

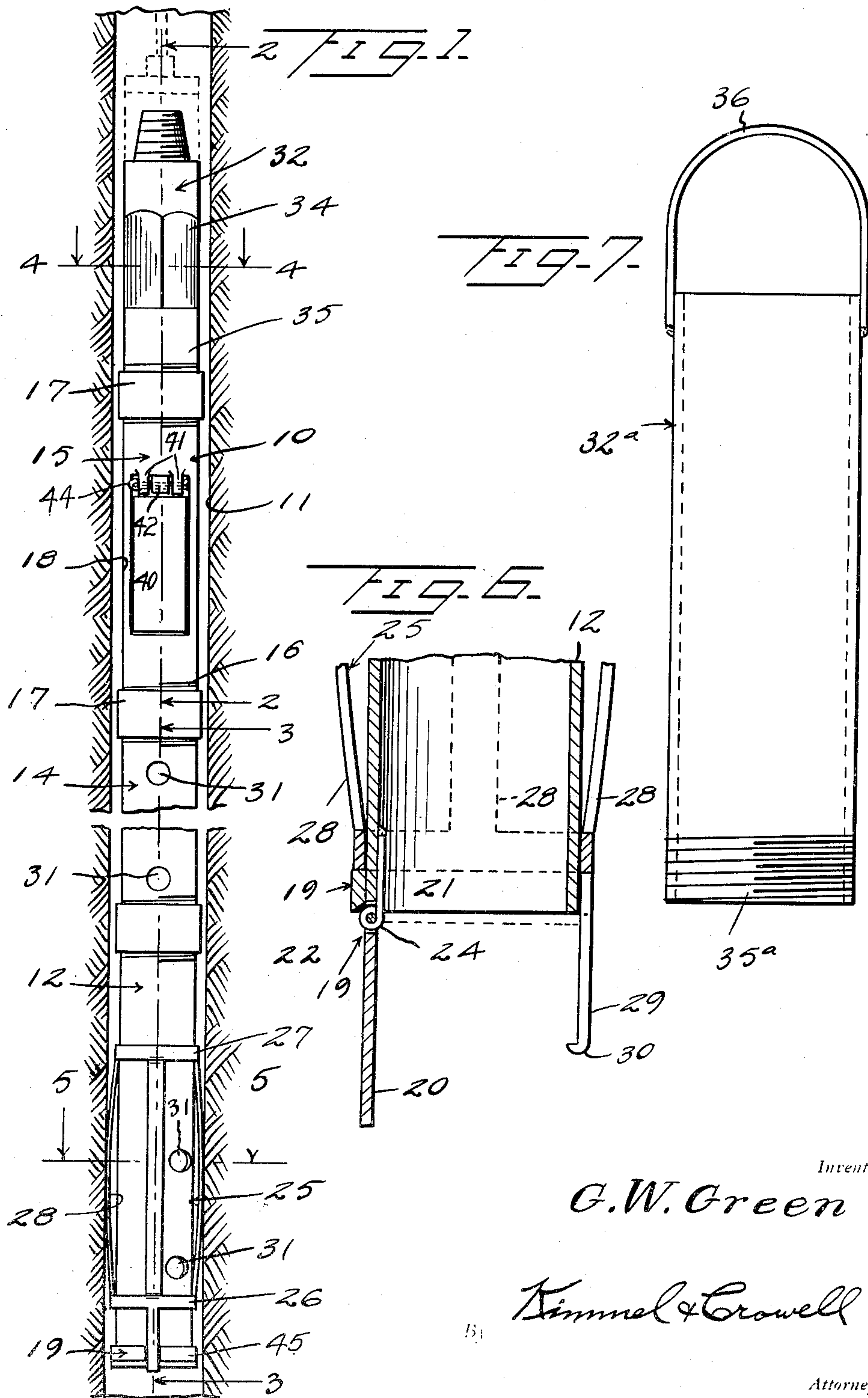
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2 Sheets-Sheet 1



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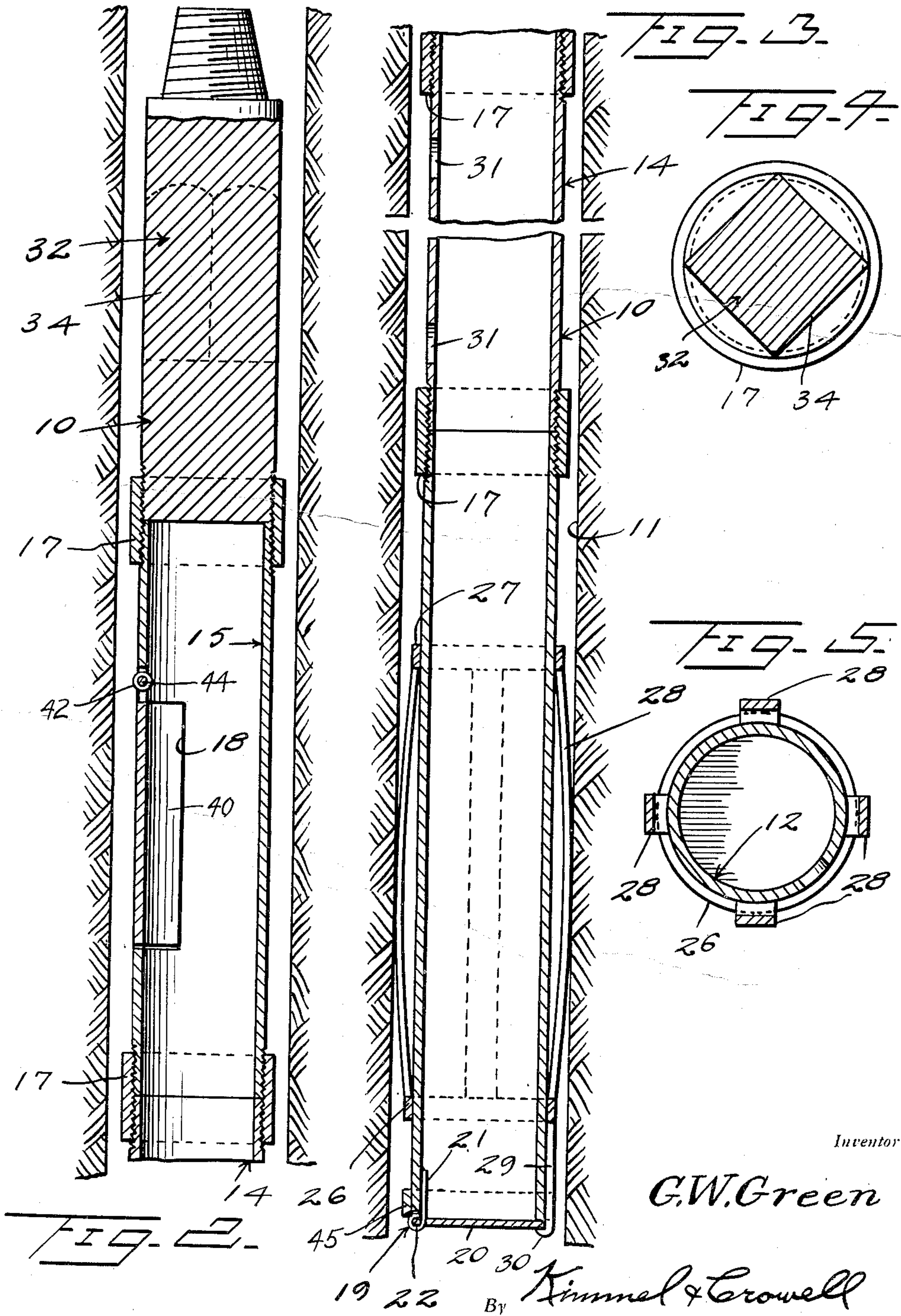
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WELL CLAY DUMPER

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5 Claims. (Cl. 166—19)

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This invention relates to a well clay dumping tool, and more particularly to an improved tool for dumping clay or other non-porous sealing material into a well hole at a predetermined level.

When an oil or gas well is abandoned for any purpose and the drill pipe removed, it is necessary to plug such holes to prevent water intrusion into the sand which might affect other wells in the vicinity. Several States have laws which require this plugging of the well holes for the protection of wells adjacent those that are abandoned.

Heretofore, the accustomed practice in sealing off the producing sand with clay, or other non-porous material, has been to drop the clay in from the top of the hole. In such operation, when clay is dropped or shoveled into the well from the top of the hole, and because of the fact that this clay has to travel, in many cases, through hundreds of feet of water, the clay will sometimes bunch together and stop at a point in the well above the desired point of plugging. When the clay "bridges" in this manner, it is then necessary to drill out this clay bridge so that more clay can be shoveled into the well in order to seal the intended horizon at the proper depth intended. Also, when clay is dropped or shoveled into the well from the top of the hole, by mixing with the water through which it travels, it often muddies or thickens the water to such an extent that no further clay can be effectively put in the well.

When this is the case, all this clay mixture has to be bailed out of the hole in order to have the well in shape so that further clay can be put into the well from the top of the hole in order that it might drop down through the water to the depth intended. The plugging of productive sands and potable water strata by clay shoveled or thrown in from the top of the hole has been very difficult due to the reasons explained above. Furthermore, it has been expensive and time-consuming in order to effect the proper job of plugging.

By means of the clay dumping tool, clay can be put into the well, being dumped automatically with this tool at the very point where clay or other non-porous material of like nature is to be placed in order to seal the formation effectively. This purpose of positively and efficiently depositing the clay at the depth point intended in a well filled in part, or in its entirety, with water is one of the main purposes of this tool. This eliminates the old method of throwing clay in from the top of the hole. Therefore, this tool

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serves the purpose of doing an effective and positive job of plugging the horizon in the wall at the exact depth intended.

With the above and other objects in view, my invention consists in the arrangement, combination and details of construction disclosed in the drawings and specification, and then more particularly pointed out in the appended claims.

In the drawings,

Figure 1 is a side elevation of a well clay dumping tool constructed according to an embodiment of this invention,

Figure 2 is a vertical section taken on the line 2—2 of Figure 1,

Figure 3 is a vertical section of the lower end of the tool taken on the line 3—3 of Figure 1,

Figure 4 is a transverse section taken on the line 4—4 of Figure 1,

Figure 5 is a transverse section taken on the line 5—5 of Figure 1,

Figure 6 is a fragmentary detailed section showing the closure in the open position,

Figure 7 is a side elevation of a modified form of the upper end of this tool.

Referring to the drawings, the numeral 10 designates generally a well clay dumping tool for depositing clay within the well hole after a well has been abandoned. According to the laws of several States, it is necessary when a well hole has been abandoned that the well hole be plugged with suitable material for preventing the infiltration of water through the sands at the various levels of the well hole which would otherwise seep through the various layers of sand into adjacent wells. With the use of the tool to be described hereinafter, it is possible to deposit clay or other suitable well plugging material into a well hole at any desired level.

It is frequently necessary to select a certain level at which the well hole plug is to be started, and with the conventional methods of dropping the clay or other plugging material into the top of the well, it is frequently impossible to determine at exactly what point the bottom of the plug will terminate. The well clay dumping tool 10 is formed of a plurality of tubular sections fixedly connected together, to be extended downwardly into the well hole 11, as far as desired.

In the drawings, the well clay dumping tool 10 is formed of a lower section 12, an intermediate section 14, and an upper end section 15. Each of the sections 12, 14 and 15 is provided exteriorly at each end with threads as 16, and a sleeve or coupling member 17 is threadably engaged with the adjacent ends of adjacent tubular sections

for removably securing these sections together.

The upper pipe section 15, as shown in Figure 1, is provided with an elongated opening 18 through one side thereof, through which the clay or other plugging material may be inserted into the tube. A closure plate 40 is provided for closing the opening 18. A pair of apertured ears 41 are fixed to or formed on the section 15 along the upper edge of the opening and a barrel 42 is rockably mounted between the ears 41 by a pin or pivot 44 engaging through the ears 41 and barrel 42. As the hinge for the plate or closure 40 is at the upper end, the weight of the plate will bias it to closed position so that no latch is required when filling the tubes with clay or other plugging material.

The lower tubular section 12 is provided with a valve 19 for selectively opening or closing the lower end of the tool 10 for permitting the discharge of clay at a selected position along the well hole 11. The valve 19 is formed with a closure plate 20 which is hingedly connected to the lower tubular section 12.

A hinge leaf as 21 is fixed to or otherwise carried by the lower edge of the tubular section 12 at the lower end thereof. The closure plate 20 is hingedly connected to the hinge leaf 21 by a pintle 22 engaging the barrel 24 of the leaf 21 and fixedly carried by two of the closures 20. A sliding operator 25 is carried by the lower tubular section 12 for effecting the operation of the valve 19.

The operator 25 is formed substantially of a pair of spaced apart sleeves 26 and 27, connected together by circumferentially spaced apart outwardly bowed resilient bars 28. The sleeves 26 and 27 are spaced apart along the length of the section 12 and the bars 28 connected between the sleeves 26 and 27 resiliently engage the inner walls of the well hole 11, providing suitable friction between the operator 25 and the well hole 11 to effect the operation of the valve 19.

A downwardly extending latch or locking member 29 is fixed to the lower sleeve 26 and extends downwardly beyond the lower edge of the tubular section 12 and sleeve 26. An inturned hook or keeper 30 is fixed to or formed on the lower end of the bar 29 for engagement with the closure or plate 20 in certain positions of the sliding operator 25.

A split ring 45 is fixed about the lower end of the section 12, the ends of the ring 25 being spaced apart a distance slightly greater than the width of the bar 29. The split ring 45 thus forms a guide for the bar 29 in its sliding movement and provides a lower limit or stop for the sliding operator 25 in its downward movement.

The lower tubular section 12 and the intermediate section 14 are each provided with longitudinally spaced apart openings 31 along the length thereof for the admission into the pipe 10 of water as the clay is discharged from the tool. The purpose of these openings is to activate the dumping of clay in a hole full of water. The reason is that when the pipe or tube containing the clay is in a hole full of water the hydrostatic pressure of the water column acting upon the clay through these openings activates the dumping of the clay the minute that the dumper is raised and the bottom closure 20 is opened.

The tool 10, including the upper, lower and intermediate pipe sections thereof is operated or otherwise dropped into the well hole 11 by conventional raising and lowering means for drilling tools. A connecting member as 32 is carried by

the upper end or tubular section 15 for attaching the tool 10 to a suitable flexible connecting member which may be a rope or cable.

In Figures 1 to 6 inclusive, there is shown a tool sub 34 with which a threaded terminal end on the flexible member may be engaged for raising and lowering the tool 10 in the well. The connector or tool sub 34 is formed at its lower end with a threaded portion 35 threadably engaging a sleeve as 17 which also engages the upper end of the tube section 15, securing the plug 34 at the upper end of the tool.

In Figure 7 there is shown a modified form of connecting member 32 in which a tubular connecting member 32a is provided at its upper end with a bail 36 with which a flexible member is adapted to be engaged. The lower end of the connecting member 32a is threaded as at 35a for engagement with a sleeve 17 at the upper end of the tool 10.

In the use and operation of this well plugging tool, the closure plate 20 is initially moved to the closed position and the sliding operator 25 is slid upwardly on the pipe section 12 whereby the latch or keeper 30 engages the lower side of the plate 20 for supporting the plate in the closed position. The lower tubular section 12 is then engaged into the well hole 11 where the bars 28 engage the inner walls of the hole. The well plugging clay may then be inserted into the tool 10 through the opening 18. The tool 10 is then lowered in the hole 11 to the desired position.

The downward sliding movement of the lower tubular section 12, having the bars 28 frictionally engaging the walls of the hole, will support the closure 20 in its closed position. When the tool has reached the desired level, the valve 19 may be opened by merely raising the tool 10 a short distance. The upward sliding movement of the tool 10 will initially cause the sliding member 25 to slide downwardly relative to the pipe section 12 due to the frictional engagement of the bars 28 with the well hole. As the sliding operator 25 moves downwardly relative to the pipe 12, the latch 29 will be lowered beyond the lower end of the pipe and moved downwardly from engagement with the closure plate 20. The force of the clay above the closure plate 20 will then open the plate and permit the clay to be discharged from the tool. In this manner the exact location of the well hole plug is readily determined and the well may be plugged at any one or more selected positions along the length of the well hole 11.

I do not mean to confine myself to the exact details of construction herein disclosed, but claim all variations falling within the purview of the appended claims.

Having thus described my invention, what I claim is:

1. A well clay dumping tool comprising an elongated pipe for insertion into a well hole, said pipe formed with an opening in the upper end thereof for the admission of hole plugging material, a closure for the lower end of said pipe, a sliding member on the lower end of said pipe, a locking member carried by said sliding member engageable with said closure securing said closure in the closed position in one position of said sliding member, said locking member disengageable from said closure in another position of said sliding member permitting the opening of said closure, means carried by said sliding member frictionally engaging the walls of said well hole for operating said sliding member, and means

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fixed on the bottom end of said pipe adapted to limit downward movement of said sliding member and to prevent rotation of said locking member relative to said closure.

2. A well clay dumping tool comprising an elongated tubular member formed at the upper end thereof with an opening for the admission therein of a well clay dumping material, a closure for the lower end of said tubular member, a sliding member on the lower end of said tubular member, resilient means carried by said sliding member for frictionally engaging the sides of a well hole affecting sliding of said sliding member on said tubular member upon sliding of said tubular member, locking means depending from said sliding member engageable with said closure locking said closure closed upon sliding of said tubular member downwardly and disengageable from said closure upon sliding of said tubular member upwardly, and means on said tubular member adapted to limit downward movement of said sliding member and to prevent rotation of said locking means relative to said closure.

3. A well clay dumping tool comprising an elongated tube for insertion into a well hole, said tube formed at the upper end thereof with an opening through which plugging material may be admitted into the tube, a hinged closure for the lower end of said tube, a pair of spaced apart collars slidably engaging about the lower portion of the tube, a plurality of outwardly bowed resilient well wall engaging rods having the opposite ends thereof connected to said collars, a downwardly extending latch member carried by the lower of said collars, said latch member having an inwardly bent lower portion adapted to engage said closure to retain the latter in closed position upon sliding of said tube downwardly in the well hole and to release said closure upon sliding of said tube upwardly in said hole, and means on said tube adapted to limit downward movement and to prevent rotation of said collars relative to said tube.

4. A well clay dumping tool comprising an elongated tube for insertion into a well hole, a hinged closure for the lower end of said tube, a pair of spaced apart collars slidably engaging about the lower portion of said tube, a plurality of outwardly bowed resilient rods fixed between said collars for frictionally engaging the well

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wall, a depending latch member carried by the lower of said pair of collars and formed with an inwardly bent bottom end engageable with said closure, a split ring fixed to the bottom end of said tube below said lower collar and having the opening thereof adapted to slidably receive said latch member whereby said split ring will limit the downward sliding of said collars relative to said tube and also prevent rotational movement of said latch member relative to said tube and said closure.

5. A well clay dumping tool comprising an elongated tube for insertion into a well hole, said tube formed at the upper end thereof with an opening through which plugging material may be admitted into the tube and having a plurality of apertures extending longitudinally thereof to activate the dumping of clay when the tube is inserted in a hole containing water, a hinged closure for the lower end of said tube, a pair of spaced apart collars slidably engaging about the lower portion of the tube, a plurality of outwardly bowed resilient well wall engaging rods having the opposite ends thereof connected to said collars, a downwardly extending latch member carried by the lower of said collars, said latch member having an inwardly bent lower portion adapted to engage said closure to retain the latter in closed position upon sliding of said tube downwardly in the well hole and to release said closure upon sliding of said tube upwardly in said hole, and means on said tube adapted to limit downward movement and to prevent rotation of said collars relative to said tube.

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