Oct. 1, 1929. S. B. MERRICK 1,730,158

SUCKER ROD GUIDE

Filed Jan. 19, 1928

Fig. 1.

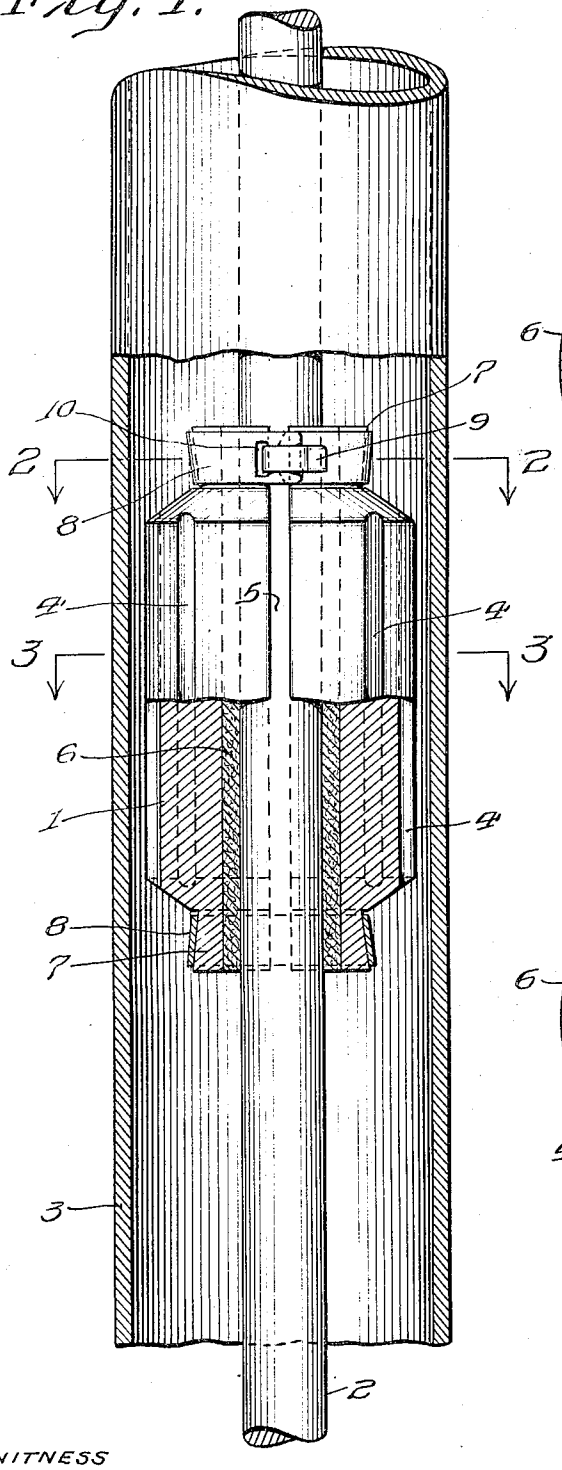



Fig. 2.

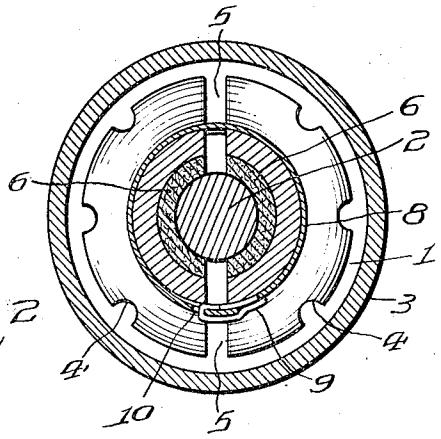
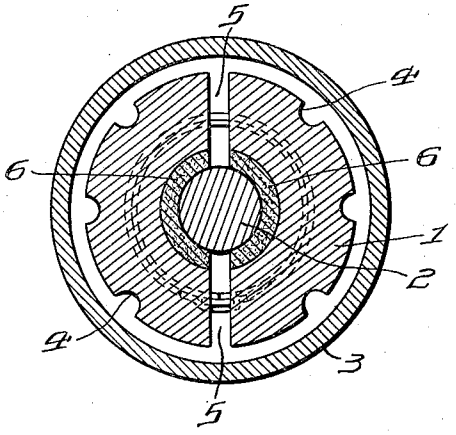



Fig. 3.




WITNESS

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# UNITED STATES PATENT OFFICE

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## SUCKER-ROD GUIDE

Application filed January 19, 1928. Serial No. 247,780.

The present invention relates to sucker rod guides which are employed in connection with the sucker rods to guide the same in their movement within the tubing that is sunk in an oil well casing.

These sucker rods extend downwardly to the pump or working barrel at the foot of the tubing, and are of smaller diameter than the tubing, so as to pass loosely therethrough and afford a passage for the fluid as it is pumped from the well. They tend to move laterally or buckle as they reciprocate in the operation of the pump, particularly where the well is not straight or is sunk to a great depth, and thus to come in contact with the inner surface of the well tubing, with the result that the latter is often scored or otherwise damaged and the sucker rods are badly worn. This is a serious matter as it becomes necessary to replace the sucker rods frequently and also to pull out and replace the well tubing from time to time, both of which—and especially the latter—involve not only considerable expense for the replacements but also substantial loss through the time the well is out of production while such replacements are being made. Furthermore, the lateral movement or buckling of the sucker rods, frequently results in the breaking off of the threaded ends thereof which are screwed into the couplings, and hence their accidental disconnection.

Heretofore it has been attempted to overcome these difficulties by fixing guides on the sucker rods to control the lateral displacement of the rods within the tubing. But these guides have not been satisfactory in actual use. They have not been impervious to dilute acids, salt water, hot water, steam, and oil and other hydrocarbons,—some or all of which are present in the fluid pumped from oil wells,—and have been attacked thereby and rendered of short life. This has been the case whether the guides were made of wood or of metal, such as bronze, these being the materials which have usually been employed. Moreover, with such guides, whether of wood or metal, there is a considerable amount of friction between the same and the inner surface of the tubing. Because of this one or both of the parts wears away rapidly, and there is also a drag imposed upon the pump which decreases the operating efficiency of the apparatus. In fact, the wood guides soon disintegrate and become worthless, and while the metal guides tend to protect the sucker rods, they do not relieve the well tubing of wear, and yet damage to it is even more serious than to the sucker rods.

The weight of the guides is also an important factor, in view of the additional load thus imposed upon the operation of the pump; with guides made of metal, for instance, the loss is substantial through the additional power consumed. The metal guides are also objectionable in that they do not wear evenly, and the small particles which are worn away do not float off with the fluid pumped from the well but settle to the bottom of the well tubing and interfere with the operation of the pump. In addition, the guides previously in use tend to work loose on the sucker rods, or if securely fixed in position thereon, the fastening means employed materially weaken both the sucker rods and the guides.

An object of the present invention is to overcome the foregoing difficulties and to provide a sucker rod guide which is not attacked by the fluid pumped from the oil well; which has a low co-efficient of friction, thus increasing greatly the life of both the guide and the tubing and causing the pump to operate easier and with less power; which polishes the inner surface of the tubing instead of scoring it; which wears evenly and in particles that float off with the fluid from the well and do not settle in the bottom of the tubing; which has a relatively low specific gravity and adds but little additional load on the pump, and which may be easily and cheaply manufactured.

A further object of the invention is to provide improved means for fixing the guides to the sucker rods so that they may be conveniently applied thereto and rigidly held in the desired position thereon and against accidental displacement, notwithstanding the

jarring and vibration of the apparatus incident to the operation of the pump.

A further object of the invention is to provide fastening means of this character, by means of which the guide may be secured to the sucker rod without the use of bolts, screws, pins, or like fastening devices, passing through the body of the guide and/or through the sucker rod, and weakening the structure of one or both of such parts.

With these and other objects in view, the invention comprises certain novel features of construction, combinations of elements and arrangements of parts which will be exemplified in the device hereinafter set forth and pointed out in the appended claims.

Referring to the accompanying drawing—

Figure 1 is a vertical sectional view partly in elevation, illustrating one embodiment of my invention and showing such a guide mounted on the sucker rod and located within the well tubing.

Fig. 2 is a transverse section on the line 2—2 of Fig. 1.

Fig. 3 is a transverse section on the line 3—3 of Fig. 1.

According to my invention I provide a guide, the body of which is made of phenolic resinoid such as bakelite, having a suitable binder. I have discovered that such a material possesses properties which make it peculiarly adapted for the construction of sucker rod guides. It is impervious to dilute acids, salt water, hot water, steam, and oil and other hydrocarbons, and is not attacked thereby. It has a low co-efficient of friction, thus increasing greatly the life of both the guide and the well tubing. It polishes the inner surface of the steel tubing—which is rough and unfinished—instead of scoring it. It wears evenly and in small particles which float off with the fluid from the well and do not settle at the bottom of the tubing and interfere with the operation of the pump. It has a relatively low specific gravity, for instance, only about one-third of that of bronze, and imposes but little extra load on the pump. It is also comparatively inexpensive, and may be readily manufactured into the desired form.

My invention consists broadly in the making of the body of the guide, or at least the peripheral portion thereof, out of a phenolic resinoid having a suitable binder. The material is produced by subjecting the binder impregnated with the phenolic resinoid or raw bakelite to hydraulic pressure and sufficient heat to form a homogeneous permanent mass. The binder may consist of linen or cotton fabric, or any other suitable material, and may be present in the form of laminations or in the form of chopped rags.

Referring now to the present embodiment of the invention, the body 1 of my improved guide is hollow or tubular and mounted on a sucker rod 2 to reciprocate therewith within the well tubing 3. The body may be of any suitable size and shape, but is preferably cylindrical and of less external diameter than the internal diameter of the tubing in order to be normally out of contact therewith, and to provide an interposed annular passage for the fluid which is pumped from the well. In order to further facilitate the flow of such fluid a plurality of longitudinal grooves or channels 4 may be formed in the periphery of the body of the guide.

The body is preferably divided longitudinally into two substantially semi-cylindrical companion sections or halves, for convenience in assembling the guide upon the sucker rod. These two sections may be secured together and clamped in desired position upon the sucker rod in any suitable manner. By reference to Figures 2 and 3 of the drawing it will be seen that the longitudinal edges of the sections may be spaced apart, as indicated at 5, thus permitting a tight clamping action, and also affording additional longitudinal passages for the upward flow of the fluid from the well during the operation of the pump.

As an improvement on the fastening means heretofore employed in sucker rod guides and as one means for clamping the body 1 on the sucker rod 2, a bushing 6 of absorptive material is suitably secured within the body, the bushing being made in two sections corresponding to and carried by the respective sections of the body. Suitable means are provided in conjunction with this bushing to hold the companion sections of the body together in association about the sucker rod. In the present embodiment of the invention this is accomplished by providing reduced end portions 7 at the opposite ends of the body and placing clamping straps or bands 8 around the same, a tongue 9 at one end of each band being locked through a slot 10 in the other end. The reduced end portions 7 of the body are preferably flared, i. e., increased in external diameter toward their outer extremities, so that the bands 8, when locked therearound, are retained in position against longitudinal displacement.

The absorptive bushing 6 may be of any fibrous material, such as, for instance, a composition of rag fibre chemically treated and subjected to heat and pressure, California red-wood, cedar, soft pine, or other suitable composition or natural material, which will swell when wet. The bushing may be cemented or otherwise fixed within the body 1, or it may be united thereto under heat and pressure during the formation of the body, so as to form a permanent mass. The body and the bushing may be made in tubular form and then severed longitudinally, or the companion sections may be separately molded.

When the guide is assembled on the sucker rod as above described, the clamping bands 8 hold it in the desired position thereon until and while it is lowered into the well tubing. In service, the liquid pumped up through the tubing keeps the bushing 6 wet, and is sufficiently absorbed thereby to cause the same to swell and to maintain it in swollen condition. No such swelling action occurs, however, in the body 1 as that is of non-absorptive or substantially non-absorptive material. The sections of the body are rigid and inflexible and, being held together by the clamping bands 8, effectively confine the bushing and resist peripheral expansion, with the result that the swelling force serves to increase the tension on the clamping bands and causes the bushing to grip the sucker rod to fix the guide firmly in position. Thus fixed, the guide will not be displaced even under the most severe working conditions.

By providing the resistance to peripheral expansion, the swelling force is not only utilized to secure the guide, but is restrained to prevent it from reducing the size of the passage between the guide and the tubing. The fastening of the guide is therefore accomplished by simple, durable and efficient means and without weakening either the guide or the sucker rod, and without obstructing the upward flow of fluid from the well.

The bushing preferably extends throughout the length of the body so that it is exposed to the liquid at each end. The longitudinal edges of its sections are also preferably spaced apart and exposed to the liquid in the spaces 5. This insures a more complete absorption of the liquid and hence the application of a more uniform and effective swelling force.

If, in the assembling of the guide, the bands 8 are not applied tight enough to secure the guide preliminarily in the desired position, it will be apparent that by merely wetting the bushing the necessary clamping action can be readily obtained.

From the foregoing description, in connection with the accompanying drawing, it is believed that the operation of my improved sucker rod guide will be obvious. It will be seen that I have provided a guide which satisfactorily overcomes the present difficulties in the art, which relieves both the sucker rod and the well tubing of wear and greatly increases the effective life thereof, which does not add material load or drag on the pump or otherwise interfere with its efficient operation, which may be easily and cheaply manufactured and readily applied, has a long life, is not likely to get out of order, and is practical and economical in use.

It is to be understood that the features of my invention comprising the making of the body of the guide of phenolic resinoid, and the means of fixing the guide upon the sucker rod, may be used either separately or conjointly, according as desired, although the best results are obtained by their coaction. The present embodiment of the invention is by way of illustration only and various changes may be made in the combinations of elements and the form and arrangement of the parts, without departing from the spirit and scope of the invention as defined in the appended claims.

Having thus described my invention, I claim and desire to protect by Letters Patent of the United States:

1. A sucker rod guide comprising a hollow body, an absorptive bushing fixed within the body and adapted to swell when wet to fix the guide in position on a sucker rod, the body and the bushing being formed in companion longitudinal sections, and means for holding said sections in association about a sucker rod, the bushing being exposed at the meeting edges of the sections.

2. A sucker rod guide comprising a hollow body, an absorptive bushing fixed within the body and adapted to swell when wet to fix the guide in position on the sucker rod, the body and the bushing being formed in companion longitudinal sections, and means for holding said sections in association about a sucker rod, the bushing extending longitudinally of the body and being exposed at the ends thereof and at the meeting edges of the sections.

3. A sucker rod guide comprising a hollow body of phenolic resinoid, an absorptive bushing fixed within the body and adapted to swell when wet to fix the guide in position on a sucker rod, the body and the bushing being formed in companion longitudinal sections, and means for holding said sections in association around a sucker rod.

In testimony whereof, I have signed my name to this specification.

SUMNER B. MERRICK.