Nov. 21, 1967 R. D. BECK ETAL 3,353,452

PNEUMATIC PUSHBUTTON CONSTRUCTION

Filed March 10, 1965 2 Sheets-Sheet 1

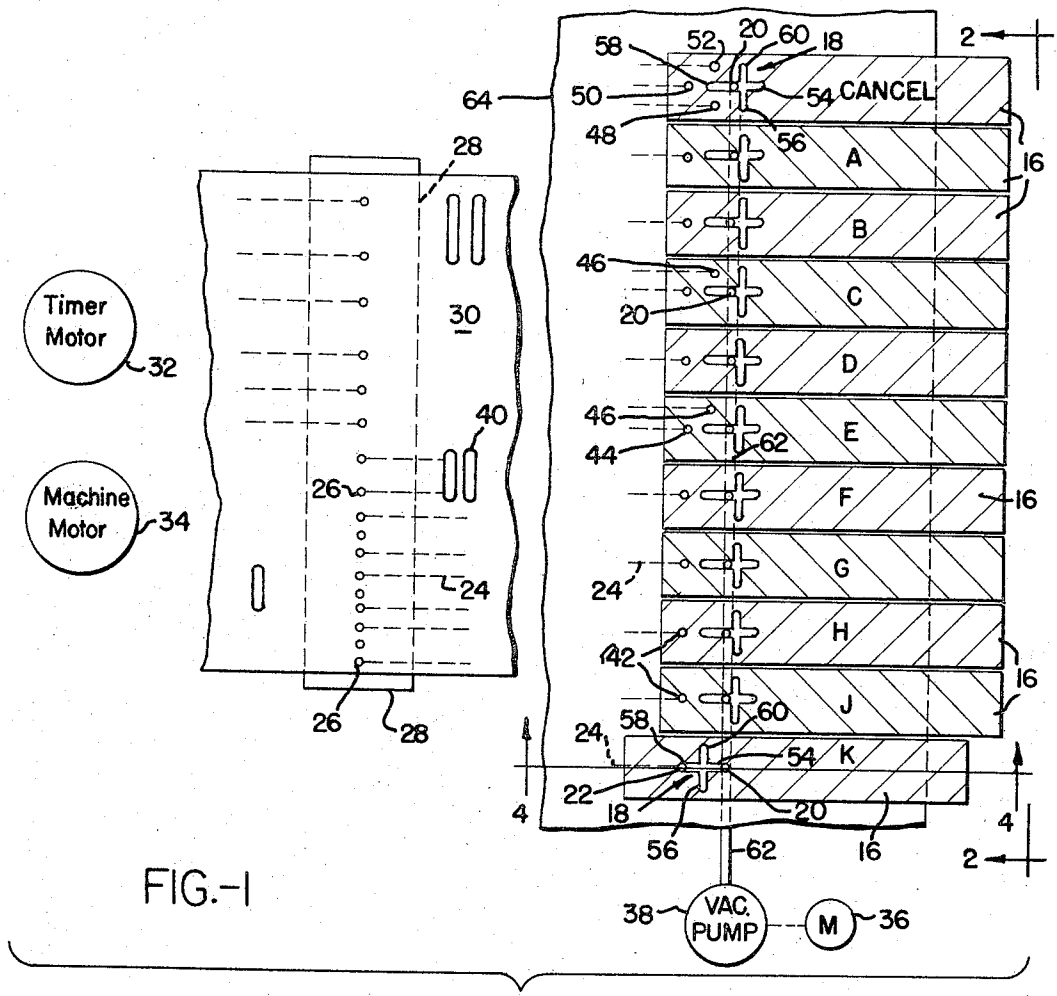


FIG.-1

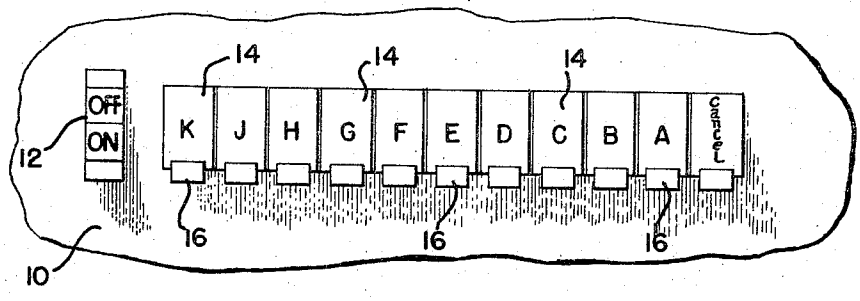


FIG.-2

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PNEUMATIC PUSHBUTTON CONSTRUCTION

Filed March 10, 1965 2 Sheets-Sheet 2

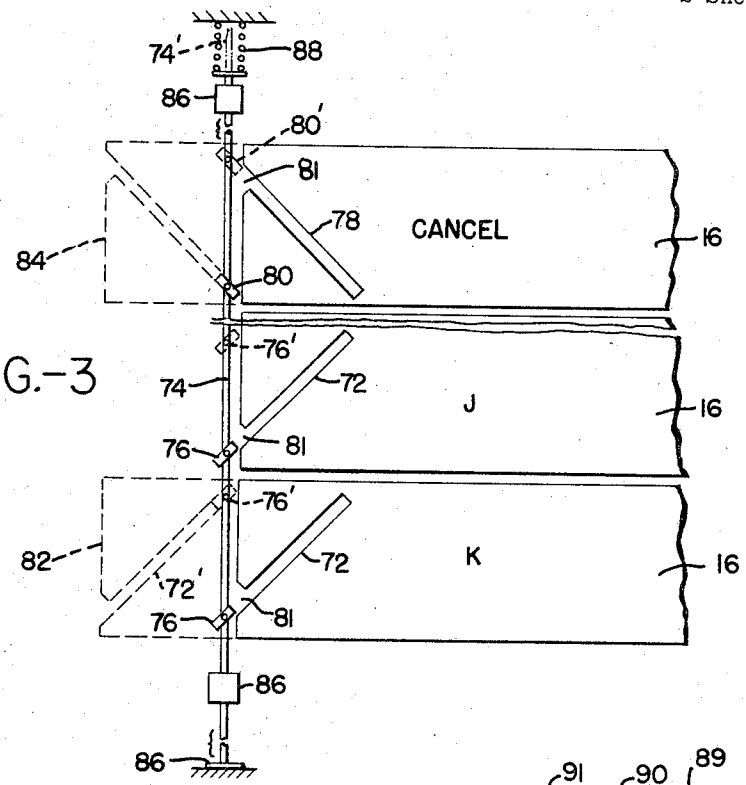


FIG.-3

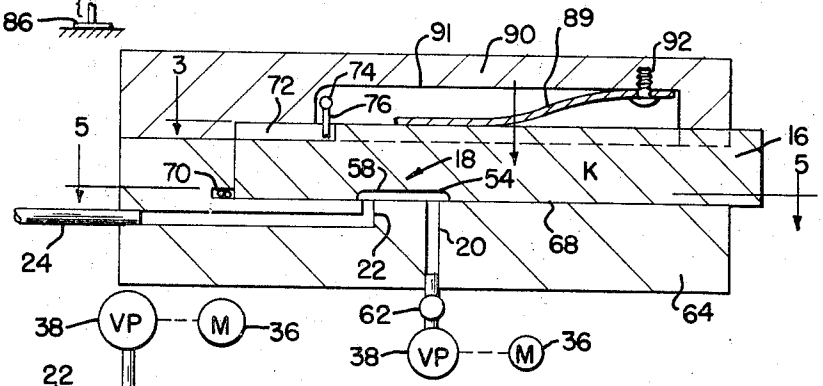


FIG.-4

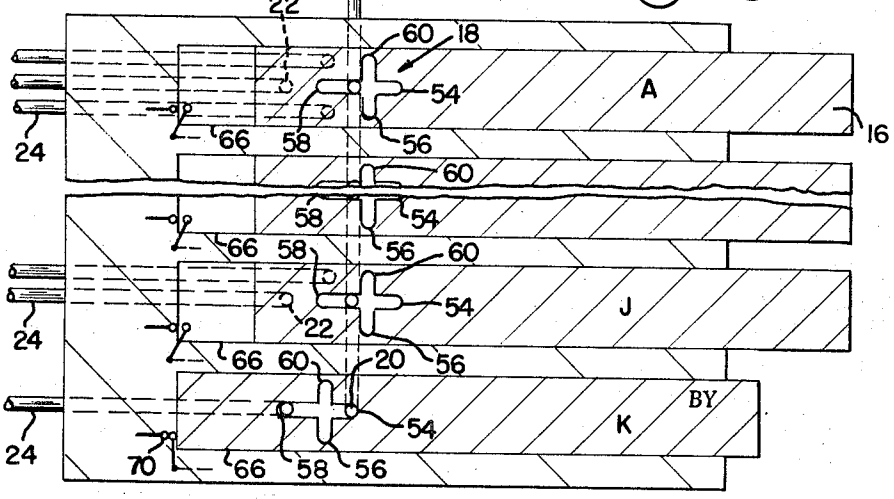


FIG.-5

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PNEUMATIC PUSHBUTTON CONSTRUCTION

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ABSTRACT OF THE DISCLOSURE

This disclosure relates to a pushbutton arrangement for selectivity interconnecting a vacuum source to a main program means wherein the main program means will direct the vacuum source to pneumatically operate actuator means in a timed relation, each pushbutton including a channel construction in the bottom thereof movable in a groove of a base member and selectively interconnecting opening means in that groove for the main program means to another opening means therein that is interconnected to the vacuum source whereby each pushbutton can selectively interconnect that vacuum source to a different portion of the main program means.

This invention relates to a pneumatic pushbutton construction.

According to this invention a pneumatic pushbutton construction is provided in which one or more pushbuttons efficiently control the transmission of a fluid to fluid operated actuators.

The pneumatic pushbutton construction may include one or more pushbuttons having pushbutton flat surfaces slidable relatively to relatively stationary flat surfaces which have fluid or vacuum transferring openings past which said pushbutton flat surfaces slide or reciprocate, the pushbutton flat surfaces being provided with a channel construction to interconnect some or all of said openings in one position of a pushbutton and to disconnect some or all of said openings in another position of a pushbutton.

The pushbutton channel construction may have relatively long, narrow interconnecting channels, which may be outwardly directed in the form of radial arms or intersecting channels.

Other features of this invention are apparent from this description, the appended claimed subject matter, and/or the accompanying drawings, in which:

FIGURE 1 is a diagrammatic horizontal plan chart showing, in general, the relationship between the pneumatic pushbutton control, a pneumatic timer reading head and flexible program member and certain parts of a washing machine or other device to be controlled.

FIGURE 2 is a diagrammatic vertical front view of the pushbutton control, and panel, taken from a plane along the line 2—2 of FIGURE 1.

FIGURE 3 is a diagrammatic horizontal cross section taken along the line 3—3 of FIGURE 4.

FIGURE 4 is a diagrammatic vertical cross section taken along the line 4—4 of FIGURE 1.

FIGURE 5 is a diagrammatic horizontal cross section taken along the line 5—5 of FIGURE 4.

The various parts of the figures are intended to be diagrammatic, and many well known mechanisms are diagrammatically shown. It is to be understood that well known components can be used in connection with such mechanisms, as indicated.

Certain words, indicating direction, relative to position and the like are used in the specification and claims for the sake of brevity and clearness. However, it is to be understood that these words are used in connection with the illustrations in the drawings, and that in actual use

the relative positions, directions and the like of the parts may be entirely different when in such actual use. Examples of these words are "vertical," "horizontal," "upper," and "lower," etc.

According to this invention, a panel 10, FIGURE 2, may be provided at any desired location. Along the front of this panel an on off switch 12 is placed which may be a master switch to start and stop the entire machine. Also, a plurality of readable signs, panels, or indications 14 may be placed along the panel. These signs may be illuminated either from the front or the rear, as desired. One of these signs 14 may have a sign "CANCEL" and each of the other signs may have suitable indications to indicate a desired washing program and the like. However, for brevity, these have been indicated as A, B, C, D, E, F, G, H, J and K in FIGURE 2 and elsewhere in the drawings. These readable signs, if applicable to a washing machine of the automatic type, may indicate a particular washing cycle or program for various wearing apparels and the like which are to be washed under the different conditions produced by the various selectable programs A, B, etc.

At the bottoms of the readable signs 14, a plurality of pushbuttons 16 may be provided which may extend forwardly out of the panel and may be pushed in from the front of the panel. When any particular pushbutton 16 is pushed in, the particular program which is indicated by the readable sign or indicator immediately above it will be automatically controlled, so that the washing machine or the like produces the selected program. When the pushbutton underneath the indicator labeled "CANCEL" is pushed in, then the washing machine may be caused to drain immediately, with a short spin cycle, if necessary, and then may be automatically stopped after having emptied the contents of the washing machine.

The particular pushbuttons herein disclosed are constructed so that they may be moved from their outer positions to their inner positions. Any suitable well known interlocking construction may be provided whereby when any particular pushbutton 16 is pushed in, the other pushbuttons are automatically locked in their outer positions, and cannot be pushed in. However, when a pushbutton such as K, has been pushed in and then the CANCEL pushbutton is pushed in, this may cause the pushbutton K to return to its outer or unactuated position. Mechanisms that accomplish this are well known, but a mechanism is indicated diagrammatically herein, and is later described, to indicate the functions that are produced thereby, it being understood that any well known automatic interlocking means may be provided.

Each pushbutton is provided with an inverted or downwardly directed vacuum transmitting channel construction 18. This construction 18 is such that when any particular pushbutton 16 is in its outer position, the channel construction 18 is connected only with its respective vacuum manifold suction opening 20. Preferably each pushbutton is provided with its respective suction opening 20.

When a selected pushbutton, such as K, is pushed in, its respective channel construction 18 connects not only with its respective suction opening 20 but also with each of any vacuum transmission opening or openings that may be placed in the path of the particular pushbutton, to interconnect said openings for the transmission of a vacuum between said openings.

The channel construction 18 is such that it interconnects some or all of such openings in one position of the pushbutton and disconnects some or all of such openings in another position of the pushbuttons.

In the instance of pushbutton K, a vacuum transmission opening 22 may be bridged by the channel construction 18, and the transmission opening 22 is then subjected

to the vacuum of the suction opening **20**, so that a vacuum transmission tube or line **24** will transmit a controlling vacuum to a reading head opening, such as any particular opening **26** of the reading head **28**, over which a timer flexible program member such as a vacuum controlling belt or disc **30** may be controlled by a timer motor **32**.

Any proper one of the openings **26** of the reading head may be connected to control vacuum operated actuators to actuate the timer motor, the washing machine motor **34**, and/or the vacuum pump motor **36**, which drives the vacuum pump **38**.

The belt or disc **30** of the timer may be flexible and may be provided with vacuum transmitting channels **40**, which may connect one or more of the reading head openings **26** to each other to cause the proper actuation of the desired washing machine components. Under certain conditions, some of the vacuum transmitting openings which are controlled by the pushbuttons may be connected directly to some washing machine component without passing through the timer reading head, if desired.

Generally, one each of the transmission openings **22**, **42**, **44**, **50**, etc., under each pushbutton, connects with a selected opening **26** which causes the timer to select the desired program corresponding to that indicated by the corresponding indicator **14** on the panel **10**.

The particular construction of the timer reading head, the timer belt or disc **30**, and the construction of the washing machine, and their operation are not part of this invention, and only sufficient portions thereof are indicated diagrammatically, to illustrate how this control can be connected to an automatic washing machine and the like, for the purposes herein disclosed.

Other vacuum transmitting openings, such as **42**, etc., may be placed adjacent or under the various pushbuttons **16**. Under certain conditions, two openings, such as **44** and **46** may be placed adjacent or under a pushbutton, such as pushbutton E. Also, three or more such openings, such as **48**, **50** and **52** of the CANCEL button may be subjected to a vacuum by a vacuum transmitting channel construction **18** of any particular pushbutton. However, it is merely by way of illustration that the "CANCEL" pushbutton has been illustrated with these three openings **48**, **50** and **52**.

Any of the vacuum transmitting openings **22**, **42**, **44**, **46**, **48**, **50**, **52** etc., may be connected directly or indirectly with vacuum operated actuators to actuate any device, component, lever, switch, etc., with or without an intermediate control by the timer.

In this particular embodiment, the vacuum transmitting channel construction **18** is provided with four relatively long, narrow, outwardly directed or radial channel arms **54**, **56**, **58** and **60**, as shown on finger K of FIGURES 1 and 5. These arms are interconnected in a star like construction, so that, if desired, any one or more of the openings can be connected to the suction manifold **62**, which may be connected to the vacuum pump **38**, and which manifold is connected to each of the suction manifold suction openings **20** adjacent or under each of the pushbuttons **16**. The arms **54**, **56**, **58** and **60** may be in the form of a pair of intersecting channels **54**, **58** and **56**, **60** respectively.

By way of example, the particular channel constructions **18** may be placed cut or molded on the undersides of the pushbuttons **16**. If desired, the pushbuttons **16** may be made of plastic, such as nylon and the like.

A base plate or panel **64** may be provided with suitable grooves **66** within which the pushbutton **16** may slide. The vacuum transmitting openings **20**, **22**, **44**, **46**, etc. may be placed at the bottoms **68** of the grooves **66**, so that the channel construction **18** can only be connected to the manifold suction opening **20**, when the respective pushbutton is in its outermost position, as illustrated. However, when a particular pushbutton is pushed in, such as pushbutton K, then the channel construction **18** will connect the suction opening **20** with every vacuum transmission opening, such as **22**, or more openings if provided, which may be under such particular pushbutton.

The grooves **66** may be of rectangular transverse cross section and may be parallel to each other, and with flat groove bottoms. The pushbuttons likewise may be rectangularly cross sectioned and parallel to each other, and with flat pushbutton bottoms. The flat groove bottoms and flat pushbutton bottoms engage each other to provide a substantially hermetic seal.

In order that each readable sign **14** may be illuminated, when any respective pushbutton **16** is pushed in, each pushbutton **16**, or the groove **66**, may be provided with a normally open push switch diagrammatically shown at **70**, which will be closed when the selected pushbutton is pushed in, so that the respective switch **70** is closed. This will cause the respective switch **70** to close a circuit from a power source to the particular illuminating lamp or the like which illuminates the respective sign or indicator **14**, to indicate that such particular pushbutton has been pushed in. These switches have been diagrammatically shown in FIGURE 5, but it is to be understood that any suitable well known switch may be used therein. Such switches **70** may be placed in any desired manner so that they may be closed when the respective pushbutton is pushed in.

The various openings that are controlled by the channel construction **18** may be connected to various vacuum transmission lines **24**, which may be connected to any of the various desired openings **26** at the reading head, or directly to any component of the washing machine as is well understood.

Merely to illustrate diagrammatically, FIGURE 3 shows a diagrammatic illustration wherein the tops of the pushbuttons A, B, C, etc., may be provided with grooves **72** which are at an effective angle with respect to an interlocking rod **74**. The rod **74** may have fixed thereon sliding pins **76**, which can slide within the grooves **72**, when any one of the pushbuttons A–K are pushed in. The pushbutton which has been marked "CANCEL" may have a groove **78** which is oppositely directed, with respect to grooves **72**. A sliding pin **80** may be provided on rod **74** to be engaged by the groove **78**, when the interlocking rod **74** has been pushed upwardly, in FIGURE 3, by the pushing in action of the pushbutton K, for example.

The action is such that, if desired, the pushbutton K may be pushed in, as shown by the dotted line **82**, FIGURE 3. When the pushbutton K is pushed in, the sliding pin **76** will move to the position **76'**, and the interlocking rod **74** will move upwardly as indicated by the dotted line **74'**. When this happens, none of the pushbuttons A–J can be pushed in, since the respective sliding pins **76** will also be in the dotted position **76'** of FIGURE 3, and such sliding pins **76'** will effectively block pushing in of any of the pushbuttons A–J. However, the sliding pin **80'** will be opposite the inlet end **81** of the groove **78**, so that if the "CANCEL" pushbutton **16** is pushed in, to the dotted line position **84**, then the reaction between the groove **78** and the pin **80'** will cause the interlocking rod **74** to slide downwardly, and in so doing, the reaction between the sliding pin **76'** of pushbutton K will react on the groove **72'** of pushbutton K and cause that pushbutton K to return to its outer, or full line position.

The interlocking rod **74** is shown as slidably supported in two or more bearings **86**. However, this interlocking construction is only diagrammatically indicated, and any well known interlocking construction for interlocking push rods may be used. If desired the rod **74** may be provided with a stop **86** at its lower end, and with a return compression spring **88** of only sufficient power to hold the rod **74** in normal or down position.

Alternatively, the pushbuttons **16** may be pushed in against the reaction of compression springs, not shown, which will return the pushbuttons to their outer positions. The pushbuttons may be automatically locked in their

inner positions and may be automatically released by a mechanism actuated by the "CANCEL" pushbuttons, for example, or by any suitable release button.

The push rods **16** may be held downwardly in the grooves **66** in any desired manner, such as by blade springs **89** or the like, with one blade spring over each pushbutton. A cover **90**, which may be provided with grooves similar to the grooves **66** and may carry the springs **89**. Such cover **90** and springs **89** loosely hold the pushbuttons **16** down against the bottoms **68** of the grooves. The cover may be provided with a transverse groove **91** to receive the interlocking rod **74** and the blade springs **89**.

The groove **72** of the pushbutton has been shown in complete elevation in FIGURE 4, although such groove is at an angle with respect to the general axial plane of the pushbutton **16**. However, it is intended that the cross section for FIGURE 4 is selectively taken along the groove **12** to allow this illustration of such groove for the sake of clearness.

While the form of the invention now preferred has been disclosed as required by statute, other forms may be used, all coming within the scope of the claimed subject matter which follows.

What is claimed is:

1. In combination: a base with a plurality of grooves having a plurality of openings therein; a plurality of pushbuttons slidably located respectively in said grooves, said buttons each having a channel construction to interconnect certain of said openings together in one position of the pushbuttons and to disconnect said certain openings from each other in another position of said pushbuttons, at least one pushbutton having its channel construction comprising a pair of right angled channels crossing each other intermediate the ends of said crossing channels.

2. A combination according to claim **1** in which all of said opening of each groove are connected together in one position of the respective push button and all of said openings of each groove are disconnected from each other in another position of said respective pushbutton.

3. A combination according to claim **1** in which all of said channel construction are in the form of said pair of intersecting channels.

4. A combination according to claim **1** and including a source of vacuum and a vacuum manifold, one opening of some of said grooves being connected to said vacuum manifold which is connected to said source of vacuum.

5. A combination according to claim **4** and including

a timer reading head, other openings of some of said grooves being connected to said timer reading head.

6. A combination according to claim **1** in which a readable sign is provided respectively adjacent each pushbutton, and in which individual illuminating switch means is actuated by movement of each respective pushbutton.

7. A combination according to claim **1** in which said openings are located along the bottoms of said grooves and said channel constructions are located along the bottoms of said pushbuttons.

8. A combination according to claim **1** in which spring means urges said channel constructions toward said openings.

9. In combination a vacuum source; a base with a plurality of straight parallel uniformly rectangularly cross sectioned grooves having flat groove bottoms, each groove bottom having a plurality of openings, one of said openings of each groove bottom being interconnected to said vacuum source; a plurality of straight parallel uniformly rectangularly cross sectioned pushbuttons with flat pushbutton bottoms, said pushbuttons being slidably located in respective ones of said grooves, each pushbutton bottom having a downwardly directed vacuum transmitting channel construction interconnecting certain of said openings together in one position of said pushbutton and disconnecting said certain openings from each other in another position of said pushbutton, a vacuum manifold extending transversely beneath, said base and interconnecting said vacuum source to said one opening of each groove bottom; vacuum operated actuators; a timer reading head having a plurality of openings, some of said other openings in said grooves being connected with certain of said openings in said timer reading head and in which other of said openings in said timer reading head are connected with said vacuum operated actuators, means movable over said timer reading head to interconnect said certain openings in said timer reading head to said other openings of said timer reading head; and leaf spring means downwardly biasing said pushbuttons.

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ALAN COHAN, *Primary Examiner.*