Jan. 4, 1966 M. L. A. TISSOT-DUPONT 3,227,180

DISTRIBUTING SYSTEM

Filed Jan. 7, 1963

4 Sheets-Sheet 1

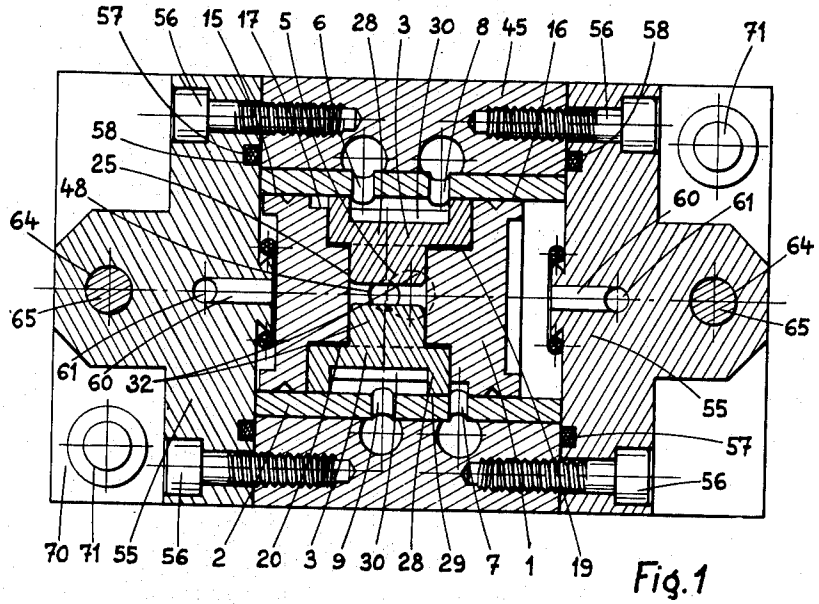

Fig. 1

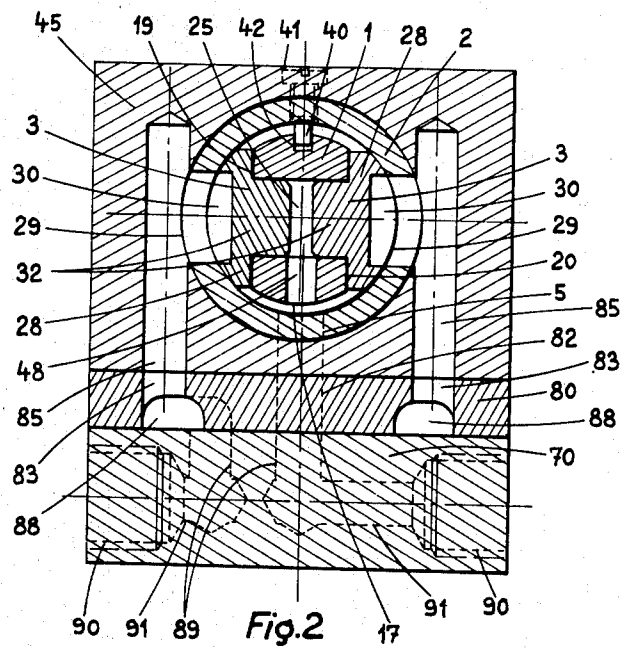

Fig. 2

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DISTRIBUTING SYSTEM

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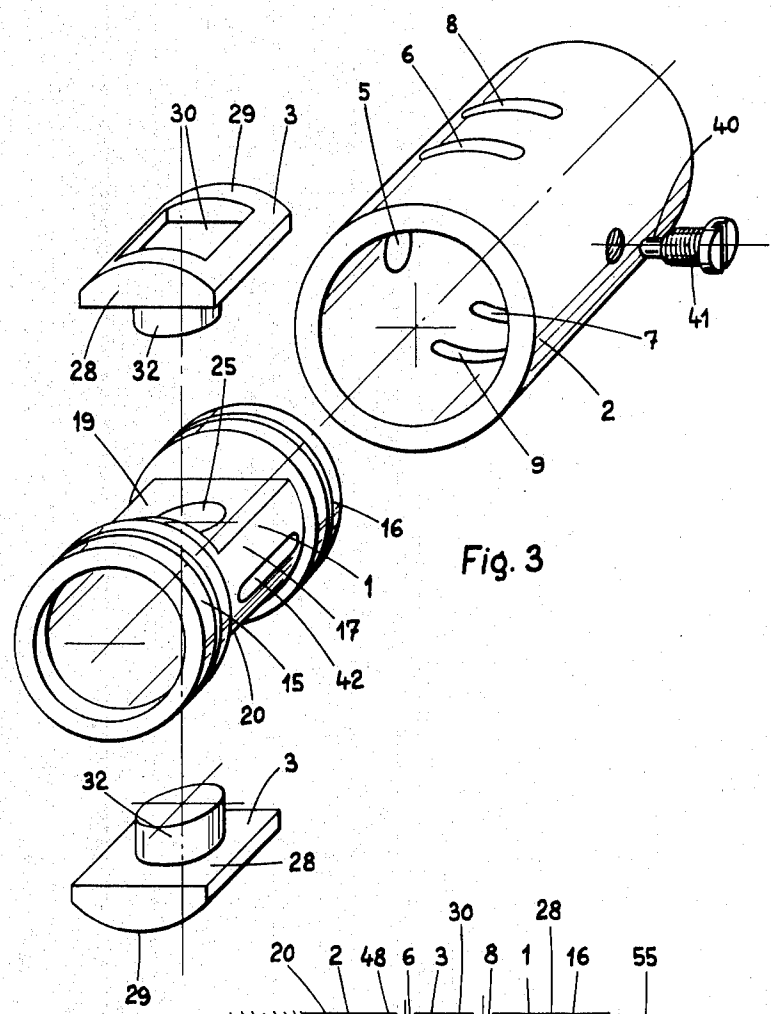

Fig. 3

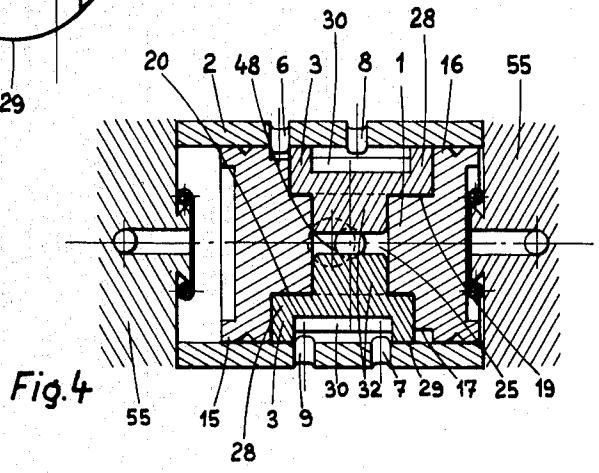

Fig. 4

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DISTRIBUTING SYSTEM

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4 Sheets-Sheet 3

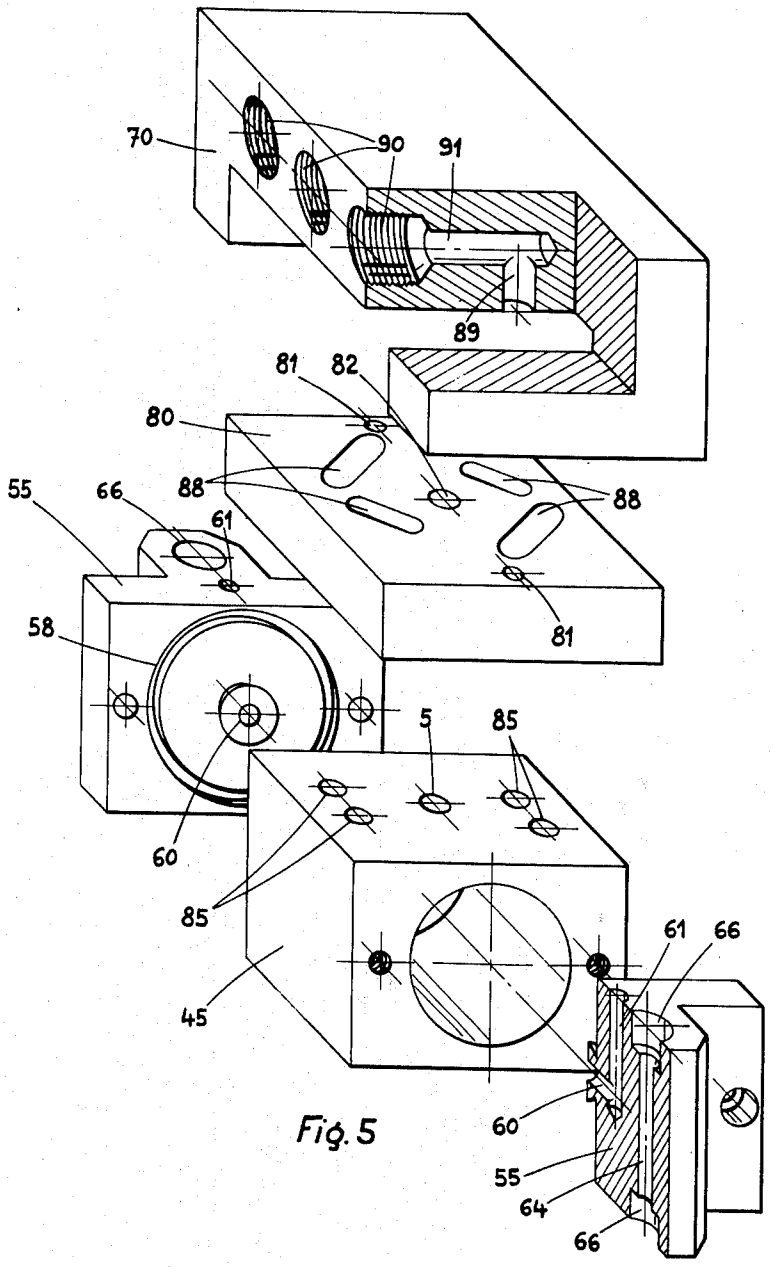

Fig. 5

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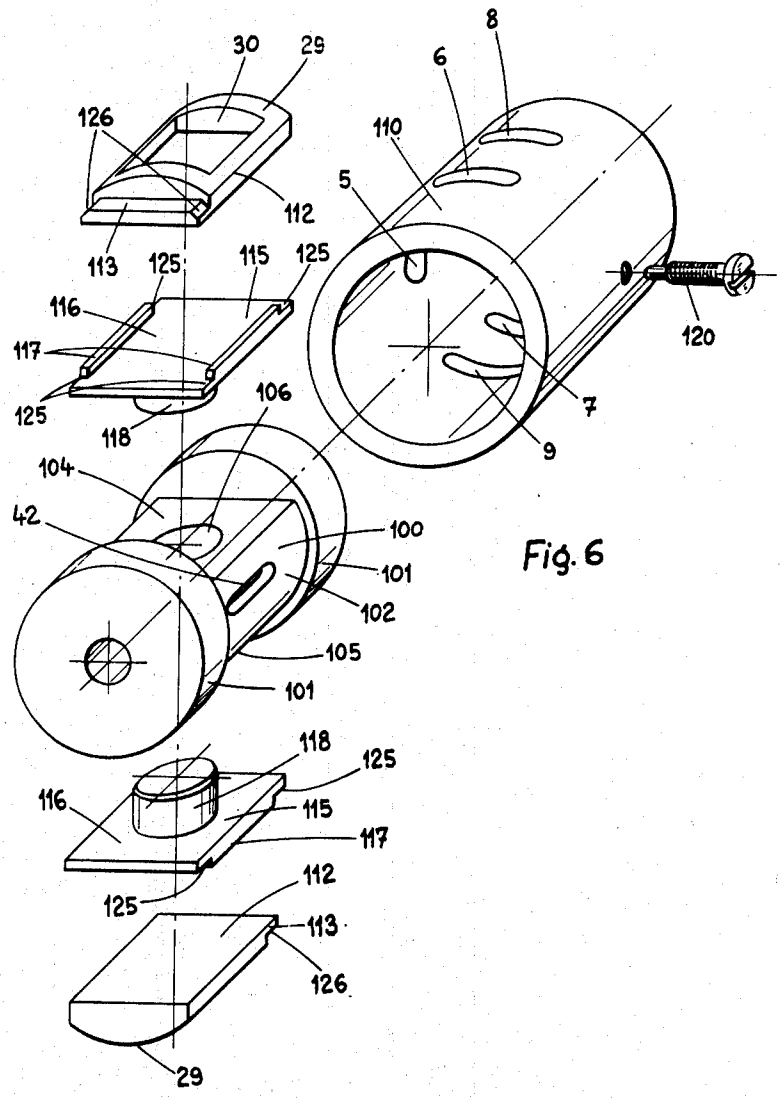

Fig. 6

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DISTRIBUTING SYSTEM

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3 Claims. (Cl. 137—625.66)

The present invention concerns an improved distributing valve.

Different types of distributing valves known up to the present time present numerous inconveniences against which there can be cited especially: rapid wear and deterioration of the joints of cylindrical slide valves due to the fact of the passage of the joints in front of the orifices of the valve, difficulty in manufacturing and machining, high cost price particularly of clack valves, difficulty in always obtaining a satisfactory sliding, good seal and a neutral control of the slide or slides of valves having plain sliders, etc.

The present invention proposes to overcome these difficulties in a simple and efficacious manner so as to obtain an improved distributing valve; further, a more simple manufacture and, in consequence, less arduous; advantages such as great facility of control, perfect functioning, solidity and an exceptional resistance to wear etc.

According to the present invention an improved distribution system comprises a valve having a slider longitudinally displaceable in a cylinder provided with a plurality of orifices, such as admission, working and exhaust, the slider having mounted thereon one or more face flanges contacting the bore of the cylinder in front of the orifices. The slider may be provided with two bearings, adapted to slide in the cylinder, separated by a bearing of smaller section comprising one or more grooves for housing one or several face flanges which are preferably made in hard plastics material, the number of face flanges depending upon the number of ways which the valve is to control.

The operative face of the or each face flange may be applied exactly against the bore of the cylinder and, preferably, the or each face flange is in the form of a cylindrical sector whilst the bore of the cylinder may be circular.

The operative face of the or each face flange may comprise a cut-out permitting the flowing of fluid between the admission, working and/or exhaust orifices in accordance with the positions of the slider in the cylinder.

The or each face flange may be applied transversely against the bore of the cylinder by any appropriate means such as a spring or similar device or, preferably, by pressure fluid acting on the face of the face flange opposite its operative face.

In this way there is obtained a distributing device in the form of a valve having a face flange which permits the obtaining of an excellent seal and an automatic taking up of the play due to possible wear of the face flange and of the cylinder. The stops of the face flange can pass in front of the orifices of the cylinder without risk of becoming hooked or of deteriorating, the face flange being made in a relatively hard material, contrary, for example, to the supple joints of the cylindrical slide valves of known type.

In another embodiment of distributing device, the or each face flange may be mounted on supports engaging in appropriate housings in the slider.

The distributing assembly constituted by the cylinder, the slider and the face flanges may be fixed in a block, after the introduction of the assembly in an appropriate

bore in the block by two lateral identical cheeks closing the cylinder. These cheeks may comprise admission and exhaust orifices for the control fluid of the slider and, also, the joints on which one or other end of the slider come into abutment, thus closing one or other of the orifices. The two cheeks may be made symmetrical in such a manner as to permit fixing in the block and access to the feed control orifices of the slider and on all preferred lateral faces of the block.

The block and cheek assembly may be fixed on a base-plate with the interposition of a coupling connecting plate for the corresponding orifices of the assembly and the base-plate, the coupling plate being made preferably in supple plastics material; one of the faces of this coupling plate may comprise holes and/or throats corresponding to the admission and exhaust orifices etc. of the block and cheek assembly opening into the holes and/or the appropriate throats of the other face of the coupling plate, corresponding to the admission and exhaust orifices etc. of the base-plate.

This base-plate may be provided, on its lateral surfaces, with branch orifices for conduits, respectively coincident with the orifices opening on its face normally in contact with the coupling plate. This coupling plate which may easily be made in moulded plastics material, assures an excellent seal between the block and cheek assembly and the base-plate on which the various branch connections of the valve can be effected.

The invention will now be described further, by way of example, with reference to the accompanying drawings, in which:

FIG. 1 is a longitudinal section of the distributing valve constructed in accordance with the invention the slider being in one end position;

FIG. 2 is a cross-section of the valve shown in FIG. 1;

FIG. 3 is a perspective view showing the several constituent parts of the valve shown in FIGS. 1 and 2 in the course of assembly;

FIG. 4 is a partial longitudinal section of the valve shown in FIG. 1 in the end position of the slider opposite to that shown in FIG. 1;

FIG. 5 is a perspective view showing the assembly of the different constituent parts of the block and base-plate assembly of the valve; and

FIG. 6 is a perspective view showing the different constituent parts of a different embodiment of distributing valve in the course of assembly.

As shown in FIGS. 1, 2, 3 and 4 a distributing device is constituted by cylindrical slider **1**, a cylinder **2** and two face flanges **3**. The valve shown is a 5-way valve: one for admission, orifice **5** of the cylinder **2**, two for working, orifices **6** and **7** of the cylinder **2**, and two for exhaust, orifices **8** and **9** of the cylinder **2**. The slider **1** comprises two end bearings **15**, **16** sliding freely in the cylinder **2** and an intermediate bearing **17**, of smaller diameter, permitting the flow of fluid from the orifice **5** to the working orifices **6** and **7**. Two oppositely disposed grooves **19** and **20**, smaller than the bearing **17**, are made therein so that one of them comes up to the flank of the bearing **15** and the other up to the flank of the bearing **16** and a bore **25**, perpendicular to the two slots **19** and **20**, is made in the middle of the slider **1**.

The two identical face flanges **3** are constituted by a body **28**, the operative face **29** of which is in contact with the bore of the cylinder **2**, presents a profile in the form of an arc of a circle of radius equal to that of the bore. The face **29** of the face flange **3** comprises a cut-out **30** permitting the flow of fluid between the working and exhaust orifices, respectively **6** and **8** and **7** and **9** and, also, each face flange **3** is provided with a cylindrical off-centre foot **32**.

The two face flanges 3 are mounted on the slider 1, by the introduction of their foot 32 in the bore 25 and their body 28 in the grooves 19 and 20, symmetrically opposite with respect to the axis of the slider 1 and to the bore 25. The slider 1 is provided with face flanges 3, and then introduced into the bore of the cylinder 2 in such a manner that the face flanges coincide, one with the orifices 6 and 8 and the other, with the orifices 7 and 9 of the cylinder 2. Fixing against rotation of the slider 1 is effected by the engagement in an end 40 of a fixing screw 41 of the cylinder 2 on the block 45 in an appropriate longitudinal slot 42 of the slider 1.

In one end position of the slider 1 shown in FIG. 1, the two working and exhaust orifices 6 and 8 are interconnected by a cut-out 30 of the corresponding face flange 3, the admission orifice 5 and the working orifice 7 are connected by a flow of fluid between the intermediate bearing 17 and the bore of the cylinder 2 and, finally, the exhaust orifice 9 is isolated.

In another end position of the slider shown in FIG. 4, the two working and exhaust orifices 7 and 9 are connected by the cut-out 30 of the corresponding face flange 3, the admission orifice 5 and the working orifice 6 are connected by a flow of fluid between the bearing 17 and the bore of the cylinder 2 and, finally, the exhaust orifice 8 is isolated.

The two face flanges 3 are applied against the bore of the cylinder 2 under the effect of pressure fluid introduced into the bore 25 of the slider 1 by the admission orifice 5; the fluid tends to push the two face flanges outwardly apart, the pressure fluid acting against the faces of the ends of the feet 32, after passage in a transverse aperture 48 of the slider 1, and against the faces opposite to the operative faces 29 of the face flanges 3. The face flanges 3 will always be applied energetically against the bore of the cylinder 2, the counter-pressure which can be exerted on the base of the cut-outs 30 being always less than the pressure of application of the face flanges 3 against the wall of the cylinder 2, not only when the cut-out 30 is above the single exhaust orifice 9 or 8, but also when the cut-out connects the working orifices 6 or 7 respectively to the exhaust orifices 8 or 9.

Due to the fact of its shape, the operative face of the face flange permits the obtaining of an excellent seal and an automatic take-up of the wear. Also, the face flanges 3, being made preferably in hard plastics material, not engaging in the orifices 6, 7, 8 and 9, after their passage, cannot be deteriorated thereby, contrary to the known supple joints of valves having cylindrical slides. The application of the face flanges 3 against the bore of the cylinder 2 is always balanced and does not create jamming of the sliding of the slider 1.

Always in FIGS. 1 and 2, and as is more particularly shown in FIG. 5 the distributing assembly, constituted by the slider 1, the cylinder 2 and the face flanges 3, is housed in a block 45 of a size sensibly equal to the length of the cylinder 2 and fixed thus by two identical cheeks 55 by the use of a screw 56. The seal is made by two circular joints 57 housed in appropriate grooves 58 of the cheeks 55.

Each cheek 55 is a prism having a base in the form of a T, the face corresponding to the upper stop of the T abutting against the block 45; an orifice 60, made in the centre of the abutting face of the cheek 55, coincides with the arrival orifice 61 opening perpendicularly on one of the faces of the T of the cheek 55. Each cheek 55 comprises a hole 64 for the passage of a fixing screw 65 (FIG. 1), the hole 64 being provided with two counterbores 66 for housing the head of the screw 65 permitting the obtaining of reversibility and interchangeability of the cheeks 55 and, also, to permit the fixing of the block and cheek assembly 45, 55 and the disposition of the orifices 61 on either one of the lateral faces of the block 45.

The mounting of a valve on a machine or similar can be facilitated by the distribution of the block and cheek

assembly 45, 55 on a base-plate such as 70 comprising, on both sides of the base of the cheeks 55 constituted by a T, holes 71 for the passage of screws, gudgeons or similar beneficial means of fixing as well as an excellent accessibility.

As shown in FIGS. 2 and 5 the block and cheek assembly 45, 55 is fixed on the base-plate 70 with interposition of a plate 80, preferably in moulded plastics material permitting the obtaining of an excellent seal for the assembly. The plate 80 comprises, on its support face against the block and cheek assembly 45, 55, holes such as 81, 82 and 83, respectively corresponding to the control orifices 61 of the cheeks 55, to the admission orifice 5 of the block 45 and to the orifices 85 of the block 45 opening into the working and exhaust orifices 6, 7, 8 and 9. The holes 81, 82 and 83 opening either on the other face of the plate 80, such as the holes 81, 82, or in the appropriate throats 88 of the other face of the plate 80 such as the holes 83 (FIG. 2). The throats 88 permit the connection of the holes, such as 83, to the corresponding holes 89 of the base-plate 70; the holes 89 are connected to the branch bores 90 by means of holes 91 perpendicular to the holes 89; the holes, such as 81 and 82, are axially coincident with the corresponding holes 89 of the base-plate 70. This base-plate 70 can be made in a particularly economic manner, all the holes being made perpendicular to its various faces; moveover, on the plate 80, there can easily be made throats 88 of the holes of the base-plate 70 connecting with the orifices of the block and cheek assembly 45, 55 in dispositions corresponding to the preferred couplings.

In an embodiment (not shown) which permits the connection of the corresponding orifices of the block and cheek assembly 45, 55 and of the base-plate 70 in accordance with any relative position, the plate (such as 80 of FIGS. 2 and 5) could comprise throats (such as 88) on its two faces authorizing, for example, the superposition of two different fluid conduits, or even one of the conduits could be constituted by means of a hole opening into two throats disposed respectively on one and the other of the two faces of the plate which, as the plate 80 above, could be made simply and economically by moulding of plastics material.

In the embodiment shown in FIG. 6, the slide 100, provided, as the slider 1 of FIGS. 1 to 4, with two end bearings 101 separated by a reduced diameter bearing 102, comprises two opposite grooves 104 and 105, made along the whole length of the bearing 102, and a bore 106 perpendicular to the grooves, in the middle of the slide 100. The cylinder 110 lies sensibly similar to the cylinder 2 of the preceding figures. The two face flanges 112 only differ from the face flanges 3 of FIGS. 1, 2, 3 and 4 in that they do not have any feet (32 of the face flanges 3) and in that they are provided on one of their ends with a flange 113. This embodiment comprises two supports 115 for the face flanges 112 constituted by a plate 116 comprising two longitudinal flanges 117 and a foot 118. The face flanges 112 are mounted between the flanges 117 of the supports 115 which are disposed in the grooves 104 and 105; the length of the face flanges 112, of the supports 115 and of the grooves 104 and 105 being similar, the face flanges 112 are longitudinally fixed and, also, transversely fixed by the flanges 117 of the supports 115. It is to be noted that the two face flanges 112 are mounted back to back, the flanges 113 being found respectively on one side and on the other of the slide 100. The assembly of the slide 100, face flanges 112 and supports 115 thus mounted is then introduced into the cylinder 110 and fixed against rotation by a screw 120; the functioning of the valve thus made will remain identical with that of the valve shown in FIGS. 1, 2, 3, and 4.

The flow of control fluid between the admission orifice 5 and the working orifice 6 or 7, is effected around the bearing 102 and by the clearances 125 of the flanges

117 of the supports 115 and 126 of the flanges 113 of the face flanges 112.

The distributing device could be applied to any valve presenting any number of ways, the different constituent parts of the valve could be made in any material and/or combination of materials, presenting any aspect, subjected to any physical or chemical treatment etc. in view, for example, of their protection against wear or corrosion of the valve could be destined to any purpose and/or be controlled by any means, pneumatic, hydraulic, etc.

I claim:

1. An improved distributing system comprising a housing, a bore in said housing open at each end, a five-way valve mounted in said housing and a sealing and fixing cheek closing each end of said bore of said housing, said valve comprising a cylinder having a bore, one admission orifice, two working orifices and two exhaust orifices, leading into said bore of said cylinder for the passage of working fluid into and out of said bore of said cylinder, a slider freely longitudinally displaceable in said bore of said cylinder and at least one face flange mounted on said slider adapted to contact the bore of said cylinder, said valve being mounted on a base plate provided with bores therethrough, and an intermediate supply plastics material plate, likewise having bores therethrough, mounted between said base plate and said valve to form a seal.

2. An improved distributing system comprising a closed cylinder, a pair of orifices extending through the wall of the cylinder, and valve means for connecting and disconnecting the orifices from each other, said valve means comprising a slider reciprocably mounted in the cylinder, a plastic face plate reciprocably mounted on the slider, and fluid pressure means for urging the face plate into engagement with the cylinder wall, the fluid pressure means comprising a piston integral with the face plate, a cylinder integral with the slider, and conduit means connecting the cylinder with a source of pressure.

3. An improved distributing system comprising a closed cylindrical chamber, an inlet opening extending through the wall thereof, a pair of outlet and exhaust openings extending through said wall and axially displaced from the inlet, and valve means for selectively connecting said inlet opening with one of said pair of outlet openings and the other of said outlet openings with an exhaust opening, said valve means comprising a slider, plastic face plates reciprocably mounted on the slider, and means urging said plates against the cylinder wall, the means for urging the plates against the cylinder wall comprising a piston integral with each face plate, a cylinder integral with the slider receiving said pistons, and conduit means connecting the cylinder with a source of pressure.

References Cited by the Examiner

UNITED STATES PATENTS

358,215	8/1886	Hughes	137—625.63
1,654,642	1/1928	Geissinger	251—186
1,886,007	11/1932	Goldberg	137—625.43 X
2,176,594	10/1939	Nordstrom	251—175 X
2,605,079	7/1952	Miller	137—625.43
2,616,449	11/1952	Maha	251—31 X
2,792,020	5/1957	Lieser	251—31
2,875,782	3/1959	Lee	137—625.27
2,889,569	6/1959	Riester	251—176 X
2,918,935	12/1959	Ohls	251—31 X
2,976,701	3/1961	Greenawalt	137—625.29 X

FOREIGN PATENTS

1,150,454	8/1957	France.

M. CARY NELSON, *Primary Examiner.*