Oct. 23, 1951 J. ANTOLCH 2,572,299

FLOAT-IN OR CHECK VALVE

Filed Sept. 14, 1948

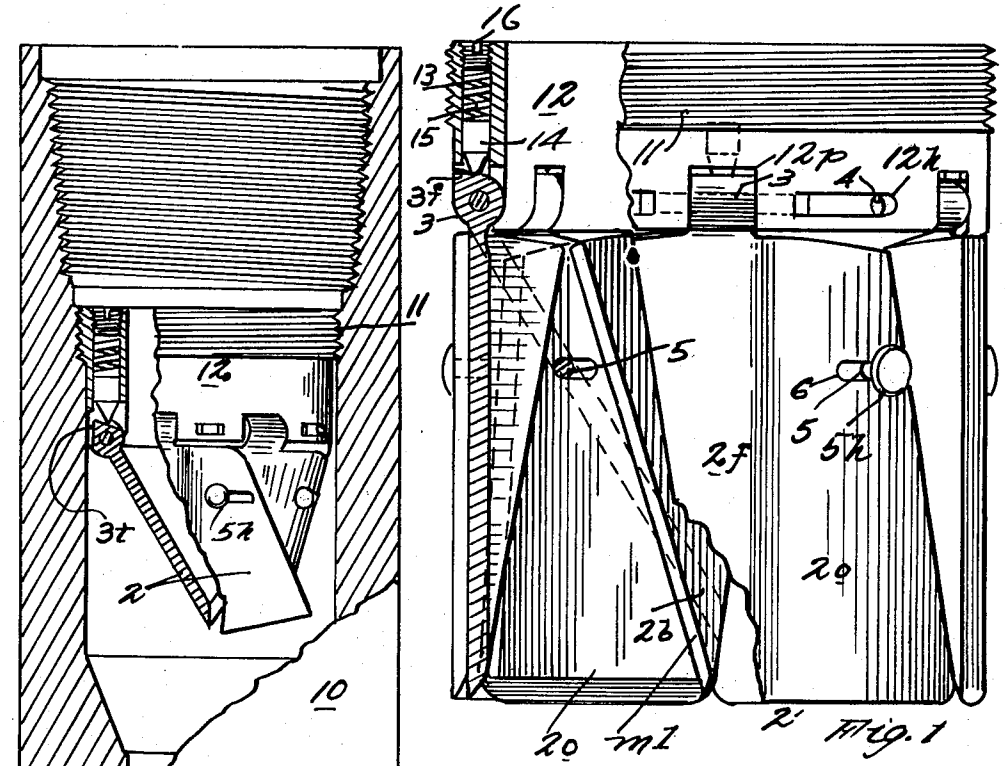


Fig. 1

Fig. 4.

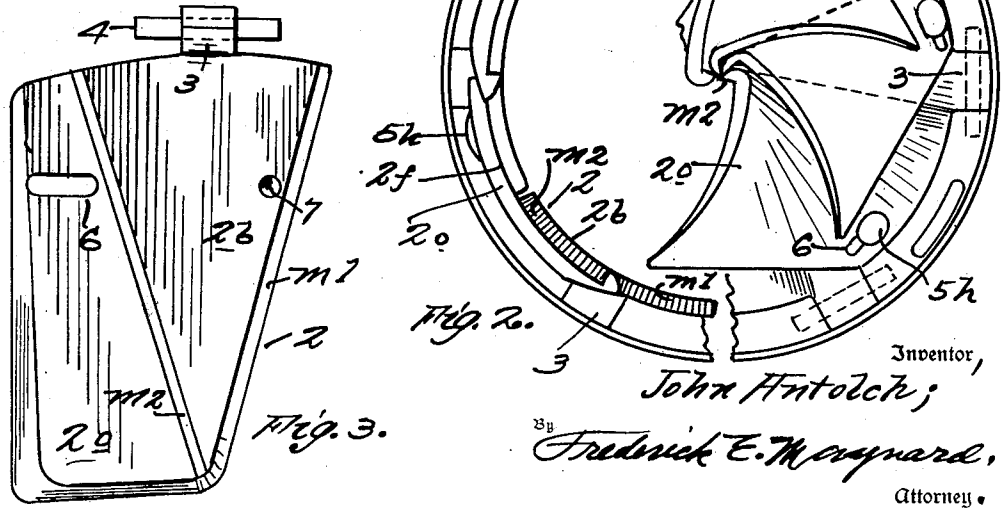


Fig. 3.

Fig. 2.

Inventor,
John Antolch;
By Frederick E. Maynard,
Attorney.

Patented Oct. 23, 1951

2,572,299

UNITED STATES PATENT OFFICE

2,572,299

FLOAT-IN OR CHECK VALVE

John Antolch, Los Angeles, Calif., assignor of one-fourth to Samuel R. Chorneau, Puente, Calif.

Application September 14, 1948, Serial No. 49,225

4 Claims. (Cl. 251—123)

1

This invention is a float-in or reverse-flow check valve and is especially useful in deep-well drill pipe.

In well drilling operations the drill pipe is often floated into the hole—that is, a device is fixed in the drill pipe at a desired assembly make-up location in the pipe and this stops up flow in the pipe as it is lowered in the hole being drilled. Several types of such closures have been used and often they have to be broken apart when at desired level or operation of the tools; as to permit lowering of certain inside implements or to permit up flow of circulating mud.

It is an object of this invention to provide a novel iris action fluid control valve which can be readily and removably mounted in a drill pipe element, a "sub" for instance, and which is simple, practical, inexpensive, reliable, is of compact organization, of handy size for manual installation, packing and transportation, and of few and substantial parts, is fool-proof and wholly free from tricky delicate parts, and involves no cumbersome engine for motivation.

A further object is to provide a drill pipe check valve having many advantages and numerous functional capacities. Namely, to provide a check valve which is automatically closeable by pressure of ascending fluid directly on its closure elements, hereinafter called blades; to provide a set of blades which will all move concurrently in both opening and closing actions.

Further, a purpose of the invention is to provide a set of shutter blades which will open into a ring or tube arrangement to provide a free boreway of not less diameter than the minimum bore size of the pipe element or sub in which the given valve may be mounted so that an inside tool string or other apparatus may be readily worked in and through the check valve here disclosed.

This invention also provides a valve whose shutter blades are adapted to be opened while deep in a well hole by the mere rotation of the drill pipe to give a centrifugal impulse to the blades, and which blades will be automatically closed as rotation is stopped.

The invention provides a valve having blades which contract iris fashion from a free open position by action of a closing device or by fluid pressure upward on the valve blades, and which includes means for effectively locking the cooperative blades in open, tube-forming position in cases where an up-flow, mud circulation is intended in the drill pipe.

The invention resides in certain advancements in this art as set forth in the ensuing disclosure

2

and has, with the above, additional objects and advantages as hereinafter developed, and whose constructions, combinations and detail of means, and the 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 a partial axial section and side elevation of the preferred form of the valve. Figure 2 is a bottom plan thereof showing some valve blades in open position (at the left) and others in iris diaphragm or closed position. Figure 3 is an inside face elevation of one of the diaphragm blades. Figure 4 is a sectional elevation showing a form of the valve having a lock-open means for the blades.

Referring to Figs. 2 and 3, the valve includes a suitable number of elongate blades **2** of concavo-convex cross-section or plan and having a downwardly converged body **2***b* whose point is vertically under a top end bearing lug **3** for a cross-pivot **4** to hang in a suspending collar later described. The sides of the body **2***b* form meeting or sealing faces *m*1 and *m*2 and are radial as to the center of the collar so that when the ring or set of the blades is contracted as at the right in Fig. 2 all of the meeting faces come into effective abutting engagement blade to blade and constitute an iris diaphragm and shut the valve against upward flow of fluid.

Each blade has a slightly outward outskirt portion **2***o* from top to bottom and as shown in Fig. 2 this outskirt laps onto the outer face **2***f* of the next and underlying, contiguous portion of its companion blade. In order to effect the concurrent closing or opening action of all of the blades of the set coupling pins **5** pass into slots **6** in the outskirts **2***o* and fasten in the inwardly concentric, adjacent body **2***b* which has a pin or screw hole **7** for that purpose. The pins **5** have heads **5***h* overlapping the respective outskirts and therefore each blade operates to tend to pull its interlocked companion outward or inward according to the direction of applied pressure on any blade. The top end of each blade is downwardly curved to permit full closing position under the mentioned collar.

This valve is a structural unit for ready installation in or removal from a given drill pipe element or other apparatus and here shown is a drill pipe sub **10** having its main bore provided with a screw thread **11** into which may be screwed

a collar 12, Figs. 1 and 2, whose bore is not less than the bore of the reduced sub screw pin 10*p* so that the collar will pass any apparatus which will pass through the sub.

The lower end of the short collar is provided with a number of annularly spaced pockets 12*p* for the tilting reception of the blade lugs 3; the collar having tangential holes 12*h* for the suspending, pivot pins 4 of the blades.

Fig. 1 shows the set of blades thrown to open-tube forming position, as by centrifugal force when the pipe is rotated and which will allow for free upflow of circulating mud, when so desired. Means are provided having a constant tendency to contract the blades in an iris motion; this valve being intended to be normally in closed position of its blades as the drill pipe, in which the valve is installed, is being lowered into the well hole. The top end of the collar has a series of longitudinal holes 13 in which are slidable presser bolts 14 thrust down by expansion springs 15, under set screws 16 in said holes 13. In Fig. 1 a bolt 14 bears on a top land face 3*f* with a tendency to tilt the respective blade 2 inwardly to dotted line position for shutting the valve. If the installed collar is rotated with and by the drill pipe element centrifugal force will open the blade against the presser bolt action. Or any implement passed down through the drill pipe will likewise open the blades. When the iris blades are closed they will prevent back flow of circulation mud or other well liquid from flooding the derrick floor of head works at a hole being drilled.

If it is intended that there may be need of having the valve blades open while the pipe is in the well hole then there is installed in the drill pipe a valve of this type and in which the blade lug, as to each blade of a set, has a locking tip 3*t*. When the blades are in normal closing position, Fig. 4, the bolt 14 rests on the inner side of the said tip, and remains so until it is desired to open the blades by rotation of the drill pipe the centrifugal effect of which will be to swing the blades outward until the tip 3*t* passes inward under the bolt which then locks its blade open.

What is claimed is:

1. A float-in, reverse flow check valve including a collar having its bottom edge provided with an annular series of horizontal bearings, an annular set of curved blades arranged to constitute in their open position a continuation of the bore of the collar and whose upper ends are pivoted in said bearings, means on the blades whereby they are connected in circular train for concurrent opening or closing movement as to the bore of the collar, and spring detents mounted in the collar and engaging and tending to automatically contract the blades to shut off reverse flow into the bore of the collar.

2. The valve as of claim 1; the blades having cam facets on which said detents operate and lock the blades in open position.

3. The valve of claim 1; said connecting means including pins each fixed on a respective blade of the set and having sliding interlock with a slotted contiguous portion of one of the adjacent blades.

4. The valve of claim 1; each blade including a downwardly converging wedge-shaped body from which its pin projects outwardly, and said body having a lateral outskirt to lap onto the next contiguous blade body at one side and is slotted to receive the interconnecting pin thereof.

JOHN ANTOLCH.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
703,832	Rigby	July 1, 1902
1,461,847	Jackson	July 17, 1923
2,094,707	Jones	Oct. 5, 1937
2,256,119	Lillich	Sept. 16, 1941

FOREIGN PATENTS

Number	Country	Date
1,726	Great Britain	of 1915
701,682	Germany	of 1941