Aug. 27, 1963 E. A. BOULAY 3,101,838

VENT CONTROL

Filed Dec. 28, 1961 2 Sheets-Sheet 1

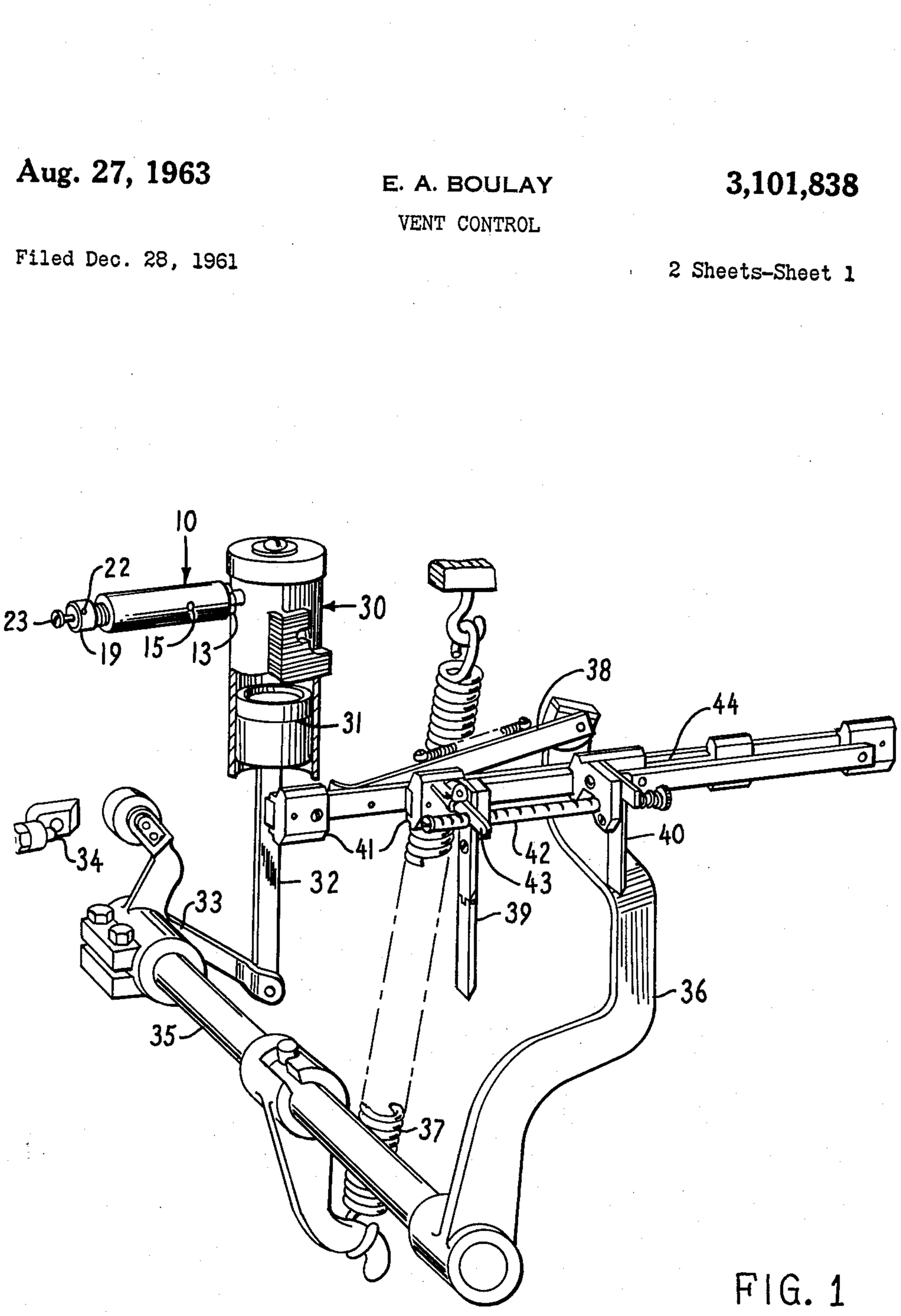

FIG. 1

INVENTOR.
EDWARD A. BOULAY
BY John P. Murphy
ATTORNEY

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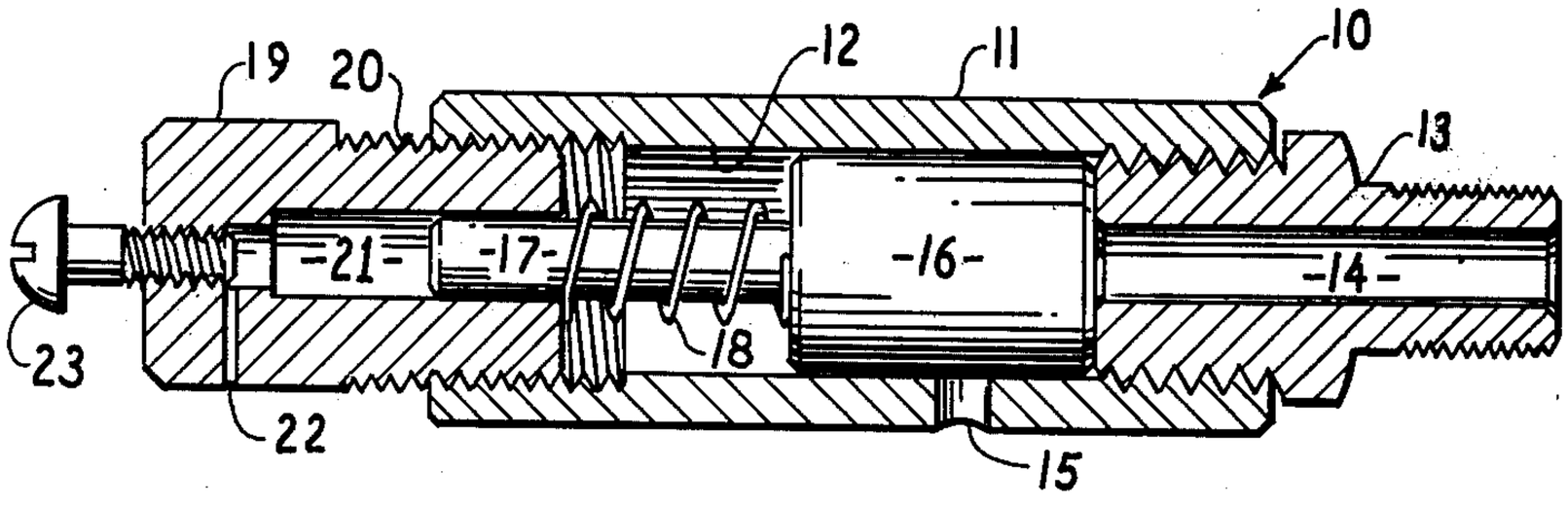

FIG. 2

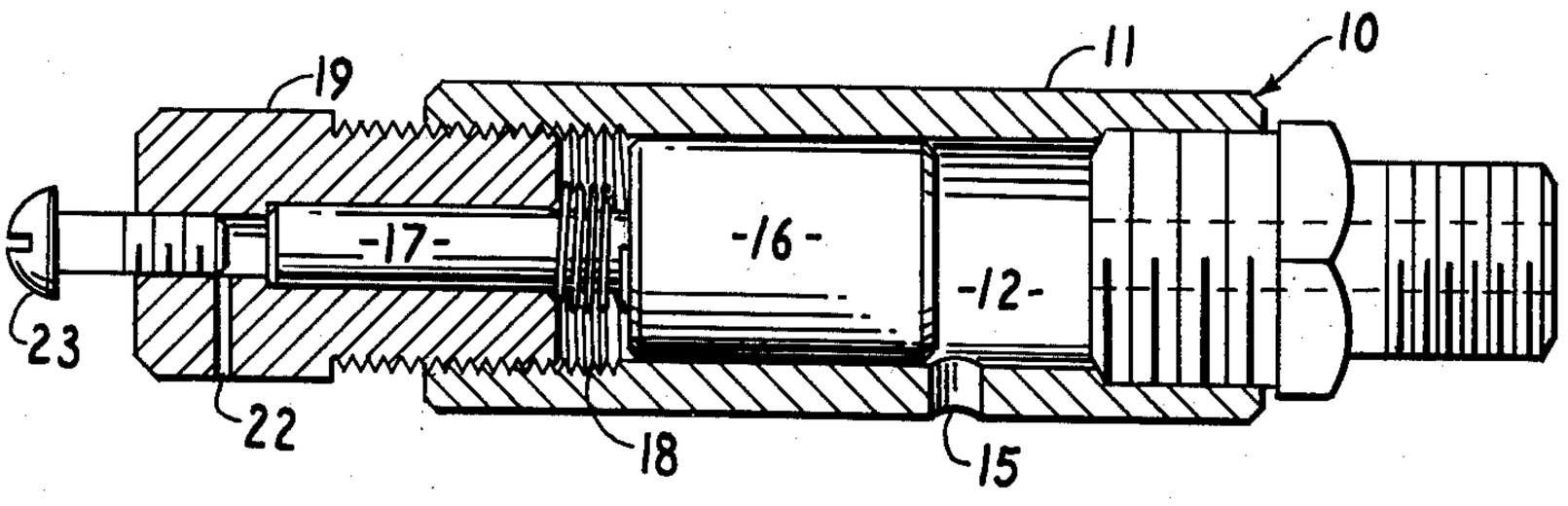

FIG. 3

INVENTOR.
EDWARD A. BOULAY
BY John P. Murphy
ATTORNEY

United States Patent Office

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VENT CONTROL

Edward Alphonse Boulay, Concord, N.H.

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This invention relates to a vent control, and more specifically to a vent control device for use in a slug casting machine.

In a slug casting machine such as the Linotype or Intertype the matrices are assembled on the assembly elevator with the spacebands for the line of type, from which they are lifted and transferred to the casting elevator for presentation to the molding apparatus. The transfer mechanism includes a delivery slide which is movable laterally to deliver the matrices and spacebands to the casting elevator, and two control fingers which are preset to establish the length of the type line. The movement of the delivery slide is rapid and it is arrested at the end of its stroke by an air cylinder or dash pot. However, the vent of the cylinder is sufficient only to prevent the buildup of pressure therein which would prevent operation of the delivery slide, and does not control the abrupt halting of delivery slide motion at the end of the stroke. It is this abrupt stop which causes the long finger to jump out of engagement with the line of matrices and spacebands when said line is a short one and the finger stops before engagement with its stop device. Hence some of the matrices will at times be caused to drop out of the line being transferred as the finger moves out of engagement at the end of a stroke.

It is therefore a main object of this invention to provide apparatus for the absolute control of the motion of the delivery slide in a slug casting machine.

It is another object to provide regulatory means for the motion of the delivery slide wherein the control may be adjusted.

A further object is to control the motion of the delivery slide and arrest such motion incident only to conditions when such motion is excessively rapid.

A further object of this invention is to provide a multiple stage automatic control over the operation of the arresting cylinder in a slug casting machine.

Another main object of this invention is to provide apparatus for controlling the venting of fluid pressure from a dashpot.

Other objects and advantages will become apparent from the following detailed specification.

In carrying out these and other objects there is provided a vent control for a fluid pressure cylinder comprising a casing defining a chamber in communication with the cylinder, a primary vent from the chamber, a piston slide in the chamber operable to open or close the primary bent, and a secondary vent opposite one end of the piston slide for controlling the movement of the piston slide in the chamber.

In the drawings:

FIG. 1 is a fragmentary perspective view of the delivery slide apparatus of a slug casting machine and such devices incident to the operation of the delivery slide.

FIG. 2 is an enlarged longitudinal sectional view of a vent control according to this invention, the vent being in the closed position.

FIG. 3 is an enlarged longitudinal sectional view similar to FIG. 2, showing the vent control in the open position.

FIG. 3 illustrates the delivery slide mechanism of a line casting machine. It is to be understood that the mechanism is normally mounted in the face plate of the machine (not shown) and in position over the assembly elevator in which the matrices are conveyed from their magazines in response to actuation of a keyboard. The

matrices and spacebands (not shown) are then carried by the delivery slide mechanism to the casting elevator, thence to the casting and molding mechanism of the machine. The delivery slide comprises two line engaging fingers designated herein as the long finger **39** and the short finger **40** which are assembled on the slide bar **44**. The fingers **39** and **40** are spaced along a notched adjusting rod **42**, and a latch **43** is movable into and out of the notches in the rod **42** to lock the long finger **39** at any predetermined point along the rod **42**. The slide bar **44** is mounted for movement in a lateral direction so as to be carried by blocks **41**. During the delivery stroke of the slide bar **44**, the bar moves to a point where it is stopped by the stop **34**, which is mounted on the face plate of the machine (not shown). A delivery lever **36** is connected to the slide bar **44** by means of link **38** for actuation of the slide bar **44**. The other end of the lever **36** is connected to a shaft **35**. Spring **37** is connected to the shaft **35** for turning same to act upon the lever **36**.

Also connected to the shaft **35** is a link **33**, the end of which is fastened to the end of a piston rod **32** of piston **31**. The piston **31** is disposed in an air cylinder **30** or dashpot. This cylinder **30** acts as a speed arrester for the motion of the delivery slide bar.

During operation, release of the delivery slide mechanism permits the spring **37** to turn the shaft **35** and thus move lever **36** against line **38**. The line **38** operates the slide bar **44** toward the stop **34**, carrying a composed line of matrices and spacebands which are held by the fingers **39** and **40**. It is to be understood that the composed line (not shown) will be engaged first by the short finger **40** during movement of the delivery slide bar **44** and is thus moved into engagement with the long finger **39**, the whole thence being moved toward the viewer's left. The motion of the delivery slide is normally rapid, and it is the function of the cylinder **30** to arrest this rapid motion by building up air pressure therein before the delivery slide reaches the stop **34**. The conventional vent in the cylinder **30** can be adjusted to permit a gradual increase of pressure, which will not prevent the slide bar **44** from striking the stop **34** hard enough to cause some of the matrices to become dislodged from the composed line. Conversely, the vent can be adjusted so as to prevent the rapid enough and efficient motion of the slide bar **44**. Should the slide bar **44** not transfer properly due to the vent being too small, a following line of matrices and spacebands can enter the assembly elevator before the completion of the delivery cycle. Moreover, it will be apparent that the motion of the delivery slide mechanism will be very rapid during the initial part of the stroke until buildup of sufficient pressure within the cylinder **30**.

Therefore the invention herein resides in the addition of a vent control, generally designated as at **10**, to the cylinder **30** to control the venting of fluid pressure therefrom to cause a smooth, substantially constant movement of the piston **31** of the cylinder **30**, and to thus positively control the movement of the slide bar **44** during transfer of a composed line of matrices and spacebands from the assembly elevator to the casting elevator.

Referring to FIGS. 1, 2 and 3, the vent control comprises a casing **11** defining a chamber **12** therethrough. An adapter **13** is fastened in one end of the casing **11** as by screw threads, and the other end of the adapter **13** is threaded into the end of the cylinder **30**. An inlet **14** is provided through the adapter **13** to the chamber **12**. A primary vent **15** is formed through the side of the casing in communication with the chamber **12**, thence in communication with the interior of the cylinder **30**. A slide valve **16** is substantially freely disposed within the chamber **12**, and is shaped to conform to the shape of the chamber **12**, being of nearly the same dimension.

In the outer end of the body **11** is disposed a knob **19** having a long threaded shank **20**. Mating threads are formed in the wall of the chamber **12** to receive the shank **20** of knob **19**. A second chamber **21** is formed through the knob **19**, and a scondary vent **22** is formed between the chamber **21** and the atmosphere. An adjusting screw **23** is disposed in the end of the chamber **21** to a point to control the size of the opening from the chamber **21** to the secondary vent **22**.

Depending from the slide valve **16** is a small piston **17**. The size and cross section of the piston **17** are complementary to that of the chamber **21** formed in the knob **19**, so as to form a close sliding fit of the piston **17** in the chamber **21** similar to that of the slide valve **16** in the chamber **12**. A spring **18** is disposed around the piston **17** to urge the piston and slide valve to the viewer's right in FIG. 2, which is toward the closed position of the vent control. By a comparison of FIGS. 2 and 3 it will become apparent that the knob **19** may be adjusted longitudinally by means of its threaded shank **20** within the chamber **12** to preset the distance of maximum travel of the piston **17** to the viewer's left, or toward the open position of the vent control. This adjustment of the knob **19** controls the degree to which the slide valve **16** will uncover the primary vent **15** to permit the escape of fluid pressure therethrough.

Adjustment of the screw **23** controls the size of the opening from the second chamber **21** to the secondary vent **22**, thus controlling the degree to which air or fluid pressure in the chamber **21** may be forced through the secondary vent **22** during movement of the piston **17** toward the left, or open position. Fluid pressure entering into the chamber **12** from the inlet **14** moves the slide valve similar to a piston, and against the urging of the spring **18**.

The operation of the vent control according to this invention is as follows: It is to be assumed that this vent control has been installed in communication with the interior of the cylinder **30** by means of the adapter **13** as shown in FIG. 1, and that all adjustments of the knob **19** and the screw **23** have been made, and that the delivery slide of the machine is about to begin a new cycle of delivering a composed line of matrices and spacebands to the casting elevator. Thus, all parts of the apparatus are in the relative positions as shown in FIGS. 1 and 2.

As the delivery slide apparatus is released for transfer motion, the power of spring **37** operates the lever **36** to move the slide bar; and also operates lever **33** and piston rod **32** of the cylinder **30**. This action causes the piston **31** of the cylinder **30** to move upwardly, increasing the fluid pressure in the cylinder.

A slight increase in pressure in cylinder **30** is communicated through the inlet **14** to the chamber **12** in the vent control body **11**. Due to the relatively smaller size of the chamber **12** with respect to that of the cylinder **30**, only a slight movement of the piston **31** is required to operate the vent control **10**. However, due to the rapid movement of the delivery slide by the spring **37**, the buildup of pressure in chamber **12** is severe, causing a quick starting movement of the slide vent **16** and piston **17** toward the left, or open position. Since the second chamber **21** is substantially smaller in size than the chamber **12**, an even more rapid and severe increase of pressure occurs in the chamber **21** to arrest the initial motion of the slide valve **16** and piston **17**.

The initial arrest or slowing down of the slide valve **16** prevents any great escape of fluid pressure through the primary vent **15**. The fluid pressure in the cylinder **30** is merely relieved to some extent by expansion into chamber **12**. Simultaneously, the gradual escape of fluid pressure through the secondary vent **22** permits the piston **17** to move slowly to the left, also moving the slide valve **17** to slowly uncover more of the primary vent **15**. This gradual opening of the vent **15** occurs in direct proportion to the increase of fluid pressure within the cylinder **30**, and thus serves to provide a constantly proportionally controlled venting of said fluid pressure.

When the piston **17** reaches its maximum stroke to the left, as governed by the position of the knob **19** in the end of the chamber **12** of the body **11**; the primary vent **15** is opened to the degree required for the proper venting of the cylinder **30** incident to the desired speed of the delivery slide apparatus in delivery of a line of composed matrices and spacebands. At this time, the piston **17** and slide valve **16** are in the relative position illustrated in FIG. 3. It will be understood that the complete operation of the vent control **10** takes place in a very short time. However, the following advantages are inherent in this improvement:

Firstly, the vent control **10** according to this invention permits a very rapid buildup of fluid pressure in the cylinder **30** due to the primary vent being closed. Secondly, the rapid increase of pressure in the cylinder **30** means that the least possible movement of the delivery slide bar **44** is required to gain the necessary fluid pressure in the cylinder **30** and its vent control **10** to achieve complete control over the motion of the slide bar **44**. Third, the initial motion of the delivery slide bar **44** may be controlled. This is achieved through the adjustment of the screw **23** in the vent control knob **19**. Fourth, the overall speed of the delivery slide bar **44** may be precisely controlled. This is achieved through the adjustment of the slide valve travel by the position of the knob **19** in the end of the body **11**, thus regulating the size of the opening from the chamber **12** past the slide valve **16** to the primary vent **15**. Fifth, the acceleration of the slide bar **44** is controlled to be gradual, resulting in a gentle rather than an abrupt stop of the slide bar **44** against the stop **34**.

Summarily, the invention contemplates an improvement to all dashpot construction involving the need for a controlled venting of fluid pressure from a chamber or the like. The invention, in its broader aspects provides for the control of venting where the resistance to the escape of pressure is proportional to the rate of increase of the pressure. The fluid pressure does not escape through the movable member of the vent control, or past the movable member; but merely travels to the member to actuate same. Because of the regulatory feature of the secondary vent, the main or primary vent is controlled proportional to the increase of pressure since a more severe increase of pressure will affect the movement of the slide valve **16** the same as a gradual increase of pressure.

A preferred embodiment of the invention having been shown and described, it is to be understood that the embodiment disclosed is for purposes of illustration only, and the invention is to be construed in the true spirit and scope of the appended claims.

I claim:

1. A vent control for fluid pressure comprising a casing defining a first chamber, a fluid pressure inlet into said first chamber, a primary vent formed from said first chamber, a slide valve slidably disposed in said first chamber, a second chamber in communication with said first chamber, a secondary vent from said second chamber, and a piston depending from said slide valve and disposed in said second chamber.

2. A vent control for fluid pressure comprising a casing defining a first chamber having formed therefrom a primary vent, a slide valve slidably disposed in said chamber for opening and closing said primary vent, a second chamber formed axially from said first chamber, a secondary vent formed from said second chamber, and a piston depending from said slide valve and being disposed in said second chamber slidably therein, the length of said second chamber being variable.

3. A vent control according to claim 2; and a means for varying the opening from said second chamber to said secondary vent.

4. A vent control for fluid pressure comprising a casing defining a first chamber having formed therefrom a primary vent, a slide valve disposed in said first chamber, a second chamber formed from said first chamber, and a secondary vent formed from said second chamber, a piston depending from said slide valve and being disposed in said second chamber, said slide valve and piston being slidable respectively in said chambers simultaneously in response to an increase of fluid pressure in said first chamber for opening said primary vent.

5. A vent control for fluid pressure comprising a casing defining a first chamber having formed therefrom a primary vent, a second chamber formed from said first chamber, a secondary vent formed from said second chamber, a slide valve disposed in said first chamber and a depending piston from the slide valve disposed in said second chamber, said valve and piston being slidable in said chambers, and adjustment means for varying the opening from said second chamber to said secondary vent.

6. A vent control for fluid pressure comprising a casing, a first chamber defined by said casing, a primary vent formed from said first chamber, a fluid pressure inlet formed in an end of said casing, a movable member disposed in the other end of said casing, said movable member defining a second chamber in communication with said first chamber, a secondary vent formed from said second chamber, adjustable means for varying the opening from said second chamber to said secondary vent, a slide valve disposed in said first chamber and a depending piston from said slide valve and integral therewith disposed in said second chamber, said slide valve and piston being movable from a position normally closing said primary vent responsive to an increase in pressure in said first chamber.

7. In a slug casting machine, the combination of a composed line delivery slide, power means for moving the slide, and means connected to said power means for arresting the movement of said slide, said arresting means comprising a dashpot and a vent control for said dashpot; said vent control comprising a casing defining a first chamber, a primary vent formed from said first chamber, a second chamber in communication with said first chamber, a secondary vent formed from said second chamber, and a slide valve disposed in said first chamber and a depending piston from said slide valve and integral therewith disposed in said second chamber.

8. In a slug casting machine, the combination of a composed line delivery slide, power means for moving the slide, and means connected to said power means for arresting the movement of said slide, said arresting means comprising a dashpot and a vent control for said dashpot; said vent control including a casing defining a chamber, a vent formed from said chamber, and a slide valve slidably disposed in said chamber, said slide valve being movable in response to an increase of pressure in said chamber from a position normally closing said vent.

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