Nov. 17, 1942. E. R. MILLER 2,302,242

AIR VALVE FOR PUNCH PRESSES

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Fig. 1.

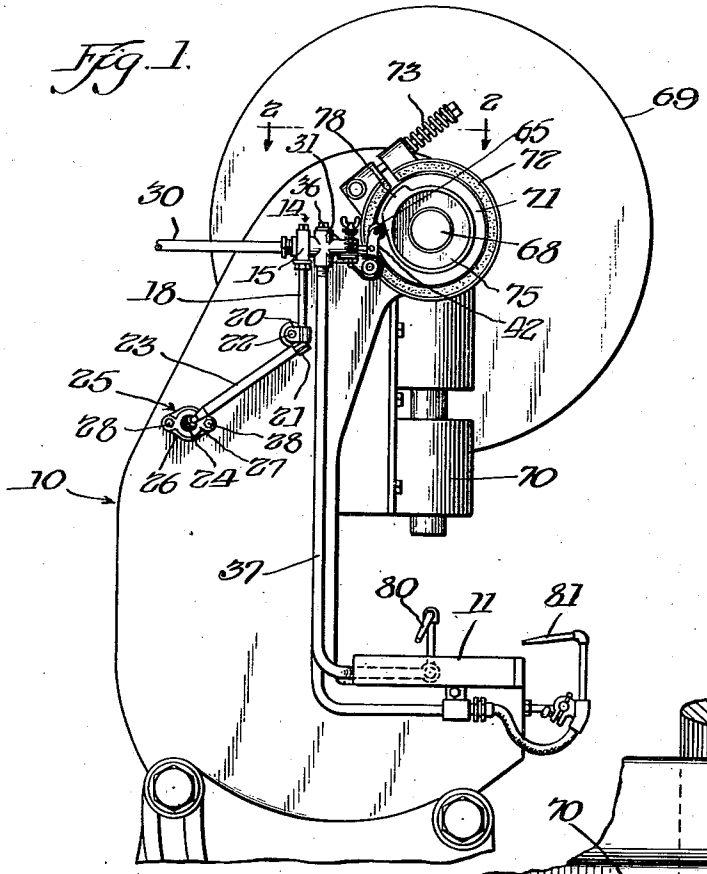
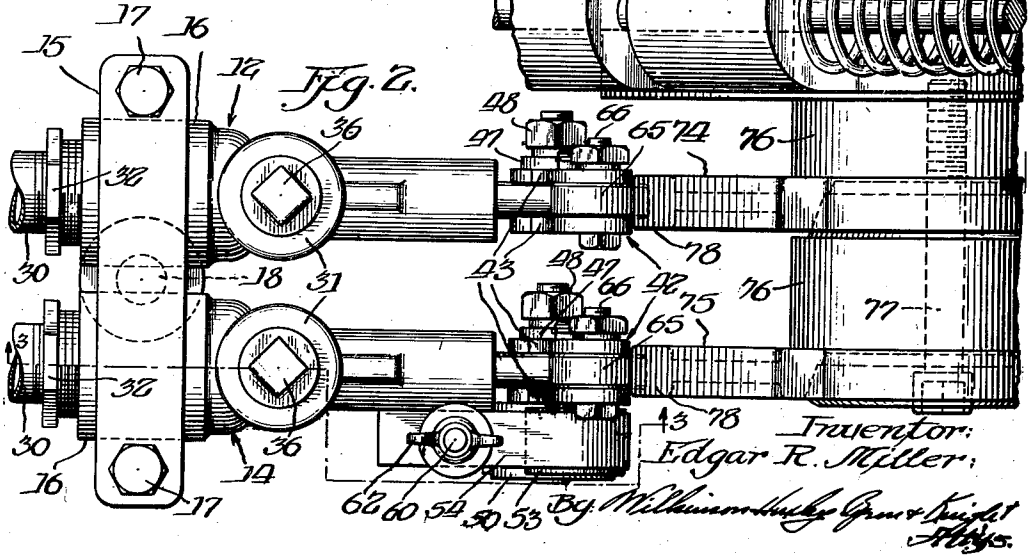


Fig. 2.



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Fig. 3.

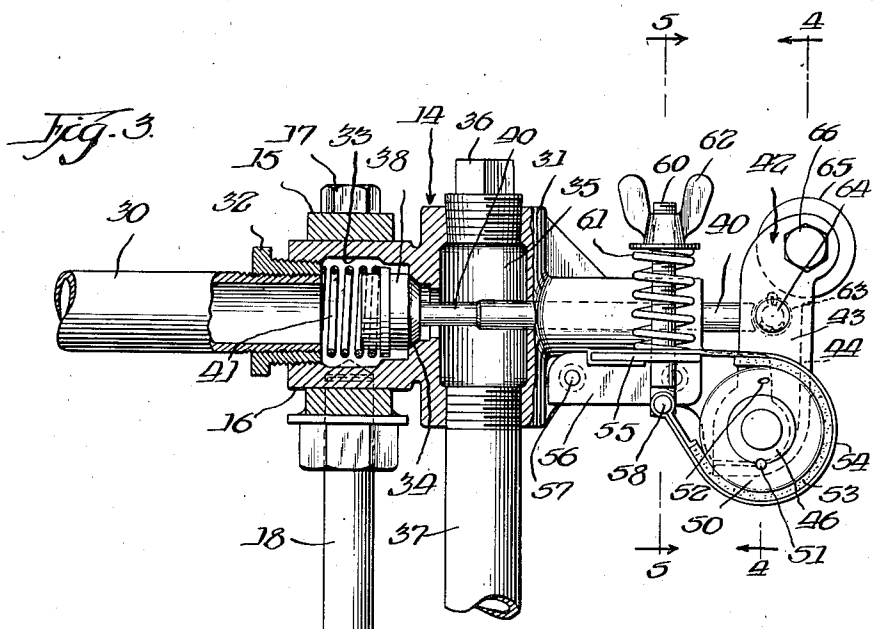


Fig. 4.

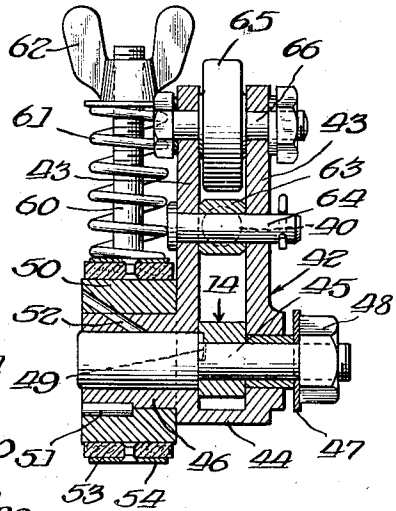
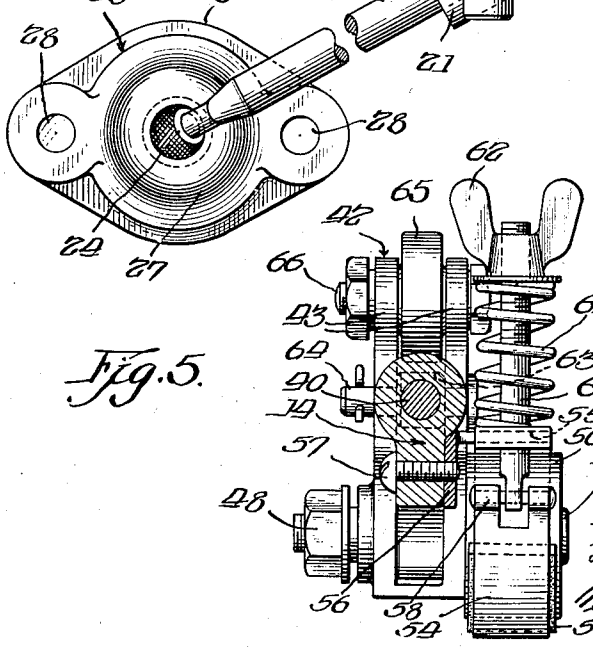


Fig. 5.



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Patented Nov. 17, 1942

2,302,242

UNITED STATES PATENT OFFICE

2,302,242

AIR VALVE FOR PUNCH PRESSES

Edgar R. Miller, Chicago, Ill., assignor to F. J. Littell Machine Company, Chicago, Ill., a corporation of Illinois

Application September 26, 1941, Serial No. 412,349

8 Claims. (Cl. 251—134)

The invention relates to valves, particularly air blast valves of the special type shown in the patent to Littell No. 2,080,724 granted May 18, 1937, and has for an object to provide improved apparatus which will deliver an air blast at the proper time and which will be of the desired duration for completely removing work pieces and waste material from the working surface of punch presses and other similar machines.

Another and more specific object is to provide apparatus including at least two independently operable air valves of the type mentioned and wherein one valve will incorporate novel brake means for delaying the closing action of the valve plunger so that the duration of the air blast from said valve can be controlled by the operator.

Another object of the invention is to provide an air blast valve having improved operating parts which will render possible quick opening of the valve member with either rapid or delayed closing of the same, depending on the particular adjustment given to said operating parts.

Another object is to provide novel friction brake means for air blast valves which will operate to delay the closing action of the valve plunger and which will be adjustable so that the duration of the air blast may be controlled.

A further object is to provide an air blast valve with Prony brake means for delaying the closing action of the valve plunger, which will be carried by the housing of the valve so as to form therewith a unitary structure and which will have operative connection with the actuating lever for said valve plunger.

With these and various other objects in view, the invention may consist of certain novel features of construction and operation as will be more fully described and particularly pointed out in the specification, drawings and claims appended hereto.

In the drawings which illustrate an embodiment of the invention and wherein like reference characters are used to designate like parts—

Figure 1 is a side elevational view of a punch press showing a typical installation of the invention with the air blast valves supported by a side frame member of the press and the air nozzles supported by the bed plate;

Figure 2 is a plan view taken substantially along line 2—2 of Figure 1 and showing part of a punch press to illustrate the association therewith of the twin air blast valves and the cams for actuating the same, respectively;

Figure 3 is a view taken substantially along line 3—3 of Figure 2, the supporting structure for the valve being shown in elevation, and which also illustrates the novel friction brake means for the air valve of the invention;

Figure 4 is a vertical sectional view taken substantially along line 4—4 of Figure 3; and

Figure 5 is a vertical sectional view taken substantially along line 5—5 of Figure 3.

The installation of the invention is adapted for attachment to a punch press 10, such as shown in Figure 1, and includes air nozzles connecting with the air valves for supplying a blast of air to the die 11 or work supporting surface to thus remove the work-piece from the press. As shown in the drawings, two nozzles are included since one is directed against the supporting surface in a manner to remove the work-piece following a punching or pressing operation, whereas, the second nozzle is designed for removing the cuttings and waste material so as to keep the work supporting surface clean. Since the air nozzles therefore have different utility it is desirable that means be provided for adjusting the duration of the air blast from at least one of the nozzles. This constitutes the basic improvement of the present invention and accordingly the installation includes twin air valves wherein one valve is provided with friction brake means for frictionally retarding the closing action of the valve so that the duration of the air blast from its respective nozzle may be controlled.

Referrring more particularly to Figures 1 and 2, the air valves 12 and 14 are each independently supported by means of a collar member 15, which member is provided with spaced openings designed to receive the cylindrical portion 16 of an air blast valve. After each individual valve has been properly positioned within member 15 tension is applied thereto by tightening the screws 17. Member 15 is supported by a vertical standard 18 which in turn is supported at its lower end by the split collar 20. The split collar 20 and a similar collar 21 are joined by the threaded screw 22 in proper rotated position, depending on the particular location desired of the air valves. Whereas, split collar 20 is horizontally positioned, it will be observed that collar 21 is angularly disposed and receives the stem 23 having the knurled ball 24 at the base end thereof. The mounting of the structure on the side frame of the press is completed by the socket member indicated in its entirety by 25, which includes a base 26 providing a socket for receiving the knurled ball 24 and a cap 27 having surrounding relation with the knurled ball and which functions to retain the said ball in its socket. The separable por-

tions, namely, the base and the cap, are securely bolted together and to the side frame of the press by bolts 28.

The internal construction of the air valves is best shown in Figure 3. The valve 14 is supplied with compressed air by the hose 30 which is admitted at one end of the valve body 31 by means of the threaded nipple 32. The body of the valve may be formed from any suitable metal such as brass, bronze or the like, and as shown in Figure 3 the same is provided at one end with a cylindrical portion previously described and identified by numeral 16. Said portion is tubular, having a central air passage 33 which receives the threaded nipple 32 and having formed at its opposite end an opening provided with a valve seat 34. Beyond the valve seat the body is formed with a vertically extending chamber 35 threaded at its opposite ends and receiving the pipe plug 36 and the pipe connection 37. The valve opening is normally closed by the valve 38 formed integral with the valve stem 40 which extends through the valve body and projects from the end thereof opposite the air passage 33. The coil spring 41, located within the air passage and confined between valve 38 and nipple 32 yieldingly maintains the valve against its seat, permitting movement of the valve in a direction to open the same against the tension of the spring.

The end of the valve body adjacent the projecting valve stem 40 is provided with an ear which pivotally supports the actuating lever 42 for actuating the valve stem to open the valve. Said lever, shown in detail in Figure 4, consists of the bifurcated arms 43 which are joined along their outer edge and along the base thereof by the connecting web 44. Lever 42 is pivotally mounted on the valve body by means of the fixed stud 45 which extends through the hub portion 46 formed on one arm of the lever, through the valve body 14, and through the opposite bifurcated arm to project from this side of the lever and receive washer 47 and nut 48 which is threaded thereto. Stud 45 is suitably fixed to the valve body 14 by means of pin 49 and therefore it will be clearly understood that the lever has pivotal movement on the stud, which may be considered as part of the valve body.

The hub portion 46 projects from that side of the lever which is to receive the friction brake means and for this purpose the said hub portion receives the drum 50, preferably of cast iron, which is fixed to the hub portion by pin 51. The oil duct 52, which extends through the drum and hub portion, facilitates the application of oil to stud 45. The treated leather band 53 has encircling relation with the drum 50, being held in said relation by retaining means in the form of a metal band 54 to which the leather band is riveted. The upper end of the metal band 54 is bent around the ledge 55 of the bracket 56 secured to the valve body by screws 57. The opposite end of the band, which terminates below ledge 55 of said bracket, is suitably pivoted at 58 to the adjusting stem 60 which passes through ledge 55 to depend below the same. The upper extending portion of the stem receives the coil spring 61 which is confined between the ledge and the adjusting wing nut 62. By turning the wing nut 62 the vertical position of the stem 60 with respect to ledge 55 can be varied. As a result the metal band 54 and of course the leather band 53 is varied in proportion as regards the diameter of the circle formed thereby and variable braking action is accordingly applied to the drum 50. The application of brake means to the drum will of course retard rotation thereof and this will directly affect the actuating lever 42 since the drum and said lever are actually a single unit.

The lever 42 carries roller 63 journalled by pin 64, which roller is positioned for engagement with the projecting end of the valve stem 40 to cause opening of the valve when the lever is locked in a direction toward the valve body. Improved operation of the valve is secured by locating roller 63 as near as possible to the cam roller 65 since maximum movement of the valve is thereby secured to give a quick opening and closing to the valve, preventing wire drawing of the seat. The cam roller is journalled at the free upper end of the lever by stud shaft 66. It will be observed by reference to Figure 3 that pivotal movement of the lever 42 in a counterclockwise direction will cause movement of stem 40 in a direction toward the left to open the valve. Movement of the lever in this direction will be free and unobstructed since rotation of the drum 50 is in a direction to cause expansion of the leather brake band against the tension of spring 61. However, movement of the lever in a clockwise direction, that is, toward the right, to allow the valve to close, can be frictionally retarded as a result of the braking action effected by the leather band 53 in contact with drum 50. Said braking action is adjustable by rotation of the wing nut 62 on the stem 60. As previously explained, this delayed closing action of the valve is desirable for at least one of said valves since the air blast will therefore continue for a predetermined duration of time to permit removal of scrap or other waste material from the die and working surface of the press.

Figure 2 illustrates a preferred structure for actuating twin air blast valves and wherein one of said valves is provided with friction brake means for delaying the closing action thereof in accordance with the invention. The press 10, a fragmentary part of which is shown in said figure, has suitably journalled in the upper end thereof the main operating shaft identified by numeral 68. Said shaft is rotated by power means through the fly wheel 69 and the shaft includes a crank portion to impart reciprocating motion to the punch 70 which is mounted so as to move within the guides on the press. Rotation of the main shaft 68 is prevented from overrunning by friction means including the drum 71 and brake band 72 and which is yieldingly held in encircling relation with the drum by structure including coil spring 73. The actuating cams 74 and 75 are fixed to the operating shaft 68 by cylindrical portions 76 which may be described as extensions of the shaft provided for the purpose and which are suitably held to said shaft by the bolt 77. Both cams 74 and 75 have a cam portion 78 aligned with each other and by reference to Figure 2 it will be observed that both cams are in alignment with their respective valves and particularly with cam roller 65 of their valve. The air valves are positioned with respect to the cams so that their roller 65 will at all times engage the periphery of their cam, either 74 or 75.

When the high point of the cam formed by portion 78 contacts its particular cam roller the actuating lever 42 thereof is caused to move toward its valve body, which movement is in a direction to open the valve. Operation of the valves as above described will result in delivery

of an air blast from nozzles 80 and 81. When the high point of each cam has moved out of contact with its respective cam roller the actuating lever 42 thereof will be free to return to its initial position, said movement being imparted thereto by coil spring 41 to thus close the valve and terminate the air blast. The closing action of valve 12 will follow immediately after cam portion 73 has moved out of contact with its cam roller. However, with respect to valve 14, the closing action can be delayed by the friction brake means operatively associated with its actuating lever as above described.

The invention is not to be limited to or by details of construction of the particular embodiment thereof illustrated by the drawings, as various other forms of the device will of course be apparent to those skilled in the art without departing from the spirit of the invention or the scope of the claims.

What is claimed is:

1. A valve for use with a punch press or like machine, including a valve body having an air passage provided with a valve seat, a valve for said seat having a stem projecting from said body, a lever pivoted at one end thereof to the valve body for actuating said stem to cause opening of the valve with respect to the seat, and friction brake means associated with the said lever for delaying pivotal movement of the lever in a direction to delay the closing action of the valve.

2. A valve for use with a punch press or like machine and adapted to be operated by a cam on said machine, including a valve body having an air passage provided with a valve seat, a valve for said seat having a stem extending through and projecting from said body, a lever pivoted at one end thereof to the valve body for actuating said stem to cause opening of the valve with respect to the seat, said lever carrying means at its outer free end for contacting the cam, and friction brake means associated with said lever for delaying pivotal movement of the lever in a direction to delay the closing action of the valve.

3. A valve for use with a punch press or like machine, including a valve body having an air passage provided with a valve seat, a valve for said seat having a stem projecting from said body, resilient means located within the air passage for yieldingly holding the valve against its seat, a lever pivoted at one end thereof to the valve body for actuating said stem to cause opening of the valve with respect to the seat, and friction brake means associated with the said lever for delaying pivotal movement of the lever in a direction to delay the closing action of the valve.

4. A valve for use with a punch press or like machine, including a valve body having an air passage provided with a valve seat, a valve for said seat having a stem projecting from said body, a coil spring located within the air passage and having contact with the valve for holding the same against its seat, a lever pivoted at one end thereof to the valve body for actuating said stem to cause opening of the valve against the tension of said spring, and friction means carried by the valve body and acting on the lever to frictionally retard pivotal movement of the lever in a direction so as to delay the closing action of the valve.

5. A valve for use with a punch press or like machine, including a valve body having an air passage provided with a valve seat, a valve for said seat having a stem projecting from said body, a coil spring located within the air passage and having contact with the valve for holding the same against its seat, a lever pivoted at one end thereof to the valve body for actuating said stem to cause opening of the valve against the tension of said spring, friction means carried by the valve body and having braking action on the lever to frictionally retard pivotal movement of the lever in a direction to delay the closing action of the valve, and means for adjusting said friction brake means.

6. In a valve of the character described, including a valve body having an air passage provided with a valve seat, a valve for said seat having a stem projecting from said body, an actuating lever pivoted to the valve body and adapted to contact the valve stem when oscillated in a direction toward said body, and friction brake means carried by the valve body and having operative association with said actuating lever, said friction brake means being constructed and arranged to frictionally retard pivotal movement of the actuating lever in a direction so as to delay the closing action of the valve while permitting free movement in the opposite direction to open the valve.

7. In a valve of the character described, including a valve body having an air passage provided with a valve seat, a valve for said seat having a stem extending through and projecting from one end of the valve body, an actuating lever pivoted to said end of the valve body for contact with the stem when oscillated in a direction toward said body, a friction drum fixed to the actuating lever in alignment with the pivot axis thereof, and friction brake means carried by the valve body and having encircling relation with the said drum whereby to retard pivotal movement of the lever in a direction to delay the closing action of the valve while permitting free movement in the opposite direction to open the valve.

8. In a valve of the character described, including a valve body having an air passage provided with a valve seat, a valve for said seat having a stem extending through and projecting from one end of the valve body, an actuating lever pivoted to said end of the valve body for contact with the stem when oscillated in a direction toward said body, a friction drum fixed to the actuating lever in alignment with the pivot axis thereof, friction brake means carried by the valve body and having encircling relation with the said drum, said brake means thereby having operation to retard pivotal movement of the lever in a direction to delay the closing action of the valve while permitting free movement in the opposite direction to open the valve, and means for adjusting said friction brake means.

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