June 28, 1960 A. E. WILDE 2,942,616

HINGED CAP, CELLAR PRODUCTION GATE

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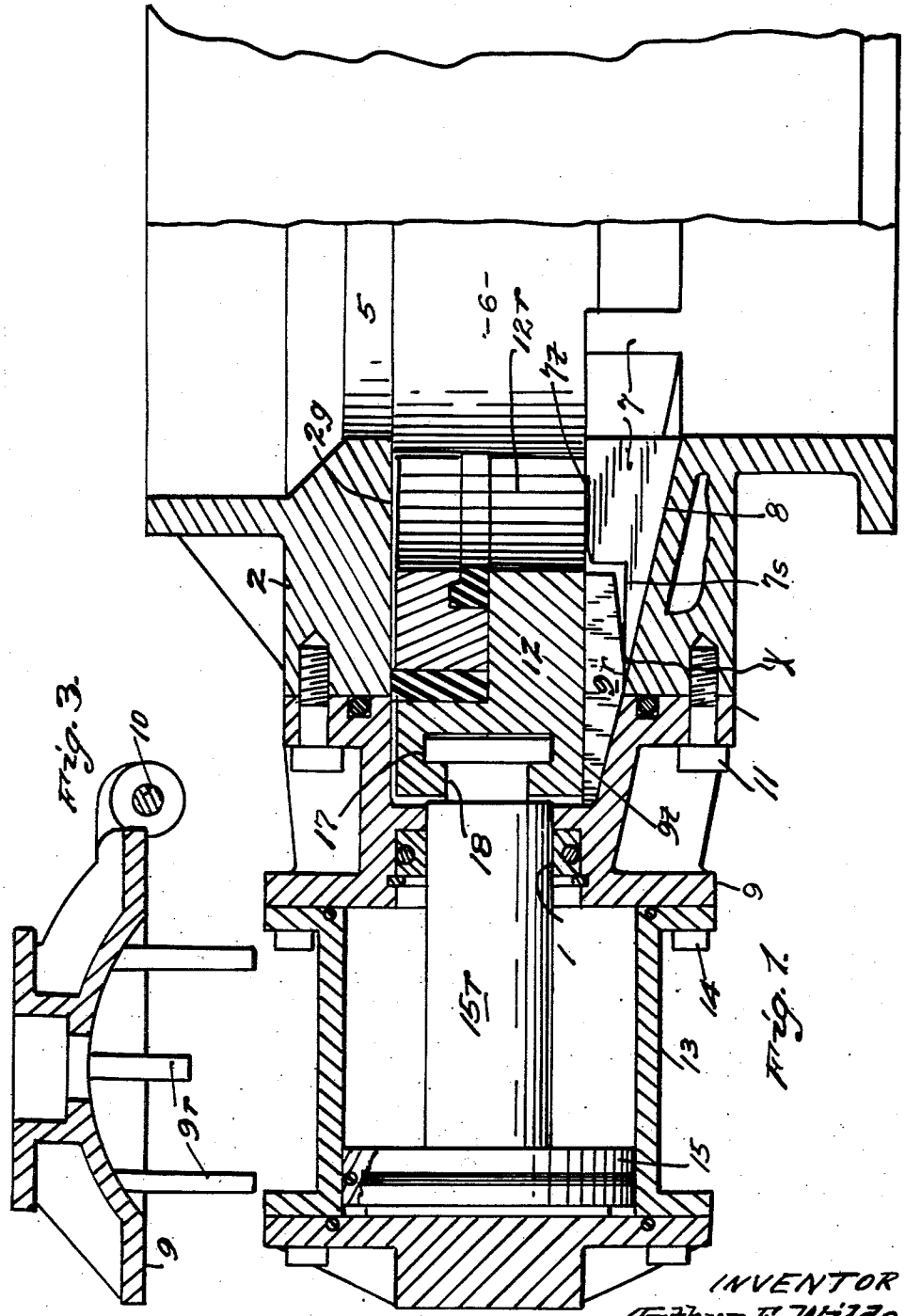


Fig. 3.

Fig. 1.

INVENTOR,
Arthur E. Wilde;
Frederick E. Maynard,
Attorney.

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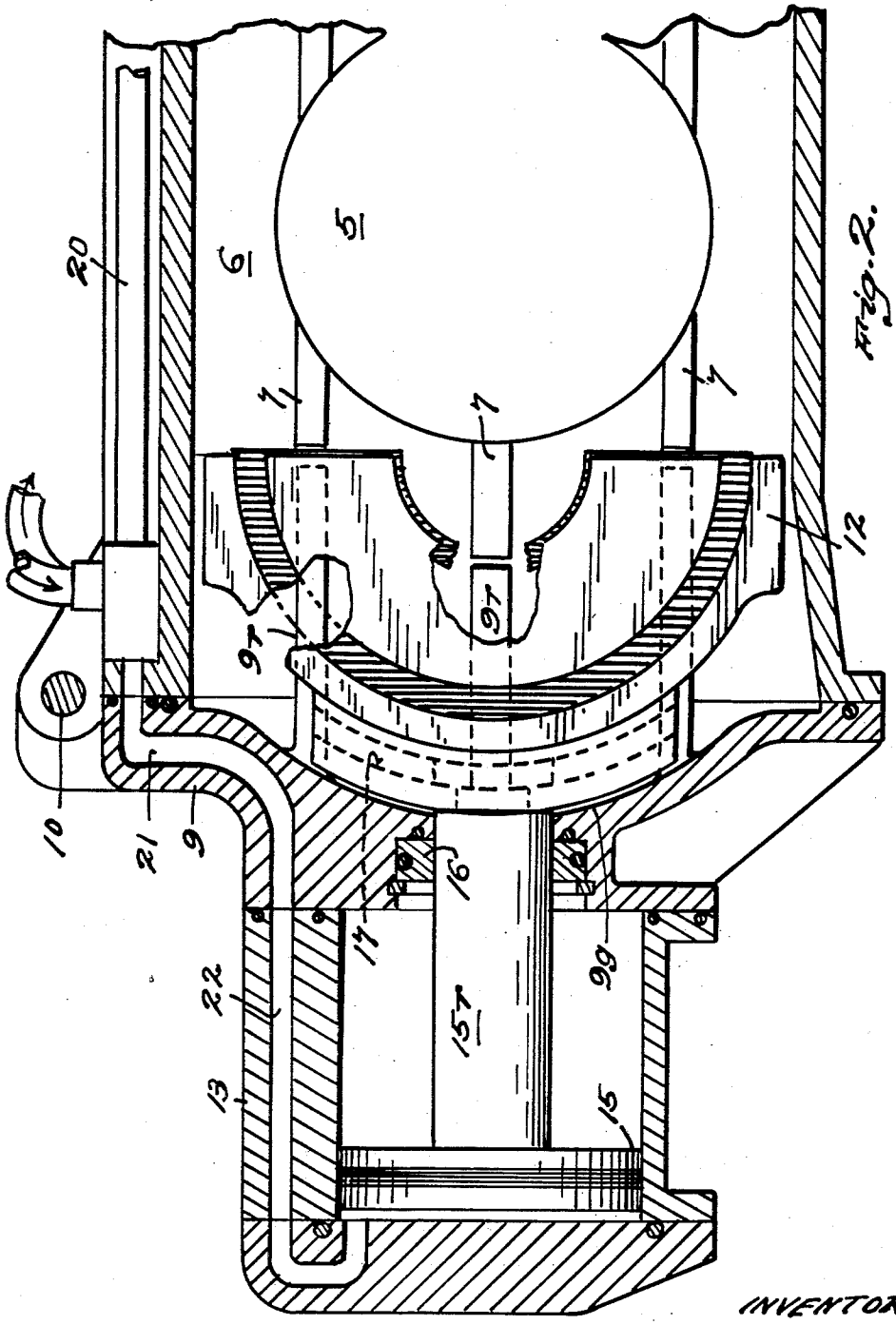


Fig. 2.

INVENTOR,
Arthur E. Wilde;
Frederick E. Maynard,
Attorney.

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HINGED CAP, CELLAR PRODUCTION GATE

Arthur E. Wilde, Yorba Linda, Calif., assignor to Shaffer Tool Works, Brea, Calif., a corporation of California

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4 Claims. (Cl. 137—315)

This invention relates to heavy duty, deep well control equipment and is a hinged cap, cellar, production valve assembly.

Assemblies of this general class involve cumbersome and heavy elements of structure which are burdensome and handled with considerable difficulty and require considerable dismantling when inner control ram gates are to be installed, removed or otherwise attended to.

A cardinal concept of the instant invention is the very great simplification of production valve assemblies whereby to wholly eliminate the need of knocking down any parts whatsoever of the valve just for the purpose of having access to the ram gate or gates of the valve. A basic principle of structure of this gate assembly is to provide a complete organization of power means and a relative ram gate in unitary combination adapted to be factory built, to be handled, to be transported, installed or dismounted, and is, when installed, so bodily mounted on the shell of the valve as to be bodily moved to or from shell closing position. Preferably, an object is to provide a production valve in which a ram gate and its actuating motor are unitarily combined and are pivotally mounted on the respective shell so that the only effort required to provide full access to the ram gate is that to overcome the unit inertia and the frictional resistance of its bearings.

A distinctive object is to provide a swinging ram gate and power unit in which it is only necessary to swing the unit to an open position on the valve shell in order to enable ready and fast mounting or dismounting of the gate device relative the power means without any dismantling of any element with which the gate is related as will be later set out.

At this point reference will be made to the notorious material cost, handling cost of the major elements of cellar control gate valves, the very objectionable weight thereof, and hazard to mechanics and other handlers from the plants where they are manufactured to the ultimate takedown of the valves on final well operations. It is an aim of this invention by one concept to greatly reduce material (usually high grade steel) cost and greatly lessen the total weight of the installed valve and of its several major elements. This original concept resides in making the named parts or elements of a substantial and light weight material, such as aluminum or an equivalent.

The original concepts of this invention reside in certain advancements in this art as set forth in the ensuing disclosure and have, 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, spirit and principles of the invention as it is claimed in conclusion hereof.

Figure 1 is an axial section of the valve with its ram gate in open position from the axis of the shell and its

carrying cap in closed position on the shell; only one of opposite ram gate assemblies being shown in the broken-away shell. Figure 2 is a central, longitudinal section of the valve structure on a plane at a right angle to the plane of Fig. 1. Figure 3 is central transverse section of a gate carrying, shell-end closure cap to show its gate rails in plan.

The valve embodies a generally oblong, horizontal shell 2 having a large bore hole 5 from top to bottom for axial passage of tools or pipe, not shown. The bore hole is intersected by a transverse, elongate chamber 6 which opens to end walls of the shell. A feature of this invention is the provision in each end of the shell chamber of a set of longitudinally extending co-rails 7 rising vertically from the down-pitched bottom 8 of the shell; these rails having a landing step 7*s* at the outer portion and a bearing tread 7*t* inward and somewhat higher as to the step.

A significant feature of this invention resides in end wall caps 9 here shown as having hinge pivots 10 at side corners of the shell and parallel to the bore axis so that the caps can be easily swung inward to close the respective end wall openings of the valve chamber 6 or vice versa. In Figs. 1 and 3 are clearly shown a set of horizontal rails 9*r* rigid with and projecting inwardly from the inner face of the cap 9 and having top treads 9*t* coplanar with the treads of co-rails 7 of the shell. When the swinging cap is closed the inner overhanging portions of the rails 9*r* land at X on the co-rail steps for stability of the closed cap and its attached elements. The closed cap is secured by screws 11 or otherwise as desired.

A distinctive advance in this highly important art is the provision, for each shell cap 9 of a suitable ram gate 12 slidably fitting between top guide surface 2*g* of the shell chamber and respective co-rails 7; the ram gates being of suitable structure and packing arrangement to make shut-off for instance against an interposed, axial apparatus in the hole 5. In the open position of a ram gate (Fig. 1) the gate is wholly supported slidably on the rails of the cap. It will therefore be seen that the gate is carried wholly by its cap 9 during the swing of the latter relative to the shell.

In furtherance of improving the art a suitable power means for actuating the cap-carried ram gate resides in bodily mounting a device or power unit directly on the swingable cap so that at any time the cap-carried ram gate can be readily swung outward with and by the cap for any attention that the gate may require, or for mounting or dismounting of a gate, as, for example, whenever there is a change of diameter of tool or of pipe axially in the shell. As here shown the power plant consists of a hydrauic motor whose cylinder 13 is fastened by screws 14 or otherwise against the outer face of the cap 9. In the cylinder there is a double action piston 15 with a piston rod 15*r* for reciprocation in a packed bearing 16 axially in the cap.

It is highly desirable that simple, practical and reliable means be provided whereby to quickly interlock the inside ram gate to the outside motor and such a connection is here effected by peripherally slotting the inner end of the piston rod and complementally channeling the outer face of the ram gate which is in the general form of a large, flat block. As seen in Fig. 2 the outer rim of the gate block is arcuate as also is the channel 17 and the rod end slot 18 likewise. This arc is concentric to a central pipe or tool reception recess 12*r* of the gate. Therefore, while the cap 9 is open on its pivot a complementary gate block can be lodged on the treads of the rails 9*t* and pushed against the inner, arcuate guide face 9*g* of the cap at which position the gate block is bodily rotated on the axis of the face 9*g*. This will bring an open end of the gate channel 17 into interlock with the

receiving slot **18** of the piston rod; the gate block being adjusted to a right angle as to the rod. Wherefore, when the piston is reciprocated the gate block will be moved to and fro on the alined rails and co-rails when the cap is closed and fastened.

The disclosed motor is hydraulically operative; it being understood that there is such a motor on each end cap. The motors must be concurrently operative in closing gates to cause their inner diametrical sealing faces to meet and engage each other and the working apparatus in the shell hole, and the motors must concurrently move the gates for opening of the valve.

The shell is provided with a fluid pressure conduit **20** opening to the ends of the shell and in the cap there is provided a fluid duct **21** which registers with the near end of the conduit when the cap is in closed position. The duct **21** opens to the outer face of the cap and registers with the near end of a duct **22** in the motor cylinder wall so as to provide pressure fluid from the conduit to one side of the piston. It is understood that a reverse or gate retracting stroke of the piston is effected by a like system of fluid conduit and ducts, not shown, for pressure against the inner end of the piston.

Appropriate packing means are shown at numerous element joints to prevent leakage at these places.

The several novel concepts here disclosed give premise for many combinations and sub-combinations all within the ken of the claimed invention.

I claim:

1. In a ram gate assembly: a hollow valve body having a flow passage therethrough from top to bottom and a gate chamber opening through a wall thereof; co-rails in said hollow valve body and located at the bottom of said gate chamber; a ram gate adapted to be supported by and slidable on said co-rails; a cap assembly including a cap member pivotally mounted upon the valve body for movement between open and closed positions relative to said gate chamber and having an outer end wall with an inner end face; and rails projecting inwardly from said end face of said cap member, said rails having ram gate supporting surfaces in the same plane as the plane of the gate supporting surfaces of said co-rails and parallel to the rail engaging surface of the ram gate in all positions of the cap member, said gate being movable between

extended and retracted positions on said gate supporting surfaces.

2. The invention defined by claim 1 wherein the rails and co-rails have overlapping engagement with each other when the cap member is in the closed position.

3. The invention defined by claim 1 wherein said inner end face of said cap member defines an arcuate pocket portion and the outer end of said ram gate is formed with an arcuate portion corresponding to the arcuate portion of the pocket, said cap assembly also having a cylinder and a piston member slidable in said cylinder and movable between an extended and a retracted position, said ram gate and piston member being formed with cooperating attaching means whereby when the piston member is moved to the retracted position, the attaching means formed on the piston member is so disposed relative to said end wall that upon the cap member being pivoted away from the valve body, the ram gate may be positioned adjacent to said end wall and rotated while supported on said rails into attaching engagement with the piston member.

4. The invention defined by claim 1 wherein the valve body is provided with a pair of passages therein for pressure fluid and said cap assembly includes a cylinder and fluid passages connected respectively with the outer and inner ends of said cylinder and having openings in the cap member adapted to connect with the passages in the body when the cap member is in the closed position; and a piston member operably mounted in said cylinder and movable by pressure fluid between said retracted and extended positions, said piston member being operably connected with the ram gate.

References Cited in the file of this patent

UNITED STATES PATENTS

1,639,326	Burnett	Aug. 16, 1927
1,834,063	King	Dec. 1, 1931
1,834,922	Abercombie	Dec. 8, 1931
2,044,590	Neuhaus	June 16, 1936
2,174,964	Burdick	Oct. 3, 1939
2,592,197	Schweitzer	Apr. 8, 1952

FOREIGN PATENTS

395,617	Germany	of 1924