

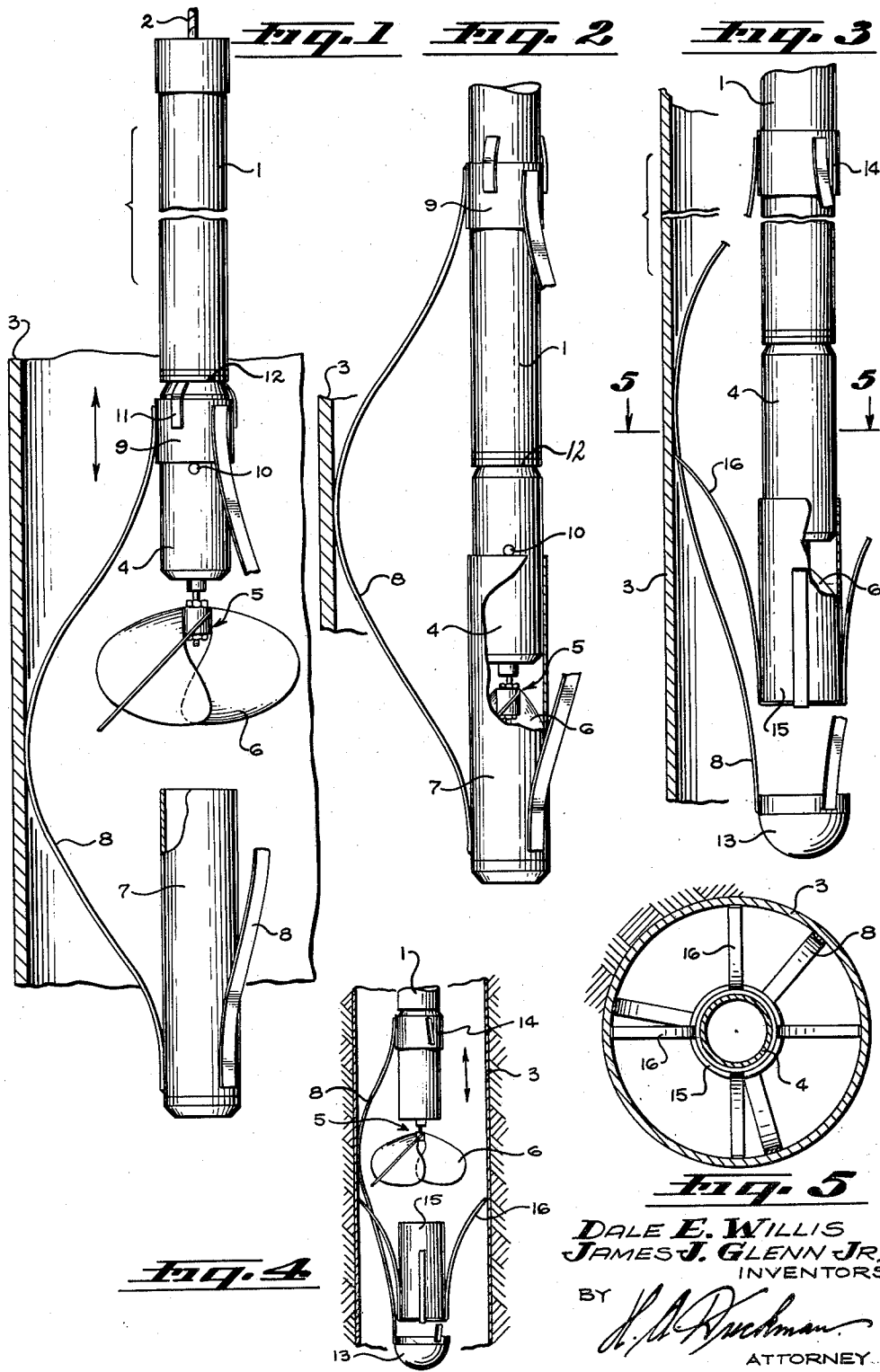
Nov. 13, 1962

J. J. GLENN, JR., ET AL

3,063,292

IMPELLER BLADE PROTECTING MEANS FOR FLOW METERS

Filed Nov. 30, 1959



1

3,063,292

IMPELLER BLADE PROTECTING MEANS FOR FLOW METERS

James J. Glenn, Jr., 4716 Funfield Ave., Long Beach 8, Calif., and Dale E. Willis, 5938 N. Whitewood Ave., Lakewood, Calif.

Filed Nov. 30, 1959, Ser. No. 856,143

2 Claims. (Cl. 73-155)

This invention relates to an impeller blade protecting means for flow meters which are run into oil or water wells. It is sometimes desirable and necessary to determine the rate of flow of the fluid in an oil or water well, and to perform this function a flow meter device is lowered into the well on a cable and flow rate is determined at one or more points throughout the depth of the well, all of which is usual and well known in the art.

Since oil and water wells have tubing or casing throughout the depth thereof this tubing or casing will vary in diameter from top to bottom of the well. The flow meter includes an impeller having blades, and when running the tool into the well the impeller blades would have to expand or contract to conform to the various diameters of the casing or tubing within the well. This constant expansion and contraction of the impeller blades tends to break them off, and also the blades might strike against collar projections and the like within the well, which would mean that the flow meter would not function properly when the test area was reached.

The prime object of our invention is to eliminate this expansion or contraction of the impeller blades while running the tool into the well, and also to protect these blades and keep them in a folded or contracted position until the test area is reached, at which time the protecting means is withdrawn from the impeller permitting the blades of that impeller to expand to a proper diameter so that the flow rate within the well can be determined.

Another object of our invention is to provide a novel protecting means for impeller blades which will house the blades during downward movement of the tool into the well, but which will permit the blades to be withdrawn from the protecting means on upward movement of the tool, and when the desired test area has been reached.

Still another object of our invention is to provide a novel impeller blade protecting means for flow meters which is simple in construction, which will effectively inclose the impeller blades while the tool is running into the well, and which will effectively release the impeller blades from their confined position when the desired test area has been reached.

Other objects, advantages and features of invention may appear from the accompanying drawing, the subjoined detailed description and the appended claims.

In the drawing:

FIGURE 1 is a side elevation of our impeller protecting means showing the protecting sleeve in its released position.

FIGURE 2 is a view similar to FIGURE 1 but showing the protecting sleeve in its blade engaging position.

FIGURE 3 is a side elevation of a modified form of blade protecting means.

FIGURE 4 is a view similar to FIGURE 3 but showing the impeller protector withdrawn from the propeller.

FIGURE 5 is a sectional view taken on line 5-5 of FIGURE 3.

Referring more particularly to the drawing the numeral 1 indicates a tubular commutator housing in which the flow meter commutator or gearing is housed, all of which is usual and well known in the art, and the details

2

of this recording mechanism forms no part of this invention. A cable 2 is attached to the upper end of the housing 1 so that the tool can be lowered into the well casing or tubing 3 to the appropriate depth within the well. A pipe 4 forms a guide for the shaft of the impeller 5. The appropriate bearings, etc., may also be inclosed within this pipe. The blades 6 of the impeller 5 are formed of a rather light metal, that is, the blades are quite thin so that they can flex inwardly or outwardly, or bend without breaking. The blades are made of suitable metal, such as steel or bronze and, as previously stated, are quite thin in cross-section so that they are somewhat delicate and will break if flexed repeatedly while going into a well, or if they should strike certain shoulders or obstructions, such as collars in the casing or tubing.

To keep the blades 6 of the impeller in a folded or contracted position while going into the well, we provide means of retaining the blades to a diameter approximately equal to the housing 1 or the pipe 4. This is accomplished as follows: A sleeve 7 is positioned below the impeller 5 and the outside diameter of this sleeve is about the same as the guide 4 or housing 1. A plurality of spring steel fingers or bows 8 are fixedly attached to the sleeve 7, and these fingers bow outwardly and frictionally engage the inside of the casing or tubing 3. At their upper ends the fingers 8 are fixedly attached to a collar 9, which is slidably mounted on the housing 1 and the guide 4. A stop pin 10 on the guide 4 limits the downward movement of the collar 9 and prevents that collar from slipping off of the lower end of the guide 4. A plurality of spring catches 11 are attached to the collar 9 and these catches engage an annular shoulder 12 in the lowered position of the collar 9; that is, when the collar is engaging the stop 10. Thus the collar 9 cannot move either upwardly or downwardly once the collar is moved to the position shown in FIGURE 1. The position shown in FIGURE 1 is that in which a test is being run in the well and the impeller blades 6 are exposed and rotate, due to the flow of the fluid in the well. The operation of the structure shown in FIGURES 1 and 2 are as follows: The catches 11 are released from the shoulder 12 and the collar 9 is pushed upwardly on the guide 4 and housing 1. The sleeve 7 also moves upwardly and the blades 6 of the impeller are folded or contracted so that they will slide into the sleeve 7. This is the position shown in FIGURE 2. When the tool is run into the well the friction of the bows 8 on the tubing or casing 3 will hold the parts in the position shown in FIGURE 2. When the test area is reached the cable 2 is pulled upwardly and again the friction of the bows 8 will hold the sleeve 7 stationary, permitting the impeller 5 to be pulled out of the sleeve into operating position, shown in FIGURE 1. The collar 9 is now engaging the stop pin 10 and the catches 11 engage the shoulder 12, thus holding the parts in position so that the pipe testing will not be interfered with. The parts remain in the position shown in FIGURE 1 when the tool is returned to the surface.

The modification, shown in FIGURES 3, 4 and 5, is similar to the construction previously described; however, in this instance the protecting sleeve is not attached to the bows 8. In this latter instance the bows 8 are secured at the lower end to a bullnose 13, and to the upper end to a collar 14. The collar 14 is pinned or is otherwise fixedly attached to the housing 1. To protect the blades 6 of the impeller we provide a separate sleeve 15 to which a plurality of spring arms 16 are attached. These spring arms extend upwardly and outwardly from the sleeve 15 and engage the inside of the tubing or casing 3 the same as the bows 8. The springs 16 thus drag

3

against the inside of the casing 3 during the downward movement of the tool and, as a result, tend to hold the sleeve 15 on the impeller 5.

The operation of the last described modification is as follows: The bows 8 tend to hold the tool centrally within the casing or tubing 3. Before the tool is run into the well, the sleeve 15 is pushed over the blades 6 of the impeller, thus constricting and protecting these blades. The sleeve 15 completely houses or incloses the impeller. The spring fingers 16 press outwardly against the inside of the casing and thus drag against the casing on downward movement of the tool, tending to push upwardly on the sleeve 15 and thus hold the sleeve on the impeller 5. When the test area is reached, upward movement of the entire tool will cause the spring fingers 16 to bite into the casing or tubing to hold the sleeve 15 stationary and permitting the impeller 5 to be pulled out of the top of the sleeve. This exposes the impeller 5 and permits it to rotate during the testing operation. When returning the tool to the surface the spring fingers 16 are sufficiently light and flexible so that they will bend back upon themselves, permitting the tool to be retrieved.

Having described our invention, we claim:

1. A protecting means for the impeller blades of a flow meter, said flow meter being movable into and out of a well and consisting of a cylindrical housing, a sleeve slidably mounted on said housing and inclosing the blades of the impeller during downward movement of the flow meter into the well, a plurality of spring fingers, said

4

spring fingers being attached at one end to said sleeve, a collar surrounding said housing and slidable longitudinally thereon, said spring fingers being attached at one end to said collar, said spring fingers being engageable with the wall of the well to slide said sleeve away from the impeller blades on upward movement of the flow meter.

2. A protecting means for the impeller blades of a flow meter, said flow meter being movable into and out of a well and consisting of a cylindrical housing, a sleeve slidably mounted on said housing and inclosing the blades of the impeller during downward movement of the flow meter into the well, a plurality of spring fingers, said spring fingers being attached at one end to said sleeve, a collar surrounding said housing and slidable longitudinally thereon, said spring fingers being attached at one end to said collar, said spring fingers being engageable with the wall of the well to slide said sleeve away from the impeller blades on upward movement of the flow meter, and catch means on said collar, said catch means holding the collar in position with the sleeve disengaging the blades of the impeller.

References Cited in the file of this patent

UNITED STATES PATENTS

2,649,710	Dale	Aug. 25, 1953
2,649,711	Dale	Aug. 25, 1953
2,944,603	Baker et al.	July 12, 1960