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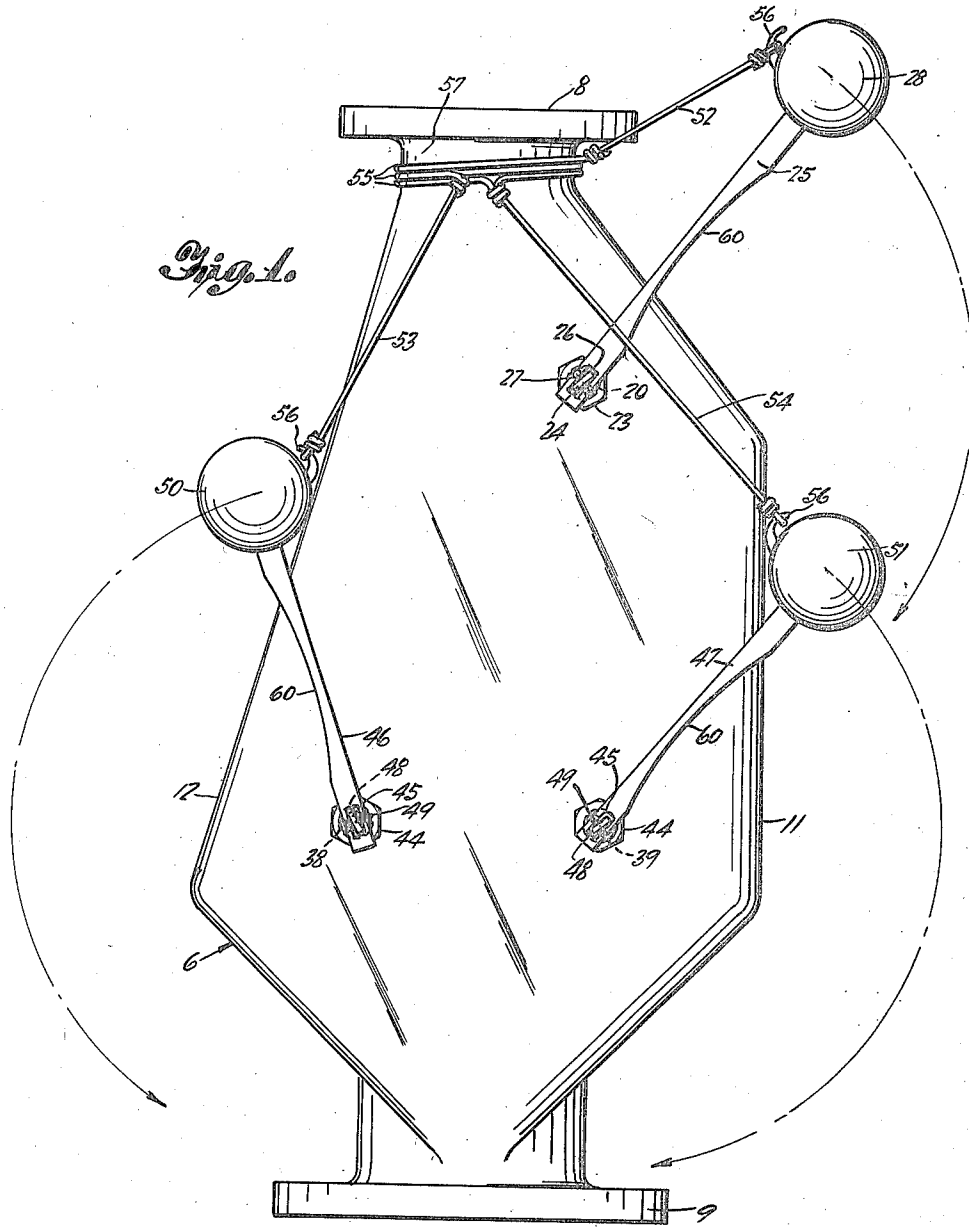
J. S. BRITTINGHAM

2,052,275

AUTOMATIC VALVE

Filed Aug. 29, 1935

3 Sheets—Sheet 1



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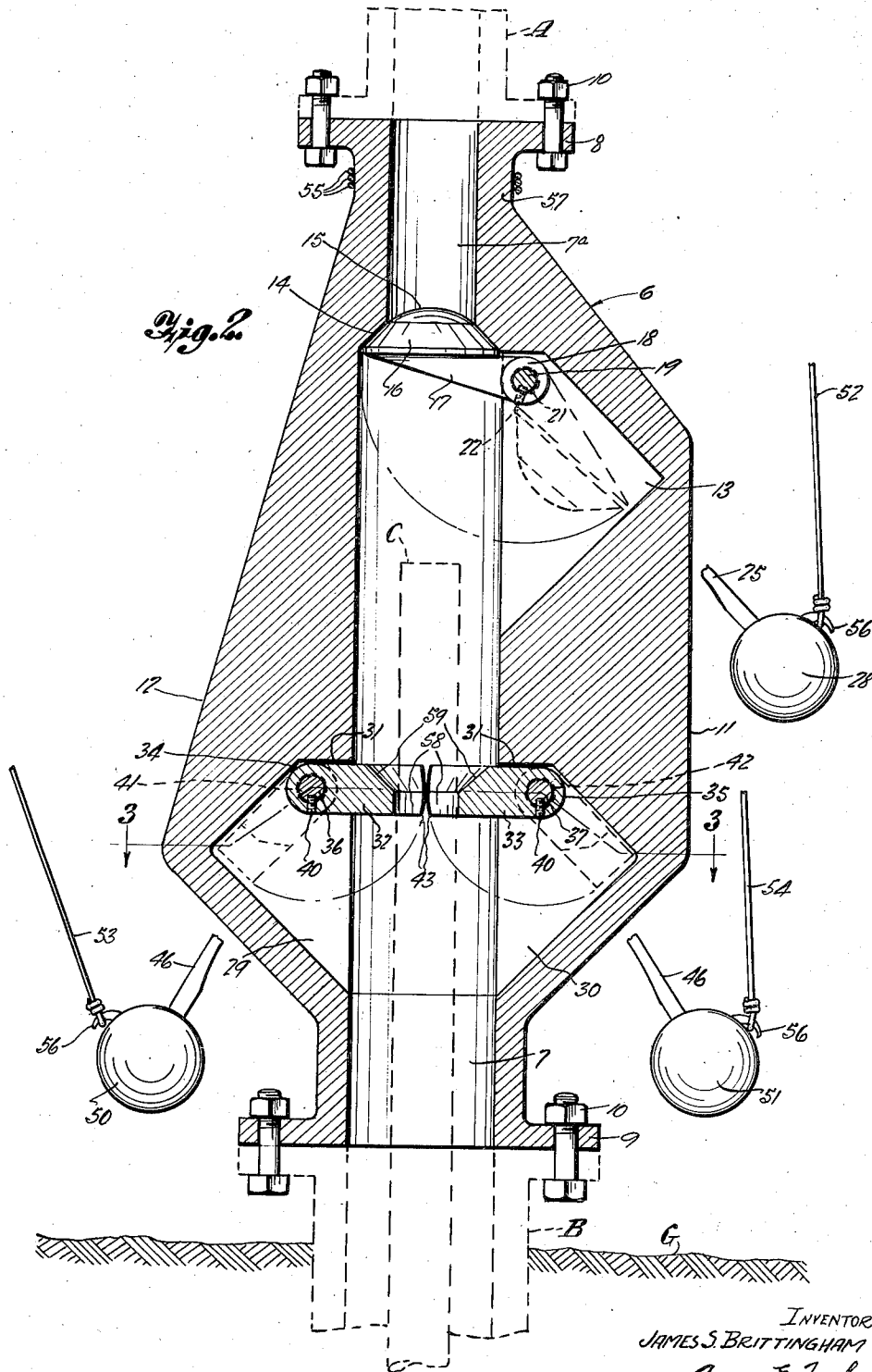
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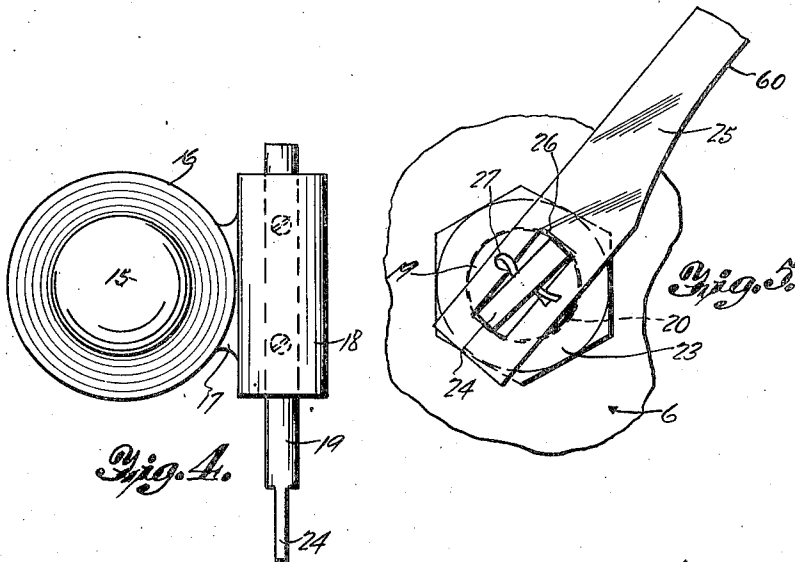
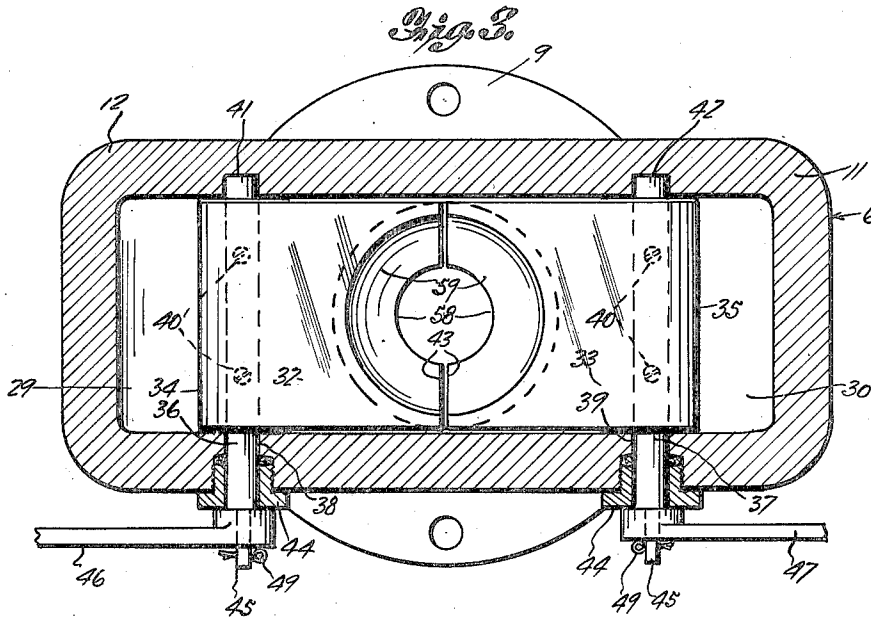
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# UNITED STATES PATENT OFFICE

2,052,275

## AUTOMATIC VALVE

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Application August 29, 1935, Serial No. 38,375

### 1 Claim. (Cl. 137—162)

This invention relates to automatic valves for oil and gas wells.

The main object is to provide a valve adapted to be mounted in the well casing near the ground level and including means whereby passage through the casing will be automatically shut off should a fire start in the well and the fire will be smothered and extinguished.

Another object is to provide a device of this kind comprising a housing flanged at each end for connection in the well casing between adjacent sections thereof and having a central axially extending passage joining the casing sections, there being a plug valve and seat near the intended upper end of the housing and a pair of lateral gate valves near the intended lower end with mating recesses in their inner ends adapted to receive and embrace the well drill rod when closed, the said valves all having arms arranged externally of the housing and weighted to normally swing downward and close the valves, and tie wires to hold up the arms, the said wires being of fusible metal having differing low melting points so that they will be melted should a fire start in the well casing and then will part and allow the arms to swing downward and close the valves one at a time.

Another object is to provide a valve of this kind in simple, practical and durable form.

With these and other objects in view the invention resides in the novel construction and arrangement of parts as hereinafter fully set forth and claimed, reference being had to the accompanying drawings wherein:

Figure 1 is a side elevation of the valve alone showing the arms in raised position.

Figure 2 is a medial vertical and longitudinal section showing fragments of the well casing and drill rod in broken lines and showing the arms swung downward and the valves all closed.

Figure 3 is a horizontal cross section along the line 3—3 in Figure 2.

Figure 4 is an enlarged plan view of the upper or plug valve and its stem.

Figure 5 is an enlarged fragmental end view of one valve stem showing the connection of the arm therewith.

Referring now with more particularity to the drawings my invention comprises an elongated housing 6 of heavy and sturdy construction and material and having a passage 7 extended axially through from end to end. The housing at the ends is flanged as shown at 8 and 9 whereby it may be secured by bolts 10 between adjacent sections A and B of the usual well casing with

the passage 7 forming a continuation of the bore through the casing. Intermediate its ends the housing 6 is bulged or extended out laterally as indicated at 11 and 12. A valve recess or pocket 13 is formed in the housing communicating with the passage 7 and extending in substantially triangular shape into the bulge 11 on one side, the location being toward the intended or predetermined upper end portion of the housing as shown. At the upper extremity of the pocket 13 where the same merges into the passage 7 the said passage is reduced in diameter clear up to the upper end flange 8 as indicated at 7a and an annular, upwardly tapering valve seat 14 is formed around the passage at this point. A plug valve 15 having a tapering annular face 16 to seat tightly against the valve seat 14 is provided and same has a radially extended hinge arm 17 terminating in a tubular mounting hub 18 which fits nicely into the valve pocket 13 near the upper end thereof. A valve stem 19 is journaled through an opening 20 in the housing 6 through the hub 18 and into a socket 21 in the wall of the pocket 13 and the said hub 18 is rigidly secured to this stem by set screws 22 whereby rotation of the stem will swing the valve 15 either to its seat 14 or outwardly into the pocket 13 as shown in dotted lines (Figure 2) clear of the passage 7. The said stem 19 extends endwise through the opening 20 exteriorly of the housing 6 and is packed and sealed by a packing gland 23, the extreme outer end of the stem being flattened as shown at 24. An arm 25 is mounted by a rectangular opening 26 on this flattened stem end 24 and held in place by a cotter key 27 and a ball weight 28 of suitable size is rigidly mounted on the outer end of the arm.

Some distance below the upper valve pocket 13 horizontally aligned and laterally opposed lower pockets 29 and 30 are extended from the passage 7 out into the bulged sides 11 and 12 of the housing, these pockets being also of substantially triangular shape but with horizontally extended or faced stop shoulders 31 at their upper inner ends or extremities. A pair of flat rectangular gate valves 32 and 33 are provided and include hubs or bored hub ends 34 and 35 fitted into the pockets 29 and 30 just below the stop shoulders 31. Valve stems 36 and 37 are journaled through openings 38 and 39 in the walls of the pockets 29 and 30, passed through the hubs 34 and 35 and secured therein by set screws 40 and journaled at their inner ends in sockets 41 and 42 in the opposite sides of the pockets as clearly shown in Figure 3. The gate

valves 32 and 33 are thus adapted upon rotation of their stems 36 and 37 to swing inwardly to a horizontal position across the passage 7 or to swing outwardly into the pockets 29 and 30 clear of the passage as shown in dotted lines (Figure 2). The length of the gate valves is such that they will just nicely meet at their inner ends 43 when stopped in horizontal or closed position and resting against the shoulders 31. At their outer ends the stems 36 and 37 project exteriorly of the housing through packing glands 44 in the openings 38 and 39 and like the aforesaid stem 19 are flattened as at 45. Arms 46 and 47 are mounted by rectangular apertures 48 on the flattened ends 45 of the stems 36 and 37 and held in place by cotter keys 49, and ball weights 50 and 51 are rigidly mounted on the outer ends of these arms. The arms 25, 46 and 47 are all so mounted that when same are raised to an upwardly and angularly extended position (Figure 1) their respective valves 15, 32 and 33 are in opened position or swung outward into their pockets clear of the passage 7 as shown in dotted lines in Figure 2. The arms are then held in this position by tie wires 52, 53 and 54 all wrapped around the housing 6 near its upper end as shown at 55 and extended thence outwardly to the weights 28, 50 and 51 where they are twisted around hooks 56 formed on these weights as shown. The tie wire 52 thus holds up the arm 25, the tie wire 53 holds up arm 46 and tie wire 54 holds up arm 47 as shown. These tie wires are all made of some readily fusible metal having a very low melting point such as an alloy of lead, bismuth, or the like.

In use the housing 6 is mounted as described between adjacent well casings A and B at or above the ground level G and the work of drilling the well proceeds as usual. Now should a fire break out in the well as often occurs with disastrous results the heat and flame passing through the housing passage 7 will melt the tie wires 52, 53 and 54 where they are wrapped at 55 around the housing and the arms 25, 46 and 47 thus freed will fall or swing downward under influence of the weights 28, 50 and 51 and swinging their associated valves 15, 32 and 33 to closed position as described will shut off or seal the passage 7 and the fire below will be smothered and extinguished for want of air as will be readily understood. Then when the fire is out, by again raising and tying the arms the valves are opened and the gas or oil may be drawn off in usual manner. To make the action more positive the housing has a reduced, thin-walled neck 57 at its upper end around which the tie wires are wrapped as at 55 and the heat thus acts much quicker on the wires.

In some cases the drill rod C shown in dotted lines in Figure 2 may still be in the well when fire breaks out and the upper or plug valve 15 may strike this drill rod and be prevented from closing. The meeting ends 43 of the gate valves 32 and 33 however have mating semicircular recesses 58 which will encircle and embrace the drill rod as shown and will thus still seal the well and extinguish the fire as will be understood. The drill rod C may be resting off center in the casing and for this reason the tie wires 52, 53 and 54 are all made of slightly different compositions so that each will burn or melt at a slightly different temperature. The preferred arrangement is such that the wire 54 will melt first closing valve 33, the wire 53 will melt next closing valve 32 and finally the wire 52 will melt and close the plug valve 15. This results in the valves centering the drill rod C in the housing so that a tight seal is formed as will be understood. The gate valves 32 and 33 may be further tapered and flaringly enlarged around the recesses 58 as shown at 59 to aid in this centering of the drill rod if so desired.

The rectangular openings 26 and 48 in the arms 25, 46 and 47 are substantially larger than the flattened ends 24 and 45 of the valve stems which they receive as clearly shown in Figure 5 and as a result when the arms start their downward swing as the tie wires melt and part the stems are at first not turned but as the sides of the openings engage the stems the valves are given a sharp jerk closing them quickly. To further aid in this "snapping" the valves shut, the arms 25, 46 and 47 are made of spring material and thinned or cut away intermediate their ends as at 60 so that some resiliency is imparted to the arms.

While I have herein set forth a certain preferred embodiment of my invention, it is understood that I may vary from the same in minor structural details, so as best to construct a practical device for the purpose intended, not departing from the spirit of the invention and within the scope of the appended claim.

I claim:

In a device of the kind described including a housing having an axial bore and valves pivotally mounted therein, valve stems secured to the valves and extended outwardly from the housing, the outer ends of the stems being flattened, arms having rectangular openings for loosely engaging the said flattened ends of the stems, weights at the free ends of the arms, the said arms being made of spring material and reduced in cross sectional area intermediate their ends.

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