June 21, 1960 J. G. ADAMS 2,941,500

INHIBITOR APPLICATOR

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Fig.1

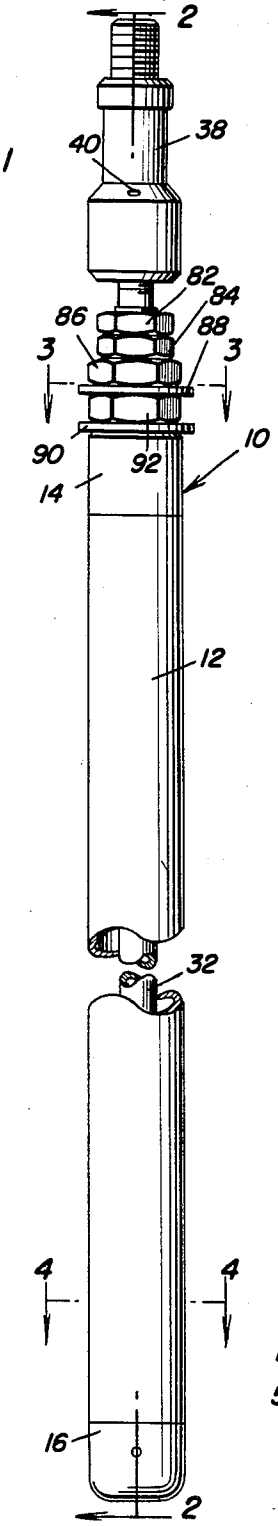


Fig.3

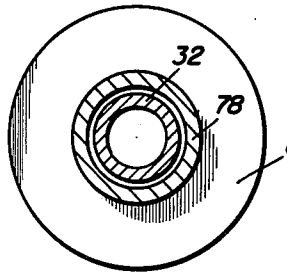


Fig.4

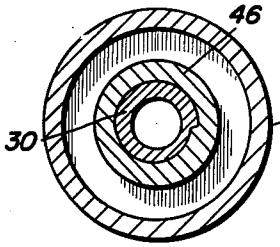


Fig.5

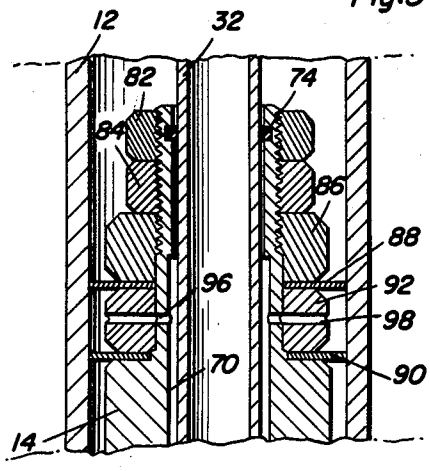
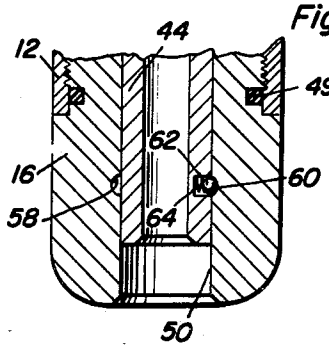


Fig.6



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INHIBITOR APPLICATOR

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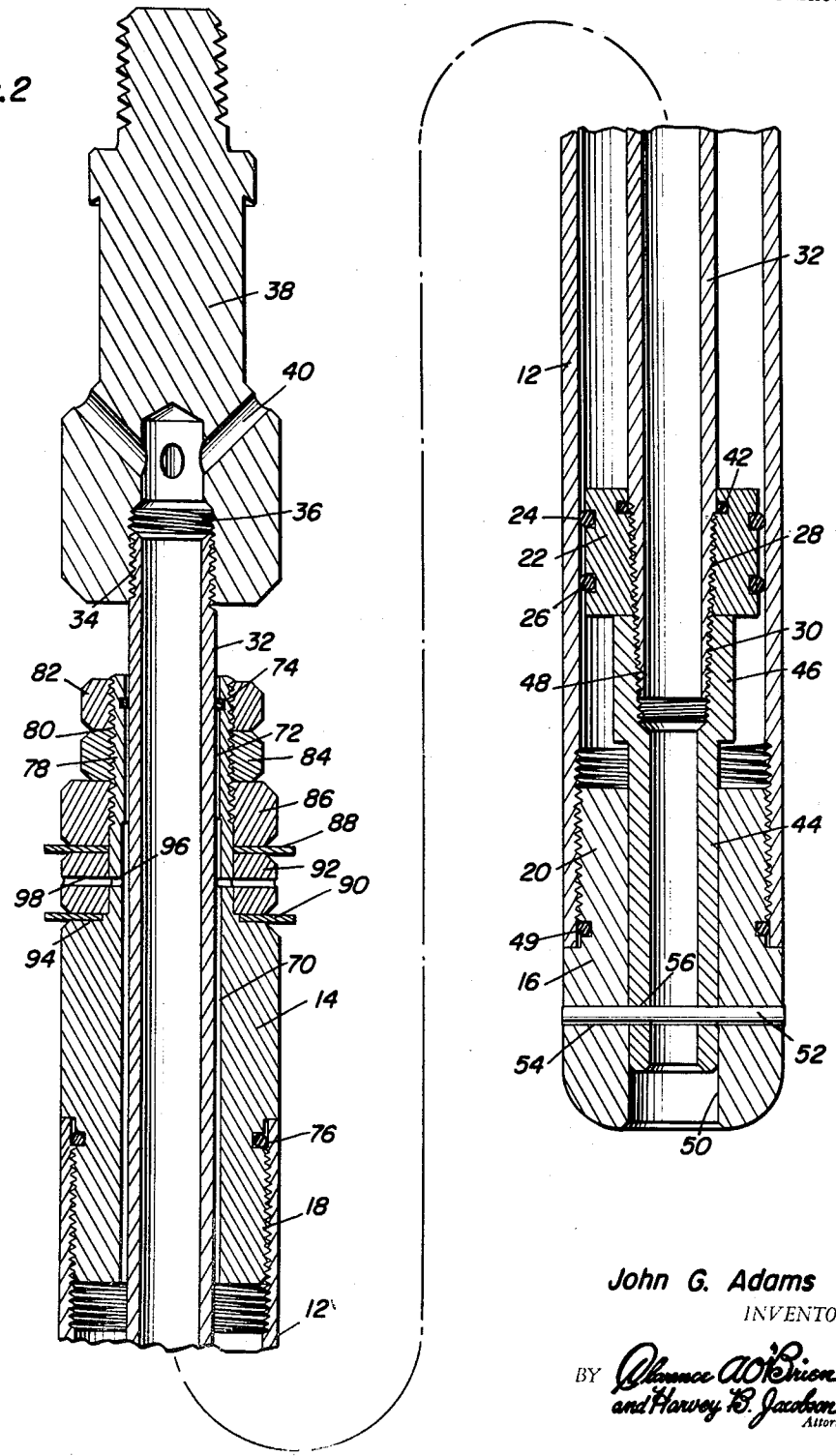
Fig. 2



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INHIBITOR APPLICATOR

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9 Claims. (Cl. 118—408)

This invention comprises a novel and useful inhibitor applicator and more particularly relates to an apparatus for effectively and uniformly applying a coating of corrosion inhibiting material to the inside of casings or tubings such as those employed in oil wells and the like.

It frequently occurs in producing oil wells that the casing and tubing of the same are deleteriously affected by corrosion resulting from the chemical action of formations and fluids through which the well bore passes. In order to minimize such damage to the casings or tubings, and the expense and delays occasioned by the necessity for replacing the same, compositions of liquid or semi-liquid corrosion inhibiting substances are applied to the surfaces of the pipes which are subject to such corrosion. Owing to the great length of pipes and tubing commonly employed in oil wells and the like, the action of the fluids flowing in such pipes or engaging the surfaces thereof, the application of the corrosion inhibitor thereto is very difficult.

It is therefore the primary purpose of this invention to provide an apparatus capable of applying a coating of corrosion inhibitor to the interior of well casings and tubing with great uniformity, efficiency and rapidity.

A further object of the invention is to provide an apparatus in accordance with the foregoing object which shall be of relatively simple construction and yet extremely certain and efficient in its operation.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

Figure 1 is an elevational view, parts being broken away, showing a suitable form of apparatus in accordance with this invention;

Figure 2 is a view taken upon an enlarged scale substantially upon the plane indicated by the section line 2—2 of Figure 1, parts being broken away, and showing the internal construction of the apparatus of Figure 1 with the parts thereof in position for lowering into a casing or tubing in preparation for the beginning of the inhibitor applying operation of the device;

Figures 3 and 4 are horizontal sectional views taken substantially upon the planes indicated by the section lines 3—3 and 4—4 respectively of Figure 1;

Figure 5 is a detail view taken on an enlarged scale showing a portion of the apparatus of Figure 2, and specifically that portion of the apparatus by which the corrosion inhibitor is applied to the bore of a casing or tubing; and

Figure 6 is a detail view taken upon an enlarged scale of the lower portion of the apparatus of Figure 2 showing a modified construction of means for retaining the device in its initial position in readiness for the beginning of its operation.

Referring more particularly to Figures 1 and 2, it will

be seen that the corrosion inhibitor applicator embodying the principles of this invention comprises a vertically elongated hollow tool designated generally by the numeral 10. This tool includes a barrel portion consisting of a cylindrical housing 12 constituting a container for the corrosion inhibitor or other liquid to be dispensed by the device, and which will be of sufficient external diameter as to be loosely slidable in a pipe such as a well tubing or casing whose interior is to be coated by the apparatus. The housing 12 includes upper and lower closures 14 and 16 respectively which may comprise bushings whereby the open top and bottom ends of the housing are closed except as set forth hereinafter.

For this purpose, the open upper and lower ends of the housing are internally threaded to receive externally threaded diametrically reduced portions 18 and 20 respectively of the two end closures. Slidable in the housing between these two closures is a plunger or piston 22 having conventional sealing means such as O-rings 24 and 26 whereby a fully tight seal is established between the circumference of the plunger and the internal wall of the housing. An axially disposed internally threaded bore 28 is disposed through the plunger to receive the externally threaded lower portion 30 of a hollow plunger rod 32. The upper end of the latter extends upwardly through an axial bore in the upper closure 14 to the exterior thereof, and at its upper end is externally threaded as at 34 for engagement in the internally threaded bore 36 of a conventional fitting or coupling 38 by which the plunger rod may be connected to any suitable means for raising or lowering the apparatus in a pipe and for actuating the plunger as set forth hereinafter.

The interior of the threaded bore 36 communicates with the exterior of the device through suitable passages or ports 40 so that the interior of the plunger rod is at all times in communication with the exterior of the device.

Referring more specifically to Figure 2 it will be seen that the internally threaded bore 28 of the plunger is provided with a conventional sealing means such as the O-ring 42 whereby a fluid tight seal is established between this bore and the exterior of the plunger rod.

An extension in the form of a tube or sleeve 44 is provided with a diametrically enlarged upper portion 46, the latter having an internally threaded bore 48 which is engaged upon the externally threaded portion 30 of the plunger rod by which the extension is secured thereto. The upper end of the diametrically enlarged portion 46 abuts against the lower face of the plunger 22 to thereby securely lock the plunger upon the threaded lower end of the plunger rod.

The hollow extension 44 has its exterior surface slidably received in an axial bore 50 which passes entirely through the lower closure 16 to the outer surface thereof. It will thus be observed that the elements 40, 36, the plunger rod 32, and the extension 44 together with the bore 50 provide a passage means by which continuous communication is established from the exterior of the opposite outer ends of the upper and lower closures through the device. This serves to enable free flow of fluid through the device as the same is raised or lowered in a well casing or tubing, or to prevent flow of fluids through the device when the well is in operation.

It will be observed from Figures 2 and 6 that the diametrically reduced upper portion 20 of the lower closure 16 is provided with a conventional sealing means such as the O-ring 49 whereby to prevent fluid leakage between the closure member 20 and the lower end of the housing 12.

In the embodiment of Figures 1–5, there is provided a releasable locking means whereby the extension 44 and thus the plunger 22 is held in its lower position in the

device. This locking means consists of a shear pin which extends through aligned bores 54 and 56 formed respectively in the lower closure 16 and the extension sleeve 44.

In the arrangement of Figure 6, the sheer pin constituting the releasable locking means is replaced by a ball detent construction. For this purpose, the interior or bore 50 of the lower closure 16 is provided with a circumferentially extending annular groove 58 and a ball detent 60, seated in a recess 62 in the wall of the extension 44, is yieldingly urged by spring 64 into engagement with this groove.

In both arrangements of Figures 2 and 6, it will be apparent that when a sufficient force is applied to the extension 44, the pin 52 will be sheared to thus release the locked engagement of the sleeve 44 with the lower closure 16, or the ball detent 60 will disengage from the locking recess 58 to similarly release the extension from the lower bushing, and thus permit upward travel of the plunger in the housing 12 as set forth hereinafter.

Referring again to Figures 2 and 5, it will be seen that the passage extending through the upper closure 14 consists of an axially disposed lower bore 70 which is spaced slightly from the exterior of the plunger rod 32 to provide a restricted cylindrical space therebetween, and a diametrically reduced upper bore 72 which is slidably engaged upon the plunger rod. A conventional sealing means such as an O-ring 74 is carried by the uppermost portion of the upper closure 14 and engages the exterior of the plunger rod to prevent leakage therebetween. It will also be noted that a sealing means such as an O-ring 76 is provided between the externally threaded portion 18 of the upper closure and the internally threaded portion of the upper end of the housing 12 similar to the O-ring 49 at the lower end of the housing.

The upper portion of the upper closure 14 is diametrically reduced as at 78 and is externally threaded as at 80 for the reception of a pair of locking nuts 82 and 84. A further locking nut constituting a retaining member is shown at 86 beneath the locking nut 84, and serves to clamp in assembled relation a pair of disks 88 and 90 which comprise each a sealing means together with a nozzle body 92 disposed therebetween. The lower sealing means 90 is seated upon an annular seat 94 formed by the junction of the diametrically reduced portion 78 and the upper portion of the upper closure 14.

Discharge means are provided which consist of a series of ports 96 extending through the diametrically reduced portion 78 to the bore 70 upon the interior thereof, together with registering radially disposed passages 98 extending through the nozzle body 92 to the space between the two sealing means 88 and 90.

The sealing means 88 and 90 are formed of any suitable material but preferably of a flexible or resilient nature so that they will resiliently and slidingly engage the interior wall or bore of a pipe in which the applicator is placed and thus will establish a temporarily sealed or partially sealed zone therebetween into which the corrosion inhibitor may be discharged by upward travel of plunger 22, and by upward movement of the tool in the pipe may then be evenly spread upon the internal surface of the latter.

In the operation of the device, the parts are normally in the position shown in Figure 2, at which time the interior of the housing above the plunger 22 is substantially filled with the composition or material to be discharged by the device into the interior of the pipe. With the locking means 52 or 60 in place, the device is suspended by suitable means not shown attached to the member 38 is then lowered into the tubing or well casing to be treated by the apparatus to the desired position therein. Thereafter, as by jarring and the like, the locking means 52 or 60 is caused to release either by shearing the pin 52 or by disengaging the ball detent 60. Thereupon, the weight of the device is sufficient to cause the housing portion of the same to move relatively downwardly past the plunger 22 as the plunger rod is slowly lifted. Upon this downward movement, there is a continuous slow flow or dispensing of the treating agent from the interior of the housing 12, through the discharge means and into the annular space between the two sealing means 88 and 90 to thereby uniformly and evenly coat the interior of the pipe.

This device will be particularly effective for coating the interior of coupled pipe sections such as tubings or casings and the like. Owing to the passage means extending entirely through the device, it will not interfere with the fluid in the pipe as the apparatus is inserted therein or withdrawn therefrom.

From the foregoing, the construction and operation of the device will be readily understood and further explanation is believed to be unnecessary. However, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as claimed.

What is claimed as new is as follows:

1. A coating applicator for the interior of pipes comprising an elongated cylindrical housing of such diameter as to be slidable through a pipe to be coated, top and bottom closures for the ends of said housing, discharge means in the top closure establishing communication between the interior of said housing and its exterior, a plunger reciprocable in said housing between said closures, a plunger rod secured to said plunger and slidable through said top closure and extending thereabove, releasable retaining means securing said plunger adjacent said bottom closure.

2. A coating applicator for the interior of pipes comprising an elongated cylindrical housing of such diameter as to be slidable through a pipe to be coated, top and bottom closures for the ends of said housing, discharge means in the top closure establishing communication between the interior of said housing and its exterior, a plunger reciprocable in said housing between said closures, a plunger rod secured to said plunger and slidable through said top closure and extending thereabove, passage means extending through said plunger and plunger rod and establishing continuous communication through said applicator from outwardly of each closure and establishing equalized pressure at the top and bottom closures.

3. A coating applicator for the interior of pipes comprising an elongated cylindrical housing of such diameter as to be slidable through a pipe to be coated, top and bottom closures for the ends of said housing, discharge means in the top closure establishing communication between the interior of said housing and its exterior, a plunger reciprocable in said housing between said closures, a plunger rod secured to said plunger and slidable through said top closure and extending thereabove, said top closure including a pair of radially outwardly projecting longitudinally spaced sealing members for engaging the bore of a pipe through which the applicator is passed, said discharge means opening into the space between said spaced sealing members.

4. A coating applicator for the interior of pipes comprising an elongated cylindrical housing of such diameter as to be slidable through a pipe to be coated, top and bottom closures for the ends of said housing, discharge means in the top closure establishing communication between the interior of said housing and its exterior, a plunger reciprocable in said housing between said closures, a plunger rod secured to said plunger and slidable through said top closure and extending thereabove, an extension secured to said plunger rod and positioned beneath said plunger, said extension being slidably guided in said bottom closure.

5. The combination of claim 4 including passage

means extending through said plunger, plunger rod and extension and establishing continuous communication through said applicator from the outer ends of said closures and establishing equalized pressure at the top and bottom closures.

6. A coating applicator for the interior of pipes comprising an elongated cylindrical housing of such diameter as to be slidable through a pipe to be coated, top and bottom closures for the ends of said housing, discharge means in the top closure establishing communication between the interior of said housing and its exterior, a plunger reciprocable in said housing between said closures, a plunger rod secured to said plunger and slidable through said top closure and extending thereabove, said top closure comprising a bushing having a bore receiving and in closely spaced relation to said plunger rod, a portion of said bushing being diametrically reduced and having radial ports therethrough, a nozzle body mounted upon and surrounding said reduced portion, discharge passages in said body communicating with said ports, sealing members disposed in said diametrically reduced portion of said bushing embracing said nozzle body therebetween.

7. The combination of claim 6 including means securing said sealing members and said nozzle body fixedly upon said reduced portion.

8. A coating applicator for the interior of pipes comprising an elongated cylindrical housing of such diameter as to be slidable through a pipe to be coated, top and

bottom closures for the ends of said housing, discharge means in the top closure establishing communication between the interior of said housing and its exterior, a plunger reciprocable in said housing between said closures, a plunger rod secured to said plunger and slidable through said top closure and extending thereabove, releasable retaining means securing said plunger adjacent said bottom closure, said releasable means including a shear pin.

9. A coating applicator for the interior of pipes comprising an elongated cylindrical housing of such diameter as to be slidable through a pipe to be coated, top and bottom closures for the ends of said housing, discharge means in the top closure establishing communication between the interior of said housing and its exterior, a plunger reciprocable in said housing between said closures, a plunger rod secured to said plunger and slidable through said top closure and extending thereabove, releasable retaining means securing said plunger adjacent said bottom closure, said releasable means including a ball detent.

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