

PATENT SPECIFICATION

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DRAWINGS ATTACHED

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(54) FLOW REGULATOR FOR HYDRAULIC CYCLONES AND THE LIKE

(71) I, CHARLES HAROLD WARMAN, a British subject, of 36 Linden Way, Castlecrag, New South Wales 2068, Commonwealth of Australia, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to flow regulators for regulating the discharge of liquids, particularly abrasive liquid suspensions, from vessels and apparatus such as hydraulic cyclones and other slurry handling devices.

The principal object of the invention is to provide a hydraulically controlled flow regulator in which all the action entailed in altering the cross sectional area of the bore of the regulator is performed by the deformation of two only separate members, one a resilient deformable wearing member and the other a resilient deformable fluid pressure actuated member, each member being of simple construction and capable of being readily replaced. Another objective is to provide a regulator in which all cross-sections of the opening or bore remain circular and concentric with the centreline of the regulator throughout its range of adjustment. Such a feature is important to the efficient operation and control of the underflow of hydraulic cyclones.

In accordance with the present invention there is provided a flow regulator for hydraulic cyclones and the like comprising a replaceable sleeve of deformable resilient material, an annular pressure ring of deformable resilient material in contact with the outer surface of said sleeve, upper and lower body members conforming inwardly to the undeformed outer surface of said sleeve, said pressure ring having outwardly projecting end flanges adapted to be clamped between an annular retaining ring and said upper and lower body members, the inner surface of said retaining ring and the outer surface of said pressure ring together with the clamped pressure ring end flanges defining a sealed annular

cavity and means for transferring fluid to or from said annular cavity so as to cause the pressure ring to deform radially thereby altering the diameter of the surfaces of contact between the pressure ring and the sleeve and changing the cross-sectional area of the bore of the sleeve in the region adjacent to the pressure ring.

A specific form of the invention is illustrated in the accompanying drawing which is a part axial section of the lower portion of a hydraulic cyclone to which is attached an adjustable spigot or flow regulator constructed according to the invention.

Like parts are indicated by like characters throughout the specification and drawing.

As shown in the drawing 1 is the flange of the lower portion of an hydraulic cyclone to which the upper cylindrical body member 2 of the spigot is attached concentrically about the centreline of the cyclone by its flange 3 and bolts 4. 5 is a replaceable cylindrical sleeve member conforming to the inner cylindrical surface of the body member 2 and constructed of deformable resilient wear resisting material, said sleeve member having a flange 6 which is clamped between flanges 1 and 3 and which serves to form a fluid tight joint between the cyclone and spigot and to restrain and locate the upper end of the sleeve member. An annular pressure ring 7 in contact with the outer cylindrical surface of said sleeve member is constructed of deformable resilient material and has outwardly projecting end flanges 8 and 9 adapted to be clamped between an annular retaining ring 10, flange 11 on upper body member 2 and lower body member 12 respectively, said clamping being performed by means of through bolts 113 which serve also to attach and locate the tail piece or splash guard 14. The concave inner surface 15 of the retaining ring 10 and the concave outer surface 16 of the pressure ring 7 together with the clamped pressure ring flanges 8 and 9 define a sealed annular cavity 17 to and from which fluid may be transferred through the connecting passage 19 by any suitable means such as

the hand operated hydraulic cylinder 18 illustrated. Such fluid transfer causes the pressure ring to deform radially as indicated in chain dotted outline thereby altering the diameter of the annular contact surface 20 between the pressure ring 7 and the sleeve member 5 and changing as indicated in chain dotted outline at 21 the cross-sectional area of the bore of the sleeve member 5 in the region adjacent to the pressure ring 7. Such change of cross-sectional area of the bore of the spigot serves to control or regulate the discharge of the underflow from the cyclone. Annular lips 22 and 23 on body members 11 and 12, respectively, serve to restrain the ends of the pressure ring 7 against radially inward movement and ensure that the pressure ring flanges 8 and 9 remain clamped in position when the central portion of the pressure ring is distended radially inwards by the fluid transferred into cavity 17. In its undeformed state the inner surface of the pressure ring 7 slopes inwardly from each end to form the substantially central annular ridge 24 which contacts the outer undeformed cylindrical surface of the sleeve member 5.

WHAT I CLAIM IS:—

1. A flow regulator for hydraulic cyclones and the like comprising a replaceable sleeve of deformable resilient material, an annular pressure ring of deformable resilient material in contact with the outer surface of said sleeve, upper and lower body members conforming inwardly to the undeformed outer surface of said sleeve, said pressure ring having outwardly projecting end flanges adapted to be clamped between an annular retaining ring and said upper and lower body members, the inner surface of said retaining ring and the outer surface of said pressure ring together with the clamped

pressure ring end flanges defining a sealed annular cavity and means for transferring fluid to or from said annular cavity so as to cause the pressure ring to deform radially thereby altering the diameter of the surfaces of contact between the pressure ring and the sleeve and changing the cross-sectional area of the bore of the sleeve in the region adjacent to the pressure ring.

2. A flow regulator for hydraulic cyclones and the like as claimed in claim 1 wherein the sleeve is provided with an outwardly projecting end flange adapted to be clamped between a flange on the upper body member and the cyclone or the like to which the flow regulator is attached.

3. A flow regulator for hydraulic cyclones and the like as claimed in claim 1 or claim 2 wherein the ends of the pressure ring are restrained from deforming radially inwards by annular lips on the upper and lower body members respectively.

4. A flow regulator for hydraulic cyclones and the like as claimed in any one of claims 1 to 3 wherein in the undeformed state the inner surface of the pressure ring slopes inwardly from each end to form a substantially central annular ridge which contacts the outer surface of the sleeve.

5. A flow regulator for hydraulic cyclones and the like constructed and adapted to operate substantially as hereinbefore described with reference to and as illustrated in the accompanying drawing.

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