of can parts.

The voltage of the current required to energize the solenoid 54 for closing the switch 61 depends materially upon the permeability or conductive properties of the metal accumulated in the magnetic field of the detector device, which in turn may depend upon the size and metallic content of the can parts being operated on. This permeability will thus vary with the can parts being fed through the machine units and may be compensated for by adjustment of the primary current voltage by means of the rheostat 44. Thus, for example, when the magnetic conductive properties of the can parts are low the voltage of the current supplied by the generator may be accordingly increased to furnish the required voltage in the secondary circuit to energize the solenoid 54, and vice versa when the permeability is high this primary voltage may be reduced.

Although it may appear that the magnetic field would have a braking effect on the can parts as they normally pass through the tube 14, the voltage of the currents involved is relatively so small that the permanent magnetism in the field will not noticeably retard the can parts as they move by gravity along the inclined chute H.

It is thought that the invention and many of its attendant advantages will be understood from the foregoing description, and it will be apparent that various changes may be made in the form, construction and arrangement of the parts without departing from the spirit and scope of the invention or sacrificing all of its material advantages, the form hereinbefore described being merely a preferred embodiment thereof.

I claim:

1. In an electric control, the combination of

a conveyor for articles, means for delivering said articles to said conveyor, electric means for creating a magnetic field in said conveyor, and means for stopping the delivery of articles by said delivery means when a predetermined number of articles comes into said magnetic field.

2. In an electric control, the combination of a conveyor for articles, means for delivering said articles to said conveyor, electric means associated with said conveyor for creating a magnetic field in the path of the travel of said articles, and means operable by a change in the magnetic flux of said field for stopping the delivery of articles by said delivery means, said magnetic change being effected by an accumulation of articles in said conveyor.

3. In an electric control, the combination of a conveyor for articles, means for delivering said articles to said conveyor, electric means associated with said conveyor for creating a magnetic field, electric means associated with said delivery means for controlling the passage of articles therethrough, and means actuated by a change in the magnetic flux of said field as effected by an abnormal quantity of articles in said conveyor for actuating said electric delivery means to control the passage of articles to said conveyor.

4. In an electric control, the combination of a conveyor for articles, means for delivering said articles to said conveyor, electric means associated with said conveyor for creating a magnetic field, electric control means associated with said delivery means for controlling the passage of articles therethrough, means actuated by a change in the magnetic flux of said field as effected by an abnormal quantity of articles in said conveyor for actuating said electric control means to control the passage of articles to said conveyor, and means for varying the strength of said field in accordance with said abnormal quantity of articles.

5. In an electric control, the combination of a conveyor for metallic articles, means for delivering said articles to said conveyor, and electric devices comprising a primary coil associated with said conveyor for creating a magnetic field through which said articles pass, and a secondary coil associated with said primary coil and adapted to receive induced electric energy from said field, and means associated with said secondary coil and with said delivery means and operable by a change in the magnetic flux of said field produced by an accumulation of articles therein for controlling the delivery of articles by said delivery means.

6. In an electric control, the combination of a conveyor for metallic articles, means for delivering said articles to said conveyor, magnetic means surrounding said conveyor for creating a magnetic field through which said articles pass, and means for nullifying said delivery means when the number of metallic articles passing through said magnetic field is sufficient to alter the strength thereof.

7. In an electric control, the combination of a tubular conveyor for metallic articles, magnetic means surrounding said conveyor for creating a magnetic field within said tube through which said articles pass, means operable by accumulation of said articles within said field for preventing receipt of articles in said conveyor when an accumulation of articles changes the strength of said magnetic field, and removable means associated with said conveyor to permit access

thereto for removing said accumulated articles from said magnetic field.

8. In an electric control, the combination of a conveyor for articles, means for delivering said articles to said conveyor, means for enclosing said articles in said conveyor to prevent their escape therefrom, electric means associated with said conveyor for creating a magnetic field therein said electric means being movable relative to the conveyor to permit access to the articles in the conveyor, and means operable by a change in the magnetic flux of said field for controlling the delivery of articles from said delivery means, said magnetic change being effected by a quantity of articles in said conveyor.

9. In an electric control, the combination of a conveyor for magnetic articles, means for delivering said articles to said conveyor, means for creating a magnetic field, electric means associated

with said delivery means for controlling the passage of articles therethrough, and means actuated by a change in the magnetic flux of said field as effected by a different number of articles in said conveyor for influencing said electric control means to start and stop feeding of said articles by said delivery means.

10. In an electric control, the combination of a conveyor for feeding magnetically permeable articles, means for feeding said articles to said conveyor, means for creating a magnetic flux in said articles in the conveyor, and electric means responsive to changes in said flux for controlling the feeding of said articles to said conveyor, the force of the electric current therein being increased by the collection of said articles in said conveyor and by the increase of said magnetic flux.

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