

[54] **ROLLING MILL ROLL COOLANT CONTROL**

[75] Inventors: **Hugh MacDonald Ross; Allan Ball,**
both of Parkstone, England

[73] Assignee: **Loewy Robertson Engineering
Company Limited, Dorset, England**

[22] Filed: **Apr. 12, 1972**

[21] Appl. No.: **243,212**

[30] **Foreign Application Priority Data**

Apr. 15, 1971 Great Britain 9,508/71

[52] U.S. Cl. **251/25, 235/145 R, 72/201**

[51] Int. Cl. **G06c 7/02, F16k 31/14**

[58] Field of Search **251/25; 91/461;
235/201 FS, 145 R; 72/201**

[56] **References Cited**

UNITED STATES PATENTS

3,034,628 5/1962 Wadey 235/145 R

*Primary Examiner—Arnold Rosenthal
Attorney—Briselois & Kruger*

[57] **ABSTRACT**

A control panel for use with a pneumatic control system has a plurality of openings on one face of the panel positioned relative to guide means on the panel so that an operator can temporarily cover up the openings by sliding a closure member, guided by the guide means, over the face of the panel to cover up in turn the openings beneath the path of travel of the closure member. The member is conveniently the operator's finger. By closing the openings, pneumatically operable switching components forming part of the control system are actuated. The components are pneumatically connected to the openings on the panel at a position away from the face of the panel.

8 Claims, 7 Drawing Figures

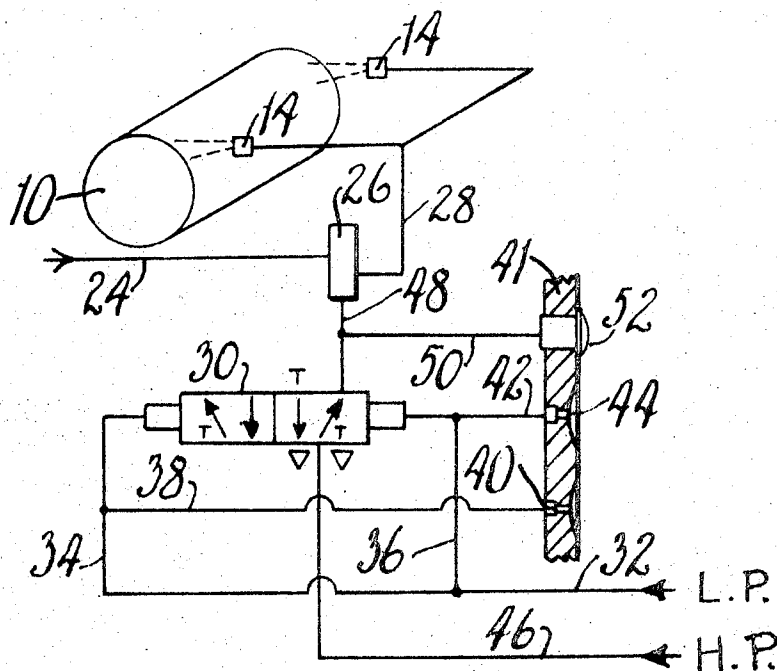


Fig. 1.

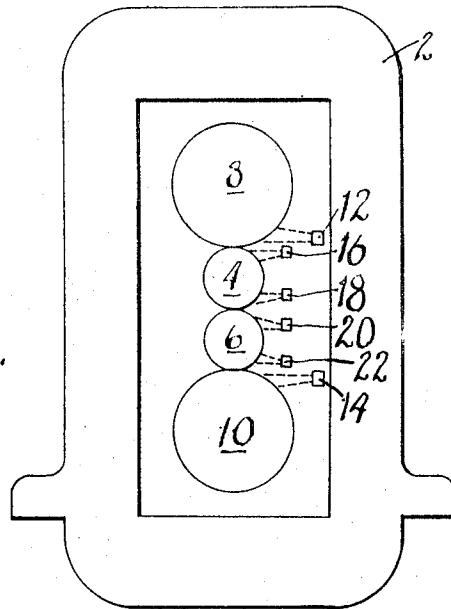
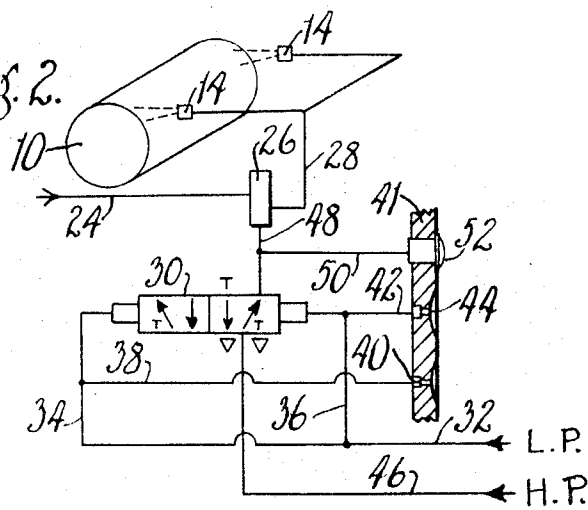


Fig. 2.



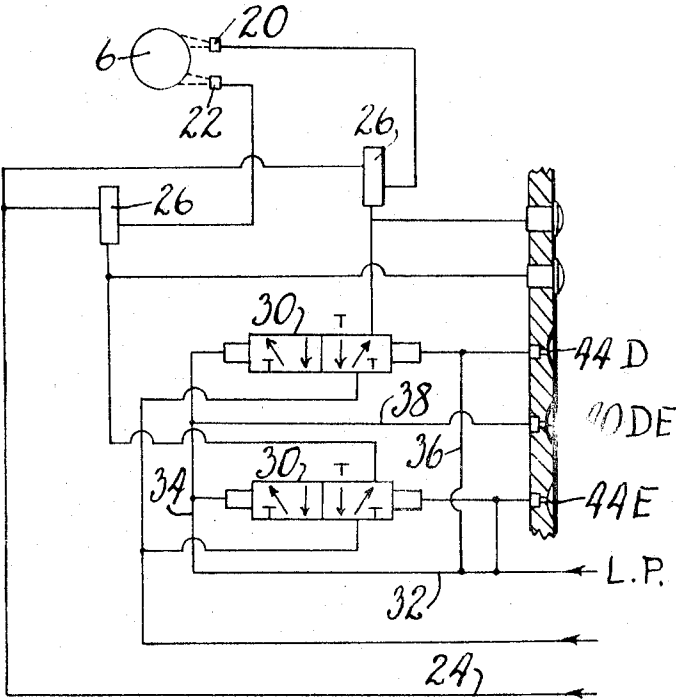
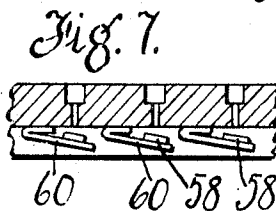
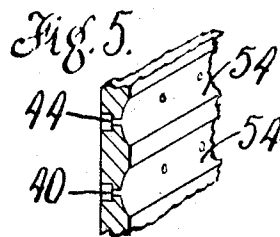
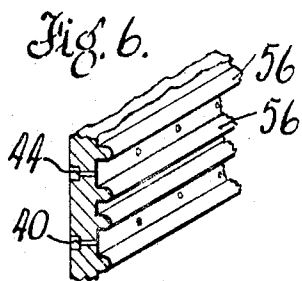
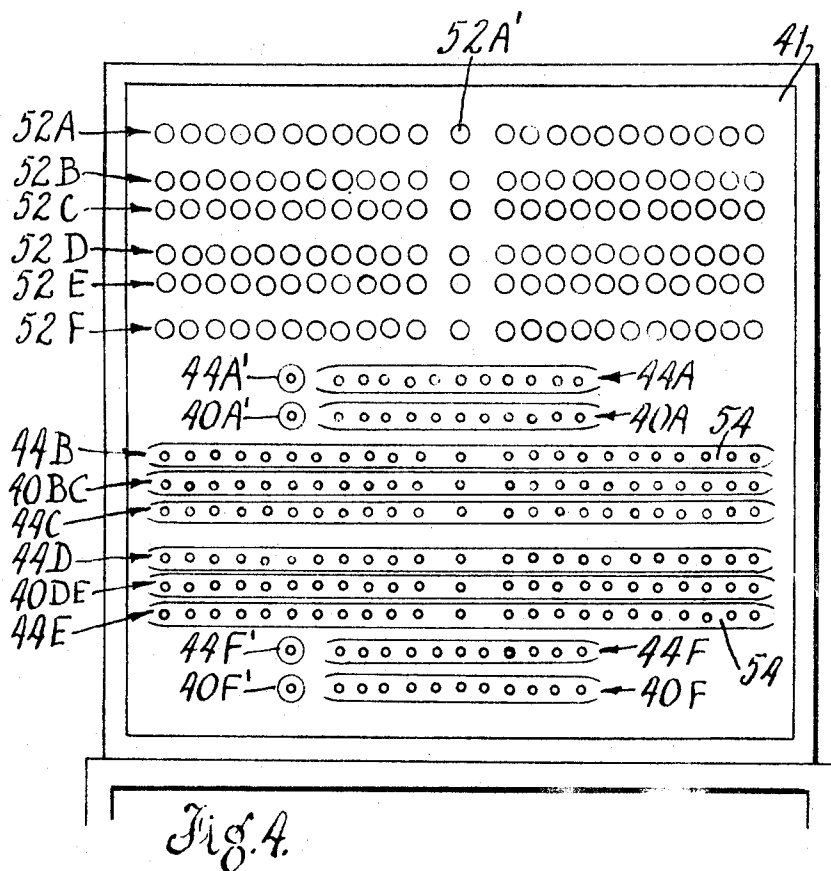


Fig. 3.



ROLLING MILL ROLL COOLANT CONTROL

This invention relates to a control panel for use with a pneumatic control system.

In many industrial processes it is known to use a pneumatic control system for actuating pneumatically operable switching components which form part of the control system and which serve to control various aspects of the industrial process. In such pneumatic control systems a low pressure pneumatic supply terminates at an opening and by temporarily closing the opening a pneumatically operable switching component associated therewith can be switched from one operating condition to another. When a plurality of openings are to be temporarily closed in quick succession it becomes difficult for the operator to temporarily close the openings in turn by either placing his finger over the openings or by displacing a closure member into a position where it temporarily closes off the opening.

It is an object of the present invention to provide a control panel which enables an operator to quickly and easily bring about temporary closing off of a plurality of openings each associated with a pneumatically operable switching component.

According to the present invention a control panel for use with a pneumatic control system has a plurality of openings provided on one face and positioned relative to guide means on the panel such that an operator, by sliding a closure member guided by the guide means over the face of the panel, temporarily covers up the openings positioned beneath the path of travel of the closure member to thereby actuate pneumatically operable switching components forming part of the control system and pneumatically connectable to the openings at a position away from the face.

The closure member may be guided and restrained by the guide means but free to slide along a path which temporarily covers the openings in turn.

The closure member may be conveniently one of the operator's fingers in which case the guide means takes the form of a guide member on the face of the panel which enables the operator to close the openings in turn by sliding a finger, guided by the guide member along a path which closes the openings. The sliding movement of the operator's finger is preferable to an arrangement in which, in order to close the openings, the operator's finger has to be moved with a prodding movement from one opening to the other and in which the finger is lifted from the control panel between closing off the openings in turn.

The finger guide may take the form of a shallow groove in the face of the panel with the openings leading into the grooves. Alternatively the finger guide may comprise a rib projecting from the face of the panel and positioned a short distance away from the openings. If desired a finger guide may comprise a pair of parallel ribs projecting from the face of the panel with the ribs spaced apart by a distance slightly greater than the thickness of the finger and with openings leading from the panel between the ribs.

It is to be understood that the control panel in accordance with the invention may form part of a control system for controlling apparatus of many different types but for the purpose of this specification the invention will be described with reference to the application of the invention to the supply of coolant to the rolls of a rolling mill.

In order that the invention may be more readily understood it will now be described, by way of example only, with reference to the accompanying drawings in which:

FIG. 1 is a diagrammatic side elevation of a rolling mill,

FIG. 2 is a diagram of a control system for regulating the flow of coolant to a back-up roll of a mill,

FIG. 3 is a diagram of a control circuit for regulating the flow of coolant to a work roll of a mill,

FIG. 4 is a front elevation of a control panel associated with the coolant control system,

FIG. 5 is a scrap view in perspective showing part of the control panel,

FIG. 6 is a view similar to FIG. 5 but showing a modification to a section of the panel, and

FIG. 7 is a horizontal section of the panel of FIG. 6 but with a further modification.

The rolling mill as shown in FIG. 1 has a housing 2, top and bottom work rolls 4, 6, and top and bottom back-up rolls 8, 10. The top back-up roll has associated therewith a spray bar 12 provided with a series of nozzles positioned at intervals across the width of the mill. A similar arrangement including spray bar 14, is associated with the bottom back-up roll. Each of the work rolls 4, 6 is provided with two spray bars 16, 18 and 20, 22, it being so arranged that the volume of coolant which issues from the nozzles on the spray bars 18 and 20 is twice that issuing from the nozzles on the spray bars 16 and 22. By use of the control system, to be described, the flow of coolant on any particular zone of a work roll can be in the proportions of 0. one-half, two-thirds, or a whole of the full flow of coolant available for that zone.

Referring particularly to FIG. 2, which shows the coolant control system associated with the bottom back-up roll, it will be seen that coolant is supplied from a line 24 through a shut-off valve 26 and thence via a line 28 to the spray bar 14. Valve 26 is actuated by means of a pilot valve which operates as follows. Low pressure air is fed from a line 32 to both left and right-hand sides of the valve spool through lines 34, 36. Line 34 is connected by a line 38 to an opening in the form of a hole 40 in a control panel 41, and line 36 is similarly connected, by a line 42, to a further opening, 44 in the panel. The low pressure air flow through lines 34, 36 provides equal pressure on either side of the spool of valve 30 until one or other of the openings 40 or 44 is temporarily covered over. When that happens the pressure in the line connected to that hole increases sufficiently to move the spool. Immediately this has happened the hole may be uncovered again and the equal pressure on either side of the spool will cause the spool to remain stable in its current position. As an added precaution to ensure that it remains so, the valve may be provided with detents and a spring catch engageable within the detents.

High pressure air is supplied via line 46, and, when the valve 30 is in the 'ON' position as is shown in FIG. 2, through line 48 to the valve 26. A line 50 branches from line 48 to an indicator 52 mounted in the panel 41, and a coloured disc appears in view in the indicator when the valve 26 is positioned to allow coolant to pass therethrough.

It will be understood that the arrangement shown in FIG. 2 illustrates the control system for a set of spray

nozzles and this system is repeated for each nozzle, or set of nozzles associated with the back-up rolls.

A suitable valve 30 is readily available and is marketed under the name "FLUIDLOG" valve by Desoutter Lang Pneumatic Limited.

A control panel incorporating the arrangement just described, and also an arrangement for controlling the flow of coolant to the work rolls, is illustrated in FIG. 4. This panel contains indicators for coolant flow through the various nozzles, and pilot valve operating holes to control the flow of coolant.

In the mill illustrated those spray nozzles which supply coolant to the median zone of each roll are supplied through one single valve 26 which operates a bank of e.g. 10 or more nozzles. Those spray nozzles which are on either side of the centre bank of nozzles are connected in pairs, as seen in FIG. 2, each pair to a control valve 26 with its pilot valve 30.

The panel according to FIG. 4 carries rows of indicators. The reference numeral 52A refers to those indicators associated with the top back-up spray nozzles, and an indicator 52A' is associated with the bank of those nozzles in the median zone of the mill. Similarly, 52B, 52C, 52D, 52E and 52F refer respectively to the indicators associated with the upper nozzles on the top work roll, the lower nozzles on the top work roll, the upper nozzles on the bottom work roll, the lower nozzles on the bottom work roll and the nozzles on the bottom back-up roll.

The rows of openings used to actuate the pilot valves 30 are shown in the panel of FIG. 4. Those referred to at 44A and 40A are associated with the top back-up roll and those referred to at 44F and 40F are associated with the bottom back-up roll. The openings referenced 44A', 40A', 44F' and 40F' are associated with the central bank of nozzles. Each opening 44A, 40A and 44F, 40F is used to control the coolant flowing from a pair of spray nozzles, as described earlier and illustrated in FIG. 2. The openings seen immediately to the right of those referenced 44A', 40A', 40F' and 44F', control coolant from the first nozzle on each side of the central bank; the second opening in each row control the second nozzles on each side of the central bank, and so on.

The spray nozzles for the work rolls are made operative by valves which are actuated by temporarily covering over openings 44B, 44C, 44D, 44E. Nozzles on the spray bars 16 and 18 for the top work roll are rendered inoperative together by covering up openings 40BC, and nozzles on the spray bars 20 and 22 for the bottom work roll are rendered inoperative together by covering up openings 40DE.

As seen in FIG. 3 the work roll 6 has two spray bars 20, 22 and these are controlled as follows. Pilot valves 30 are provided as in the system shown in FIG. 2, and these actuate valves 26, there being one such valve for each spray nozzle, except in the case of the central banks of nozzles each of which is controlled by a single valve 26 with its pilot valve 30. Coolant is fed through line 24, and low pressure line 32 provides equal pressure on each side of the pilot valve spools through lines 34, 36. Line 38 connects one side of both spools with opening 40DE. The lines 36 supplying low pressure to the other side of the spools are connected also to holes 44D, 44E.

In operation the upper and lower sprays for the work roll are shut off together by covering over the openings 40DE. The upper sprays are made effective by covering

over openings 44D, and the lower sprays by covering over openings 44E.

It will be clear from the foregoing that the various spray nozzles can be controlled by an operator by covering the required opening or openings with a closure member such as one or more of his fingers, and as each opening needs only to be covered momentarily to cause the spool valve 30 to move in the required direction, the operator can rapidly switch on or off as required an entire row of nozzles by sliding the closure member along the face of the panel and over a row of openings. This is made easier for him by providing guides on the face of the panel for each row of openings. The guides may be formed as shallow grooves as illustrated at 54 in FIGS. 2, 3, 4 and 5. Alternatively they may be in the form of protruding ribs 56 as seen in FIG. 6. Although in that figure a rib is shown on either side of each row of holes it may be desirable to provide just a single rib per row of openings in which case the operator may rest a finger on that rib and use it to guide his finger as it is slid over the openings.

It may be found that in use grease or dirt from the operator's fingers tend to block up the openings. FIG. 7 shows a modification intended to obviate this fault. In this arrangement pads 58 attached to flexible flaps 60 attached to the panel are used to cover the openings when the operator's finger is slid over them.

The flaps 60 bias the pads away from the openings. What we claim is:

1. A control panel for use with a pneumatic control system, the panel having a plurality of openings provided on one face and positioned relative to guide means on the panel such that an operator, by sliding a closure member over the face of the panel, with the member guided and restrained by the guide means but free to slide over the face of the panel along a path which passes over said openings in turn, temporarily covers up the openings positioned beneath the path of travel of the closure member to thereby actuate pneumatically operable switching components forming part of the control system and pneumatically connectable to the openings at a position away from the face.

2. A control panel as claimed in claim 1 in which the openings are arranged in a horizontal row or vertical column and a plurality of such rows or columns of openings, each with its own guide means, are provided.

3. A control panel as claimed in claim 1 in which said closure member is the operator's finger.

4. A control panel as claimed in claim 3 in which the guide means for the operator's finger is in the form of a shallow groove in the face of the panel with the openings leading into the groove.

5. A control panel as claimed in claim 3 in which the guide means for the operator's finger comprises a rib projecting from the face of the panel and positioned a short distance away from the openings.

6. A control panel as claimed in claim 3 in which the guide means for the operator's finger comprises a pair of parallel ribs projecting from the face of the panel with the ribs spaced apart by a distance slightly greater than the thickness of a finger and with the openings extending to the panel between the ribs.

7. A control panel as claimed in claim 3 in which each opening has a pad associated therewith, the pad being biased to a position in which the openings are not covered by the pads and arranged such that the operator's finger by sliding over the pads displaces them

5

into a position in which they temporarily close the opening with which they are associated.

8. A control panel as claimed in claim 1 in combination with a control system having a plurality of pneu-

6

matically operable switching components, the components being pneumatically connected to the openings at a position away from the face of the panel.

* * * * *

5

10

15

20

25

30

35

40

45

50

55

60

65