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WEDGE BLOCK, VALVE GATE ASSEMBLY

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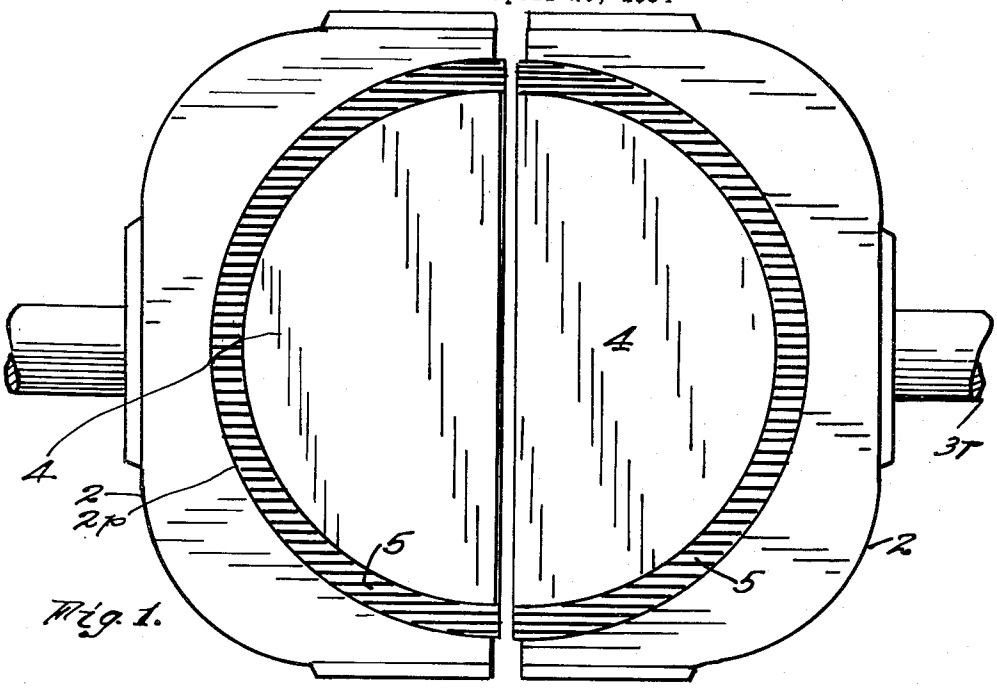


Fig. 1.

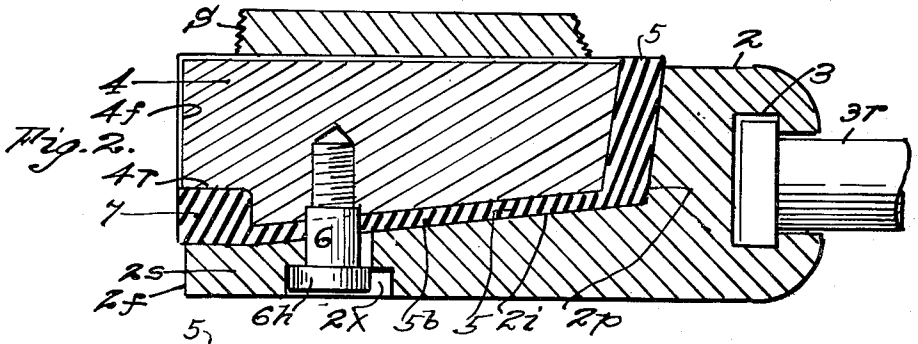


Fig. 2.

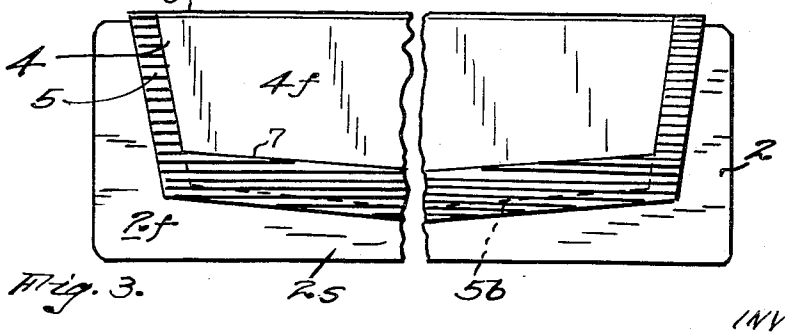


Fig. 3.

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WEDGE BLOCK, VALVE GATE ASSEMBLY

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1 Claim. (Cl. 251—1)

This invention is a ram gate assembly for blow-out preventers of the class now generally used in deep well operations.

These preventers include a heavy duty shell in the flow chamber of which there is slidably mounted a pair of opposed, power shifted cage or gate rams having, each, a semicircular packing element having top exposed edges to safely seal upward against contiguous bearing zones at the top of the chamber in which the rams slide.

In the absence of a tool or other pipe string vertically in the shell the rams are designed to meet diametrically to make a complete shut-off of well fluid while at the same time the circular rim portion of the packing element in each ram seals up against the top limb of the shell chamber. For making shut-off against an interposed pipe string the rams may have complementary recesses in their diametrical faces.

A signal purpose of this invention is to provide a ram assembly in which the ram body has in its top portion a semicircular pocket open along its diametrical side and having a bottom or shelf portion which is distinguished in that its top surface inclines in a direction extending back and upward from the said side, and in the pocket there is provided a top, filler block which has capacity for a suitable degree of outward shift from the diametrical side so as to extrude the wall part of a semicircular, cup-like packing element lodged on the shelf.

An object is to secure an additive amount of extrusion of packing material to the rim of said wall, and to that objective the filler block is of wedge form and tapers from its diametrical face outwardly to a radially distal peripheral point. Therefore outward shift of the wedge block on the rubber bottom of the packing element compacts the rubber and causes it to tend to flow to the wall which is being concurrently compressed by the engaged rim of the block.

The invention resides in certain advancements in this art as set forth in the ensuing disclosure and has, with the above, additional objects and advantages as hereinafter developed, and whose constructions, combinations and details of means and manner of operation will be made manifest in the following description of the herewith illustrative embodiment; it being understood that modifications, variations, adaptations and equivalents may be resorted to within the scope, principle and spirit of the invention as it is claimed in conclusion hereof.

FIGURE 1 is a plan view of partly closed gate rams of full shut-off, flat face type. FIGURE 2 is a vertical top to bottom section of ram unit or assembly. FIGURE 3 is an elevation of the inner, flat diametrical, shut off face of the assembly.

Each gate assembly includes a generally cup-shaped, block body **2** having a semicircular, deep pocket **2***p* from its top down to a shelf or bottom limb **2***s*; the said pocket being open at its diametrical side along the inner flat face **2***f* of the ram body **2**. A pair of these bodies **2** go to make up a full shut off valve closure when mounted in a respective shell only a part of one of which is indicated at S in FIG. 2 and constituting the top of a shell chamber in which the rams are shifted inward to make a shut-off or outward to open the valve for fluid flow, or tool or pipe string operation in a well hole.

The outermost side of the ram body is provided with

a suitable channel bearing **3** to receive a ram rod **3***r* power driven to push or pull the ram in the shell chamber. The opposed rams shift oppositely concurrently in function.

In the pocket **2***p* of each ram body there is mounted a complementary, semicircular filler block **4** whose inner, flat, diametrical face **4***f* is normally flush with the ram face **2***f*.

An effective and durable means for sealing the filler block in the pocket of the ram, for sealing up against the shell top S consists of a semicircular, cup-shaped packer element **5** of rubber or an equivalent whose rim wall extends up from the shelf of the ram and terminates slightly above the coplanar top faces of the assembled ram and block. The block is somewhat less in diameter than the inside diameter of the wall of the ram forming said pocket to provide space for reception of the cup element **5** and the block is of less thickness than the height of said wall so that the relatively thin bottom of the packing will be accommodated under the block. The flat, cross-face of the packing protrudes slightly ahead of the plane of the inner end of the block face **4***f*. Therefore, when the rams, meeting inclosing action, force the faces **4***f* together there is a tendency for the blocks to drift outward on the bottoms of the cup packing and this extrudes the lips of the cup wall up to the shell top to make a reliable seal thereat.

It is very desirable to secure an additive volume of the extruded wall of the packing cup and to that function, by this invention, the top face of the shelf **2***s* is materially inclined upwardly toward the outer wall of the ram body as shown at **2***i*, FIG. 2, and the bottom **5***b* of the packing is conformed to and pitches up at the same angle. To bring about the desired compacting of the rubber bottom **5***b* the bottom face of the block **4** is inclined complementally thereto so that the block is of wedge shape, tapering outwardly from its diametrical (inner) face. When the rams meet as closing pressure is applied to the ram assemblies the blocks are shifted back (outward) on the rubber bottom **5***b* and this is so compressed that it both additionally extrudes the lip wall upward to the shell S and tends to further compress the transverse sealing edge of the bottom **5***b*.

A bolt **6** in the bottom of the block **4** has a hold down head **6***h* sunk in the ram shelf which is provided with a back-play slot **2***x* for the head of the screw **6**. When the ram is retracted the screw acts to pull back the block to prevent the block from freezing on the shell.

Ample packing area across the face of the ram is effected by way of the high-faced bead **7** of the packing element and which is sunk in the lower, inner corner recess **4***r* of the floating block **4**.

What is claimed is:

In a ram for control gates, the combination which comprises a generally cup-shaped block body having a generally flat upper surface and a deep pocket extending from its top downwardly to a bottom wall, said pocket being semicircular in cross section taken parallel to said upper surface and open at its diametrical side, the upper surface of said bottom wall of the pocket being materially inclined in a direction extending upwardly from the diametrical side of said pocket, the semicircular outer wall of the pocket being inclined upwardly and outwardly; a semicircular packing element disposed in said pocket, said packing element having a semicircular recess therein concentric with said pocket, said recess being open at the top and at the diametrical side and having a substantially imperforate bottom wall of uniform thickness complementary to the inclined bottom surface of the pocket and having an outer, semicircular rim wall complementary to the semicircular wall of said pocket, said packing ele-

ment having an upstanding bead along said diametrical end, the bottom wall of said packing element being substantially thinner than said bead and rim wall; a semicircular ram block in the recess of said packing element and complementary to the interior contour thereof, said block having its inner, lower diametrical corner recessed for reception of the bead of said packing element, the rim wall of the packing element being thus interposed between the periphery of the block and the semicircular wall of said pocket; and a hold-down bolt connecting the block and said body and being shiftable in said body to provide for limited independent movement of the block relative to the inclined bottom surface of said pocket in a direction normal to the inner diametrical side of said pocket whereby, upon movement of the block away from the inner diametrical side of said pocket, the arcuate face of the block compacts the semicircular rim of the packing element to effect extrusion of the packing rim wall at the top of said body and the bottom of the block compacts the bottom wall of the packing element to effect further extrusion of said rim wall throughout its length.

References Cited in the file of this patent

UNITED STATES PATENTS

1,963,683	Shaffer	June 19, 1934
2,593,793	Rector	Apr. 22, 1952
2,604,903	Neilon	July 29, 1952
2,749,078	Losey	June 5, 1956
2,760,751	Wilde	Aug. 28, 1956