

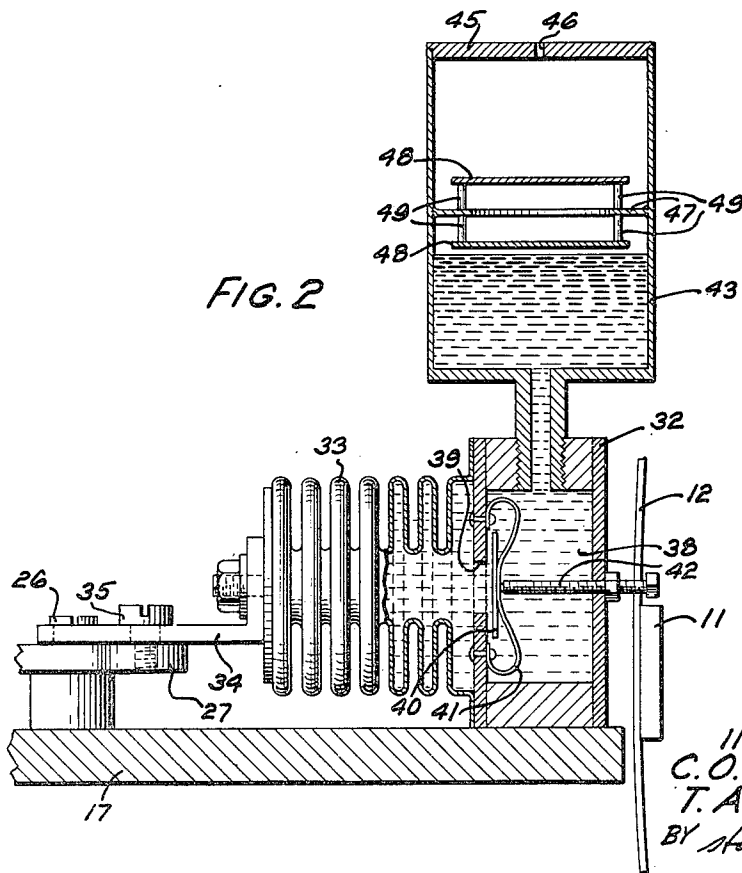
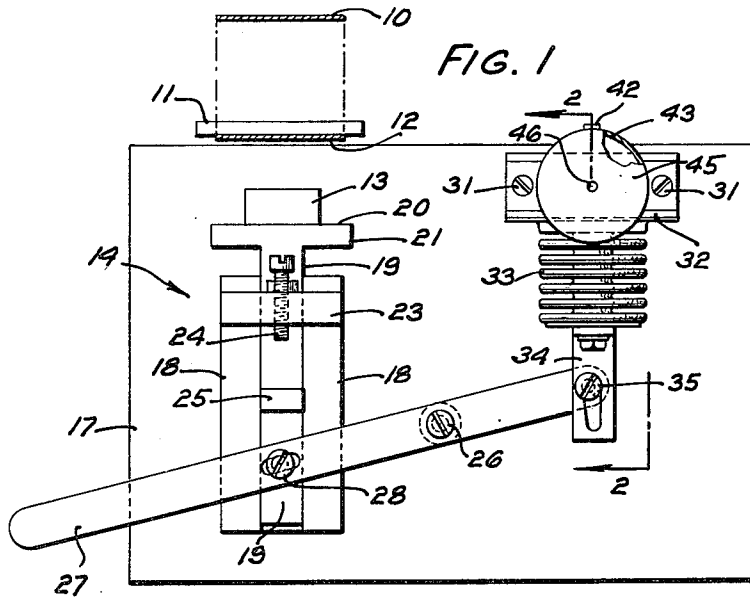
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ARTICLE FEEDING APPARATUS

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ARTICLE FEEDING APPARATUS

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This invention relates to article feeding apparatus and more particularly to a manually actuated article feeding apparatus having means effective to control the maximum limit of the rate of feed of an article against a working element.

The invention is particularly useful in controlling the maximum limit of the rate of manual feed of an article, such as ammonium dihydrogen phosphate crystals, against a sanding belt for abrading it to predetermined dimensions. In such operations, it is desirable, due to the fragile material of the article, that the operator should have the "feel" of the forward movement of the article after it engages the belt without undue retardation and yet be limited to a predetermined velocity.

An object of this invention is to provide a simple, efficient and practicable manually actuated article feeding apparatus having means effective to control the maximum limit of the rate of feed of an article against a working element.

In accordance with the above object, the present invention, in one embodiment thereof, as applied to an article sanding apparatus, comprises a base, a slide guided thereon for advancing an article mounted on the base against a sanding belt moving perpendicular to the movement of the slide and article and positive adjustable stop means for limiting the operative stroke of the slide in advancing the article against the sanding belt. A manually actuated lever for actuating the slide is pivoted on the base and also by a pin and slot connection is pivoted adjacent one end to the slide, the opposite end of the lever having a lost motion connection with one end of an oil filled bellows having a head of oil communicating with its interior through its opposite end and a diaphragm type oil escapement valve between the bellows and the head of oil, the diaphragm valve being spring supported and open as long as the bellows is expanded at a predetermined velocity and, upon such velocity being exceeded, infinite retardation results. In operation, the lost motion connection permits the slide and thus the article to be freely advanced to a point where the article is about to engage the sanding belt. Thereafter, the operator will have the "feel" of the forward movement of the article after it engages the belt without undue retardation and yet be limited to the predetermined velocity and, upon such velocity being exceeded, the valve is closed and the advance of the article is completely stopped until the valve is again opened. The sanding operation is completed when the positive stop means is effective.

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Other objects and advantages of this invention will more fully appear from the accompanying detailed description taken in conjunction with the accompanying drawing, in which

Fig. 1 is a plan view of an article feeding apparatus embodying the features of the invention shown applied to a sanding apparatus illustrated schematically, and

Fig. 2 is an enlarged vertical section, partly in elevation, taken on the line 2-2 of Fig. 1.

Referring to the drawing, in which the manually actuated article feeding apparatus embodying the features of the invention will be described, as used in connection with a sanding apparatus, which is fragmentarily and schematically illustrated in Fig. 1, having an endless vertically arranged sanding belt 10 and being provided with a backing plate 11 for a downwardly moving length 12 of the belt, against which a crystal 13 of the type hereinbefore described, to be abraded, is advanced. A more complete illustration and description of the sanding apparatus is not believed necessary since it is not essential to a complete understanding of the invention.

The feeding apparatus, indicated in general at 14, is mounted upon a plate 17, which may be the usual bed plate of the sanding apparatus. Slidably carried upon the plate 17 and guided rectilinearly between guide plates 18 fixed to the plate 17 for horizontal movement perpendicular to the movement of the belt 10 is a T-shaped slide 19. An upper end surface 20 of a cross-arm 21 of the slide (Fig. 1) provides a surface against which the crystal 13 to be abraded is abutted in the feeding thereof against the belt length 12. A transverse plate 23, fixed to the guide plates 18 and spanning the slide 19, carries an adjustable stop screw 24, against which is abutted a vertical arm 25 carried on the slide at the termination of the operative stroke of the slide, thus predeterminedly limiting the advance movement of the crystal 13 to the sanding belt.

Pivoted intermediate its ends, as indicated at 26, to the bed plate 17 is a hand lever 27, which is also pivoted adjacent its outer or left end (Fig. 1) by a pin and slot connection 28 to the slide 19. As shown in Fig. 1, the slide 19 is in its retracted position and it will be apparent that in rocking the lever 27 clockwise about its pivot 26, the slide 19, with the abutting crystal 13, may be advanced towards the sanding belt length 12 to engage the crystal therewith. Due to the fragile nature of the crystal 13, it is desirable to limit the velocity of movement of the hand lever 27 in advancing the slide 19 after the crystal has engaged the

sanding belt without imposing practically any retardation as long as the velocity of movement is below a predetermined rate of speed and, if such rate of speed is exceeded, to cause a complete stoppage of operative movement of the lever. Under these conditions, the operator will constantly have the "feel" of the forward movement of the crystal after it engages the sanding belt. In order to control the maximum limit of the rate of feed of the crystal against the sanding belt length 12, the following mechanism is operatively connected to the inner or right end (Fig. 1) of the hand lever 27.

Mounted upon and attached to the plate 17 by screws 31 is a housing and supporting member 32, to one side face of which is attached an open end of an oil filled bellows 33 of a usual conventional type. To the opposite or outer closed end of the bellows 33 is attached an L-shaped link 34, to the outer end of which is attached, by a lost motion connection 35, the inner end of the hand lever 27, the connection 35 comprising a screw carried by the lever fitted in a slot of suitable shape and length formed in the link 34. A chamber 38 in the housing member 32 is normally in communication with the open end of the bellows 33 through a port 39 and the port is adapted to be closed under certain abnormal operating conditions, to be discussed presently, by a diaphragm type circular floating valve member 40 attached to a leaf spring 41, having its opposite ends fixed to the adjacent wall of the chamber 38, the valve member being riveted at its center to the leaf spring midway between its fixed ends. For the purpose of microscopically adjusting the degree of the normal opening and thus the desired speed at which the diaphragm valve member 40 is closed, an adjustable screw 42 is threaded through an aperture in the wall of the housing and supporting member 32, with its inner flattened end engaged axially with the rivet point of the leaf spring 41 and the diaphragm valve member. The screw 42 is suitably sealed in its aperture to prevent oil leakage.

Attached to the upper wall of the housing 32 and communicating with the chamber 38 is an oil container 43, having a cover 45 with an air vent aperture 46 therein. Between its opposite ends the container is equipped with a baffle comprising a ring 47 brazed or soldered completely around its outer peripheral surface to the inner peripheral surface of the container. Spaced from and attached to opposite faces of the ring 47 and overlapping the inner peripheral edge thereof are circular discs 48 supported from the ring 47 by a plurality of pins 49. The baffle serves to prevent the oil, during its return to the container 43, from being forced through the vent aperture 46. In a normal operating condition, the bellows 33, chamber 38 and the container 43 are filled with oil, the latter providing an oil head for supplying the bellows, with the level of the oil in the container being at the level indicated below the lower face of the lower disc 48.

In the use of the apparatus above described, an operator places a crystal 13 on the plate 17 in abutting relation with the surface 20 of the slide 19 while the latter is in its retracted position, the hand lever 27 having been rocked counterclockwise about its pivot 26 and the screw of the lost motion connection 35 being positioned at the upper end of the slot in the link 34, all as shown in Fig. 1. Upon rocking the hand lever 27 clockwise, the slide 19 and abutting crystal

13 are freely advanced towards the moving sanding belt length 12 without any appreciable retardation, due to the lost motion connection 35 between the lever and the bellows link 34, until the screw on the lever has engaged the lower end face of the slot in the link 34, at which point the crystal 13 will be slightly spaced from the belt length 12. In the continued uninterrupted clockwise movement of the hand lever 27 from this point on, the operator will have the "feel" of the forward movement of the crystal 13 against the belt length 12 due to the movement of the lever and link 34 effecting an expansion of the oil filled bellows 33. As the bellows 33 is expanded, it is supplied with oil from the container 43 through the chamber 38 and port 39, since the floating diaphragm valve member 40 is not positioned to close the port 39, but is maintained in its open position against the adjusting screw 42, as shown, by the action of the leaf spring 41, which, together with the adjustment of the screw 42, provides the desired action. Thus the crystal is pressed against the sanding belt without undue retardation as long as the velocity of movement does not exceed a predetermined velocity, in which latter case all forward movement of the slide 19 and crystal 13 is completely stopped by the movement of the diaphragm valve member 40 to completely close the port 39 to the bellows 33.

In case stoppage occurs due to the predetermined velocity of movement being exceeded, the closed port 39 may be readily opened by rocking the hand lever 27 slightly in a counter-clockwise direction. This latter movement will permit the leaf spring 41 to withdraw the diaphragm valve member 40 to an open position, whereupon the operator may continue to feed the crystal against the sanding belt length 12 to complete the working thereof, which occurs when the arm 25 on the slide 19 engages the stop screw 24, the stop screw having been adjusted for the particular operation being performed. The slide 19 is then retracted by a counter-clockwise movement of the hand lever 19, and after the sanded crystal is removed, and another crystal to be abraded placed in position, the operation may be repeated in the manner above described.

What is claimed is:

1. An apparatus for feeding an article against a working element, comprising a movable member for advancing the article against said element, a manual actuator for said member, a hydraulic system having a bellows attached to said actuator, chambered means in communication with said bellows for supplying fluid thereto during its expansion, and a spring-actuated valve within said means normally positioned to permit communication between said means and bellows and effective to close communication therebetween and thereby to stop movement of said actuator when a predetermined velocity of feed is exceeded.

2. An apparatus for feeding an article against a working element, comprising a support for an article, a slide for advancing the article on said support against said element, means for guiding said slide, a manual actuator for said slide, a hydraulic system having a bellows attached to said actuator, chambered means in communication with said bellows for supplying fluid thereto during its expansion, and a spring-actuated valve within said chambered means normally positioned to permit communication between

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said chambered means and bellows and effective to close communication therebetween and thereby to prevent movement of said actuator when a predetermined velocity of feed is exceeded.

3. An apparatus for feeding an article against a working element, comprising a reciprocable member for advancing the article against said element, a manual actuator for said member, a hydraulic system including a bellows attached to said actuator, means having a port in communication with said bellows for supplying fluid thereto during its expansion, and a valve within said means normally in an open position to permit communication between said means and bellows through said port and effective to close communication therebetween and thereby stop movement of said actuator when a predetermined velocity of feed is exceeded.

4. An apparatus for feeding an article against a working element, comprising a movable member for advancing the article against said element, a manual actuator for said member, positive stop means for limiting the advance of said movable member, a manual actuator for said member, a hydraulic system including a bellows attached to said actuator, a chamber having a port in communication with said bellows for supplying fluid thereto during its expansion, a valve within said chamber, and a spring support for said valve normally effective to position said valve in an open position to permit communication between said chamber and bellows through said port during a predetermined velocity of feed and, upon said velocity being exceeded, to permit said valve to close communication therebetween and thereby stop movement of said actuator when a predetermined velocity of feed is exceeded.

5. An apparatus for feeding an article against a working element, comprising a support for an article, a slide for advancing the article on said support against said element, means for guiding said slide, an oil filled bellows, a hand lever pivoted to said support, operative connections from said lever to said slide and bellows for actuating the same, a movement of said lever to advance said slide, causing an expansion of said bellows, means normally in communication with said bellows for supplying oil thereto during its expansion, and means arranged between said bellows and oil supplying means effective to maintain communication therebetween during a

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predetermined velocity of feed and upon said velocity being exceeded to close such communication and prevent further feed.

6. An apparatus for feeding an article against a working element, comprising a movable member for advancing the article against said element, means connected to said movable member for limiting the maximum speed of said advance including a hydraulic system having a valve therein, means for biasing said valve to open position, means for drawing fluid through said valve in response to the advance of said movable member, and means in said valve responsive to movement of fluid therethrough for closing said valve when the speed of withdrawal of fluid through said valve exceeds a predetermined rate to stop movement of said movable member.

7. An apparatus for feeding an article against a working element, comprising a movable member for advancing the article against said element, means connected to said movable member for limiting the maximum speed of said advance including a hydraulic system having a valve therein, means for biasing said valve to open position, means for varying the degree of the normal opening of said valve, means for drawing fluid through said valve in response to the advance of said movable member, and means in said valve responsive to movement of fluid therethrough for closing said valve when the speed of withdrawal of fluid through said valve exceeds a predetermined rate to stop movement of said movable member.

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