Nov. 10, 1936. W. D. SHAFFER ET AL 2,060,252

FLOATING BLOCK GATE RAM

Filed Sept. 26, 1934

Fig. 1.

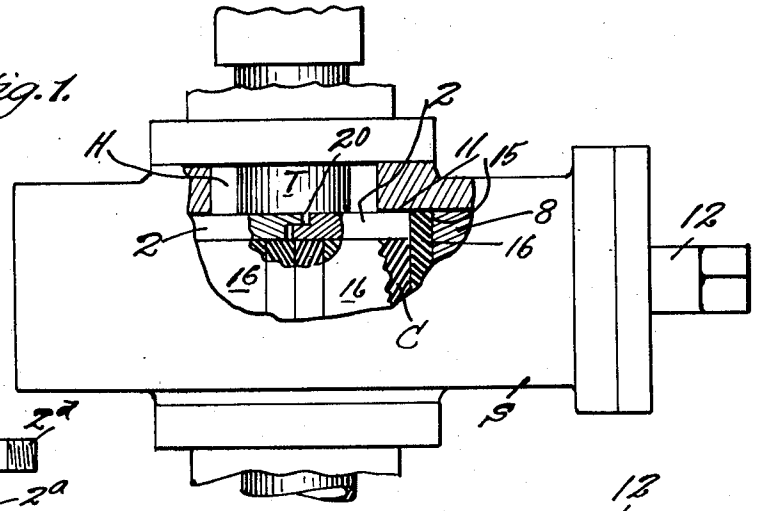
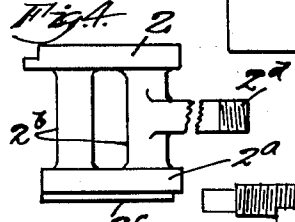



Fig. 4.



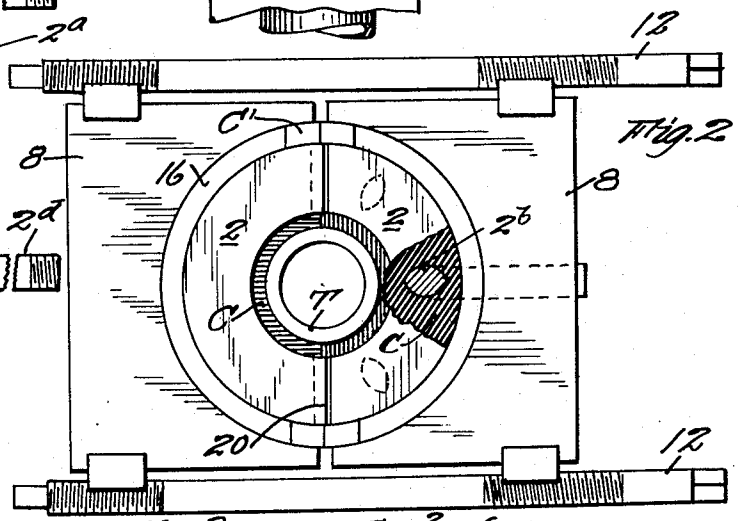




Fig. 2.

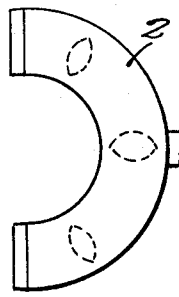



Fig. 5.

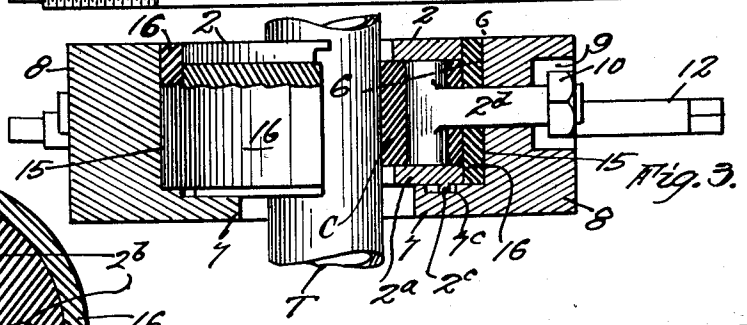
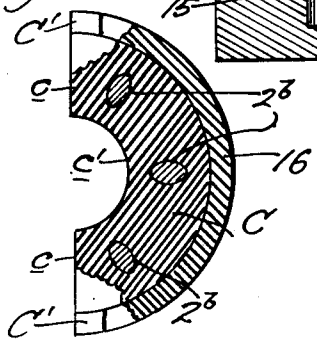



Fig. 3.

Fig. 6.




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# UNITED STATES PATENT OFFICE

2,060,252

## FLOATING BLOCK GATE RAM

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Application September 26, 1934, Serial No. 745,602

13 Claims. (Cl. 251—51)

This invention is a new packing system for blow-out preventers or control gates for gas and oil well casing.

The instant invention is an improvement in the floating block gate ram disclosed in the Schweitzer application executed August 31, 1934, filed September 26, 1934, Ser. No. 745,603, and incorporates certain features of the Segelhorst et al. gate ram shown in Patent No. 1,989,429, granted January 29, 1935, (application filed November 19, 1930, Ser. No. 496,642) owned by W. D. Shaffer, named herein.

Our constant development and production of the Shaffer line of control gates has led to the conception of the invention herein disclosed and which has for its broad object the provision of a gate ram and its packing having sealing efficiency superior to any so far produced, to our knowledge.

A further object is to provide a gate of this type which facilitates replacement of that part of the packing which is exposed to the greatest wear and tear owing to its engagement with the pipe string to be packed in the casing, and provide for such replacement without need of changing or discarding of that part of the packing which is extruded against a contiguous part of the gate shell and not subject to abrasive tear to much extent. In other words an object is to provide one packing element for sealing on the pipe and another for sealing against the shell and both cooperating to make a complete seal around the pipe passageway in the shell.

Further, an object is to provide for ready changes of the floating packer unit for differences in sizes of the pipe in the gate.

A purpose is to provide a gate in which the packing medium is in the form of a solid mass from the pipe back to the ram wall and including a floating cage aiding in edgewise extrusion of the packing against the near surface of the shell in which the packing is mounted.

The invention consists in certain advancements in this art as set forth in the ensuing disclosure and having, with the above, additional objects and advantages as hereinafter developed, and whose construction, combination and details of means, and the manner of operation will be made manifest in the description of the herewith illustrative embodiment; it being understood that modifications, variations and adaptations may be resorted to within the scope, principle and spirit of the invention as it is more directly claimed hereinbelow.

Figure 1 is a broken-away side elevation of the gate. Figure 2 is a plan of the closed gate rams. Figure 3 is a longitudinal section of the closed rams (on a pipe). Figure 4 is a side elevation of a rubber core cage, and Figure 5 is a plan thereof. Figure 6 is a detail section on line 6—6 of Fig. 3.

The gate includes a housing or shell S with a pipe hole H from top to bottom and intersecting a ram chamber having a smooth top surface 11 surrounding the through hole H.

A pair of opposed ram blocks 8—8 are operatively fitted in the shell chamber and have large, facing, semicircular pockets upward from basal flanges 7. These rams are concurrently moved inward or outward as by means of suitably connected screw shafts 12 engaging nut parts of the rams.

Seated against the inner, vertical wall faces 15 of the ram pockets are nearly semi-circular bodies of packing (preferably of rubber) 16, which are of about equal height of the wall 15 and lie close to the adjacent top surface 11 of the shell chamber.

Slidably supported on the flange 7 of each ram 8 is a core carrier, hereinafter called the "cage", which includes a top segment 2 and a bottom segment $2^a$ of the same size and shape, each of about one-half a circle in length and being rigidly connected by a set of stout ribs $2^b$ (in the manner of the Segelhorts et al. device). The outer rims of these segments contact the nearby rubber packing 16 all the way around.

A feature of this invention is that each cage 2 is solidly filled between its top and bottom segments with a core C of firm rubber which projects centripetally from the inner edges of the cage plates to provide for repression when the rubber is jammed in against the opposing obstacle, as the pipe T or opposite ram packing, by closing action of the rams. The core rim laps against the adjacent face of the wall packing 16 and has radial faces *c* ending in end lugs C′ which lap on the near ends of the wall packing 16; the tops of the lugs C′ of the cores being extrudable up against the chamber face 11 under closing pressure of the rams 8—8.

When the rams are closed the faces *c* of the cores C—C meet and the core recess faces *c′*—*c′* seal on the interposed pipe T.

The cages are suitably connected to their rams so as to insure retraction of the cores from the closed position should they tend to adhere to the pipe, or to each other where they meet face to face. To that end the bottom of each cage plate $2^a$ has a bead $2^c$ working in a recess $7^c$ provided therefor in the bed flange 7 of each

ram and allowing desired play of the cage and core on the ram flange for relative motion as when the ram continues inward after the packing cores shall have been stopped by abutment with the pipe or with each other. On retraction of the ram the bead 2c will be engaged and the core and cage pulled back with the ram.

A hold-down device for the core and its cage is provided and as here shown includes a tail-rod 2d extended from one of the cage ribs 2b and slidably fitting in the ram body 8, which is recessed at 9 to receive a stop nut 10 on the rod 2d. The nut 10 may well serve as a pull-back for the core C.

The radial edges of the cage tops 2 are mortised and tenonned at 20 to overlap in closed position and limit the upward flow of the packing in event of very high pressures of fluid in the well casing.

With a given size pipe T to be run in the gate complementary size packer cages and cores will be set in the rams and these will be assembled in the shell S in open position. When a seal-off is to be made the rams are closed in on the interposed pipe and as the cores of packing C—C of opposed rams engage the pipe they will stop motion but will permit some still further closing movement of the ram bodies due to the fluidity of the rubber core mass and the extrusive action of the wall packing 16 as this is compressed by the abutted cores and the inwardly moving rams.

The extruded packing flows hard up against the chamber surface 11 around the hole H and seals off flow around the hole.

The large amount of core rubber increases the free floating action of the cage and increases packing efficiency, while at the same time the cage structure prevents rubber blow-out.

The core rubber C and the wall rubber 16 may be of equal density, or the wall rubber may be the softer of the two, as desired.

The right ram core C is shown broken away in Fig. 2 as extending from packing 16 inward to and engaging the tube T. The end lugs C' extend from the top plane of the wall packing 16 to its bottom plane, Figs. 2, 3 and 6.

What is claimed is:

1. A blow-out preventer ram block provided with a shiftable cage, a packing core extending through the cage, inner packing at the face of the cage to seal on an inner obstacle, and outer packing to seal on a wall part of the ram; the core being adapted to flow rearward when the inner packing abuts the obstacle and to cause the outer packing to be extruded laterally; said cage being yieldably supported by the packing as to the block, the inner packing consisting of a part of the core and the outer packing comprising a separate, removable element between said wall and the core.

2. A blow-out preventer ram block provided with a shiftable cage, a packing core extending through the cage and presenting an inner body at the face of the cage to seal on an inner obstacle, and an outer packing body engaging the core and adapted to seal on a wall part of the ram block, and hold-down means connecting the cage and the ram block and including a connecting rod slidably mounted in said wall part of the ram block and having a cage pull-back device.

3. A blow-out preventer ram block provided with a shiftable cage, packing medium including a packing core extending through the cage to seal on an inner obstacle and an outer body to seal on a wall part of the ram, and pull-back means connecting the ram block and the cage to retract the core with the ram block and including a rod slidably fitting in and passing through said wall part.

4. A blow-out preventer ram block provided with a shiftable cage including top and bottom plates which are rigidly connected by isolated ribs, a packing medium filling the cage and embedding the ribs and extending inwardly beyond the inner face of the cage to engage an inner obstacle and extending outward at the back of the cage to engage a ram part; the cage adapted to recede relative to the block when the inner packing abuts the obstacle and the outer packing being extrudable edgewise under compaction due to further inward movement of the block, and the cage having a pull back passing through the outer packing material and sliding in said ram part.

5. A blow-out preventer ram block provided with an axially shiftable packing device having an inner packing body at its face to engage and seal on an inner obstacle and an outer or back packing body bearing against the relatively movable ram block and which is extrudable edgewise when the inner packing is compacted against the obstacle by movement of the ram block, and a tail rod connecting the said device to the ram block to retract the device from the obstacle said block having a frontal pocket in which said device is arranged, and having means slidably supporting the said device.

6. A packing device, for a blow-out preventer ram block, including a cage open from front to rear and having front or inner packing to engage an opposed inner obstacle and outer or back packing to engage an opposing part and a filling of packing in the cage by which, when the inner packing is compacted against the obstacle, the outer packing is extruded laterally, that is, edgewise, and means piercing the outer or back packing for slidably connecting the cage to its ram block.

7. A blow-out preventer ram block provided with a pocket opening to one side and to the top of the block, a cage slidably mounted in the pocket and forming the inner wall of the ram, and packing material lying beyond the front and the rear faces of the cage and extending therethrough from front to rear; the rear part of the packing sealing on an opposing surface and being extrudable edgewise when the front or inner part of the packing is compacted against an obstacle in front of the ram.

8. A blow-out preventer having a through hole for an object to be sealed off, and means for sealing all around and on the object and for sealing all around the said hole and including a pair of rams with relatively movable cages having packing at their inner faces to meet around and on the object, packing extending from the inner packing and through the cages to the rear, and edgewise extrudable packing surrounding the outer sides of the cages; said extrudable packing sealing on a surface of the preventer shell around the hole; said rams having frontal pockets in opposed faces and in which said cages are arranged and presenting back faces against which said extrudable packing rests, and means extending forwardly from said back faces and providing for sliding action of the cages and having means for retracting the cages with the rams.

9. In a blow-out preventer; a slidable ram block having a hollow closure element which is

open from inner to outer faces, and packing filling the chamber of the element and extending beyond and continuously around the element and extrudable against upper and lower bearing surfaces therefor; said block presenting a back wall against which the extrudable, lateral packing rests, and means piercing the lateral packing and said wall for slidably supporting said element and for effecting its positive retraction and providing for the desired extrusion of the lateral packing edges to seal on contiguous bearing surfaces for the element.

10. In a blow-out preventer; a slidable ram block having a gate block and a hollow closure element which is open from inner to outer faces, packing filling the chamber of the element and extending beyond and continuously peripherally around the element and engageable with upper and lower bearing surfaces therefor, and retaining means embedded in the packing in the chamber and rigidly connecting top and bottom parts of the element; said retaining means having a tail rod piercing the peripheral packing and sliding in said block, and means on said rod for effecting a retraction of the element with the block.

11. A valve having a shell having a flow hole which is surrounded by a plane bearing face in the valve chamber, opposite gates working in said chamber and each having a relatively sliding closure element which is peripherally girdled by lateral packing including edge portions to seal on said plane face completely around the flow hole and including filling or core portions extending through each element from inner faces to rear faces thereof; each gate having an inner wall face against which the rear lateral portion of the relative packing seats whilst its inner face portion closes against an opposing obstacle, centrally in the shell chamber, to effect extrusion of said edge portions against the said plane bearing face, and means extending inwardly from said inner wall faces for supporting and retracting the said elements from closed positions.

12. A gate valve shell having a flow hole and a gate chamber presenting a plane surface surrounding the hole, and opposed gates working in the shell chamber and each having a floating element which is peripherally girdled by packing which extends through the element from inside face to rear face and transversely across the said inner face to seal on opposed area when the gates are closed and portions of said packing girdle being extruded against said plane surface upon relative inward movement of the gates as to the stopped packer elements to completely seal around the hole said elements having parts embedded in the packing body and slidably supported by their gates and having means engageable by the gates upon their rearward movement to positively retract the relative elements from closed, sealing position.

13. A blow-out preventer having, in combination, a through-hole shell, and a ram or gate element movable therein to an inner, closed position and being provided with a packing device having a pair of upper and lower bearing plates axially slidable as to the gate element and between which is confined a core of packing which presents a sealing area at its inner face to engage and seal on an obstacle, the core also presenting an outer or back packing area bearing against the gate element and which back area is extrudable edgewise against upper and lower bearing surfaces therefor when the inner packing is compacted firmly against the obstacle by movement of the gate element, and means connecting the said packing device and the gate element to retract the packing device from the obstacle; said element having a frontal pocket in which said device is arranged, and means slidably supporting the packing device.

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