

April 6, 1954

R. C. ANGELL

2,674,435

TUBE COMPRESSOR

Filed March 30, 1950

2 Sheets-Sheet 1

FIG. 1.

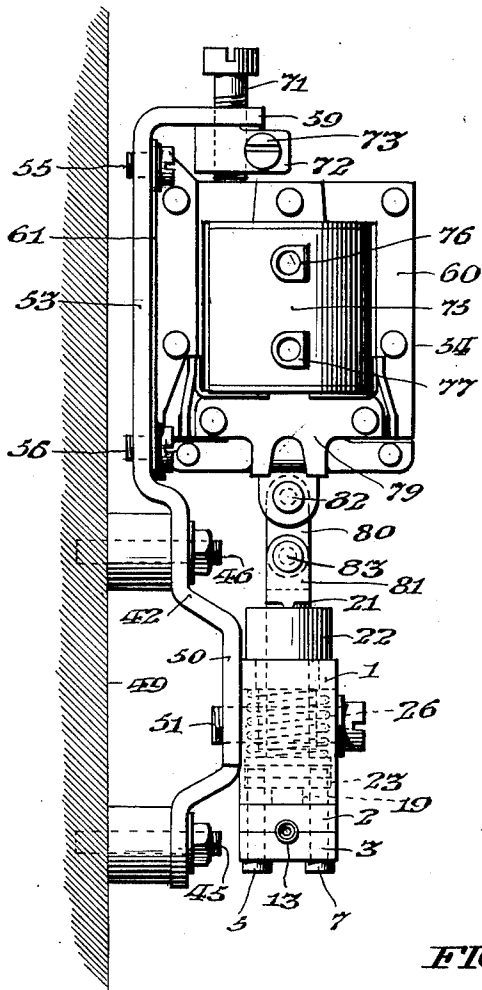


FIG. 2.

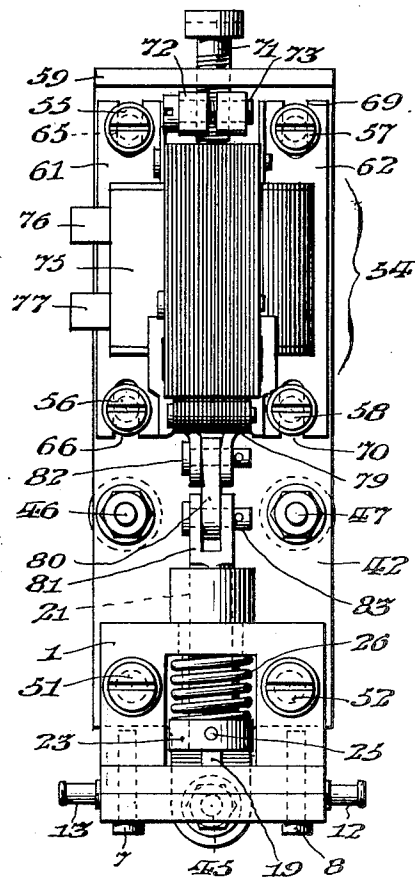
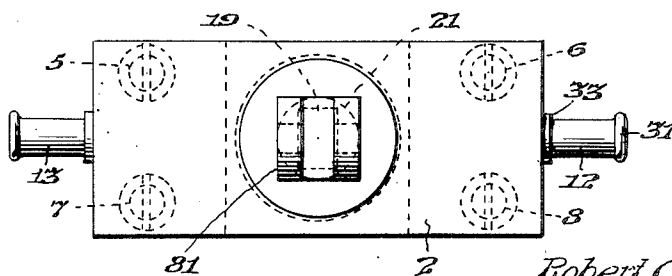


FIG. 3.



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FIG. 4.

FIG. 9.

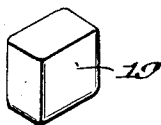


FIG. 10.

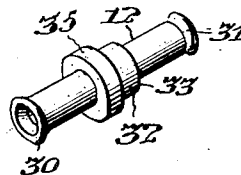


FIG. 7.

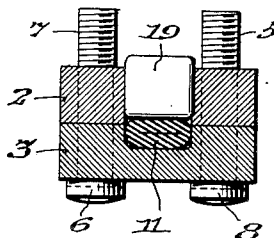


FIG. 8.

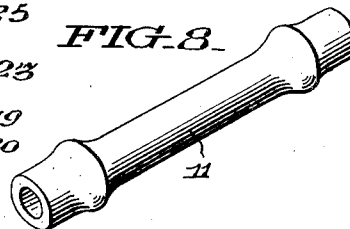


FIG. 5.

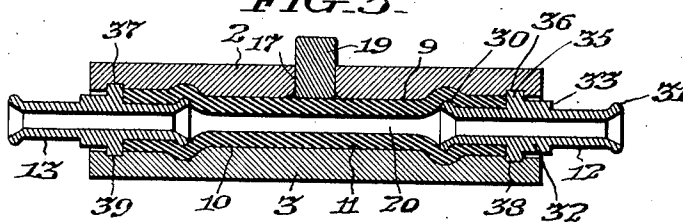
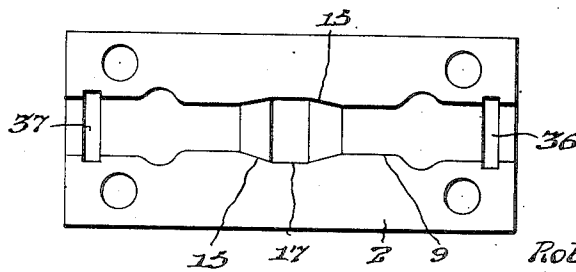


FIG. 6.



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2,674,435

TUBE COMPRESSOR

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Application March 30, 1950, Serial No. 152,909

1 Claim. (Cl. 251-7)

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My invention relates to that type of valves that are generally known as pinch valves, wherein a yielding fluid conveyor tube is collapsed to choke its passageway and thereby temporarily prevent passage of fluid therethrough.

The principal object of my invention is to provide the valve having such fluid conveyor tube with a non-yielding jacket for supporting its yielding walls against internal pressure and having a cavity limiting lateral expansion of said tube at its region of collapse.

Other objects of my invention are to provide said pinch valve with a spring actuated plunger extended through said jacket and normally maintaining said yielding conveyor tube in its collapsed or closed condition, and to provide a plunger actuating means comprising a solenoid connected to withdraw said plunger from its tube collapsing action, thereby to open said valve for the free passage of fluid therethrough when energized.

Further objects of my invention are to provide a valve jacket composed of readily separable sections whereby the removal and replacement of the fluid conveying tubing may be facilitated.

Another object of my invention is to provide said fluid conveyor with tube attaching terminal nipples having circular flanges which register with similarly spaced circular grooves in the bore of said jacket to insure against longitudinal displacement of the replaceable valve tube.

The form of my invention as hereinafter more definitely specified, comprehends a pinch valve having a fluid conveyor tube preferably composed of rubber or other readily compressible material which is snugly confined within the cylindrical bore of a readily assembled split jacket comprising the valve casing, and having an enlarged pocket within which said fluid conveyor may be distorted laterally when compressed by a reciprocating spring pressed plunger which is arranged to normally maintain said valve closed, but which may be withdrawn to open said valve by actuation of a suitably connected solenoid.

My invention also includes all of the various novel features of construction and arrangement as hereinafter more definitely specified.

In the accompanying drawings Figure 1 is a side elevational view of a solenoid pinch valve assembly constructed in accordance with my invention; Fig. 2 is a front elevational view of the valve assembly shown in Fig. 1; Fig. 3 is an enlarged plan view of the valve structure per se exclusive of the solenoid; Fig. 4 is an enlarged transverse vertical sectional view of the valve structure shown in Fig. 1 taken on the line 4-4

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in said figure; Fig. 5 is a vertical longitudinal sectional view taken on the line 5-5 in Fig. 4 of the valve casing per se, comprising the opposed jacket plates which embrace the fluid conveyor tube shown in open position in correspondence with the foregoing figures; Fig. 6 is an inverted plan view of the upper jacket plate showing the longitudinal recess therein and the valve-plug guideway; Fig. 7 is a transverse vertical sectional view corresponding to the plane of section in Fig. 4 of the valve casing sections with the valve-plug depressing the flexible tubular passageway in closed position; Fig. 8 is a perspective view of the flexible tube forming the passageway through the valve casing; Fig. 9 is a perspective view of the valve-plug shown in Figs. 4, 5 and 7; and Fig. 10 is a perspective view of one of the terminal nipples of the flexible tube.

In said figures, the valve body 1 is provided with the relatively opposed valve casing sections 2 and 3 which are joined with said valve body 1 by the screws 5, 6, 7 and 8 to form an integral valve structure, and which are respectively provided with relatively registrable elongated complementary recesses 9 and 10 substantially conforming to a liner conveyor comprising a length of flexible tubing 11 having the terminal nipples 12 and 13 for the convenient connection of fluid conveying conduits which may constitute the fluid conveying line to be controlled by said valve.

Included in the bore necessarily afforded by said complementary recesses 9 and 10 is a pocket 15 provided for the local expansion or distortion of said tubing 11, and a guideway aperture 17 for the convenient axial reciprocation of the valve-plug 19 which when thrust inwardly effects collapse of the liner tubing 11, as shown in Fig. 7, to close the passageway 20 extending there-through by choking.

The valve-plug 19 is normally maintained in its closed position, as shown in Fig. 7, by the plunger type valve-stem 21, which, as shown in Fig. 4, is mounted to be moved axially in the bushing 22 and is provided with the collar 23 engaged thereon by the pin 25 and arranged to be forced against said valve-plug 19 by the expansion of the valve actuating spring 26 which, as illustrated in Fig. 4, is disposed in the recess 29 in the valve body 1 but which in said figure is shown withdrawn and temporarily maintained restrained from its valve closing action by means to be hereinafter described.

The nipples 12 and 13 are each provided with the end flanges 30 and 31 to afford a secure attachment to the valve tubing 11 and to the con-

necting conduits that may be attached thereto, and have the enlarged circular medial region 32 affording a shoulder 33 against which the end of an attached conduit may abut and the circular flange 35 which may be received in the semi-circular grooves 36 and 37 in the valve casing section 2 and the complementary semi-circular grooves 38 and 39 in the valve casing section 3 to insure against axial displacement of said flexible tubing 11, which provides a leak-proof fluid conveyor for the valve either when closed or open.

The valve body 1 may be conveniently supported, as shown in Figs. 1 and 2, by the bracket 42 which, as illustrated, may be attached by the screws 45, 46 and 47, to a panel or wall 49, said bracket being formed to provide the forwardly projected vertically disposed plane region 50 to which the valve body 1 may be secured by the screws 51 and 52, and to provide the inwardly recessed plane region 53 to which a valve actuating device such as a solenoid 54 may be secured in vertically adjustable relation by the screws 55, 56, 57 and 58, the upper portion of said bracket 42 being extended forwardly to provide a horizontal flange 59.

The solenoid frame 60 is provided with the laterally disposed wings 61 and 62 respectively provided at their end regions with open ended slots, the wing 61 having the slots 65 and 66 through which the screws 55 and 56 extend and the wing 62 having the slots 69 and 70 through which the screws 57 and 58 extend.

The solenoid frame 60 is held in proper adjustment by the set-screw 71 which may be held in adjusted position by the pinch collar 72 engaged thereon by the set-screw 73.

The solenoid includes the field winding 75 having the terminals 76 and 77 and the armature 79 which is connected by the link 80 with the bifurcated upper end 81 of the valve-stem 21 by means of the pins 82 and 83, it being obvious that when said solenoid is energized the armature 79 will draw the valve-stem upwardly in opposition to the spring 26 and thereby release the valve-plug 19 and thereby permit the fluid to pass through the flexible tube 11.

My invention is advantageous in that it provides a valve structure that is designed to control the flow of fluid under pressure and to insure against leakage in either its open or closed position, and its simplified construction affords easy replacement of its flexible fluid conveyor whose imperforate wall is encased in a non-yielding casing composed of readily separable casing sections which prevents distortion except at the region of intended collapse by the in-thrust of the valve-plug.

Although the valve assembly as herein depicted

includes a solenoid connected to effect withdrawal of the valve-stem and the consequent release of the valve-plug from its spring-pressed tube collapsing action, it is here noted that compressed air or other fluid actuated devices may be employed to produce the desired motion.

I do not desire to limit my invention to the precise details of construction and arrangement as herein set forth, as it is obvious that various modifications may be made therein without departing from the essential features of my invention as defined in the appended claim.

Having thus described my invention, I claim:

In a pinch valve, a collapsible fluid-conveying tube, a jacket formed of members having longitudinal grooves, said members abutting along surfaces extending along the tube at each side thereof so that the longitudinal grooves provide a longitudinal recess for receiving and confining the tube, means for holding said members around the tube, said tube having peripheral enlargements near its ends and said members having first peripheral inside grooves for closely receiving the said tube enlargements for preventing relative axial movements of the tube and members, terminal nipples engaged in the ends of the tube with their inner ends located at said tube enlargements, said nipples also having outer peripheral flanges and said members having second peripheral inside grooves for receiving the flanges for preventing relative axial movement of the nipples and members, said jacket having an aperture at a transverse plane between said first peripheral grooves, and a valve plug movable in said aperture and effective upon inward movement to compress the tube against the opposite wall of the recess and cause a restricted area of the same to be flattened until its inner wall surface is moved to flow-choking position and therewith distorted laterally relative to the direction of movement of the valve plug, said members having lateral enlargements of the recess at said transverse plane for receiving the laterally distorted parts of the tube.

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