March 13, 1928. 1,662,311

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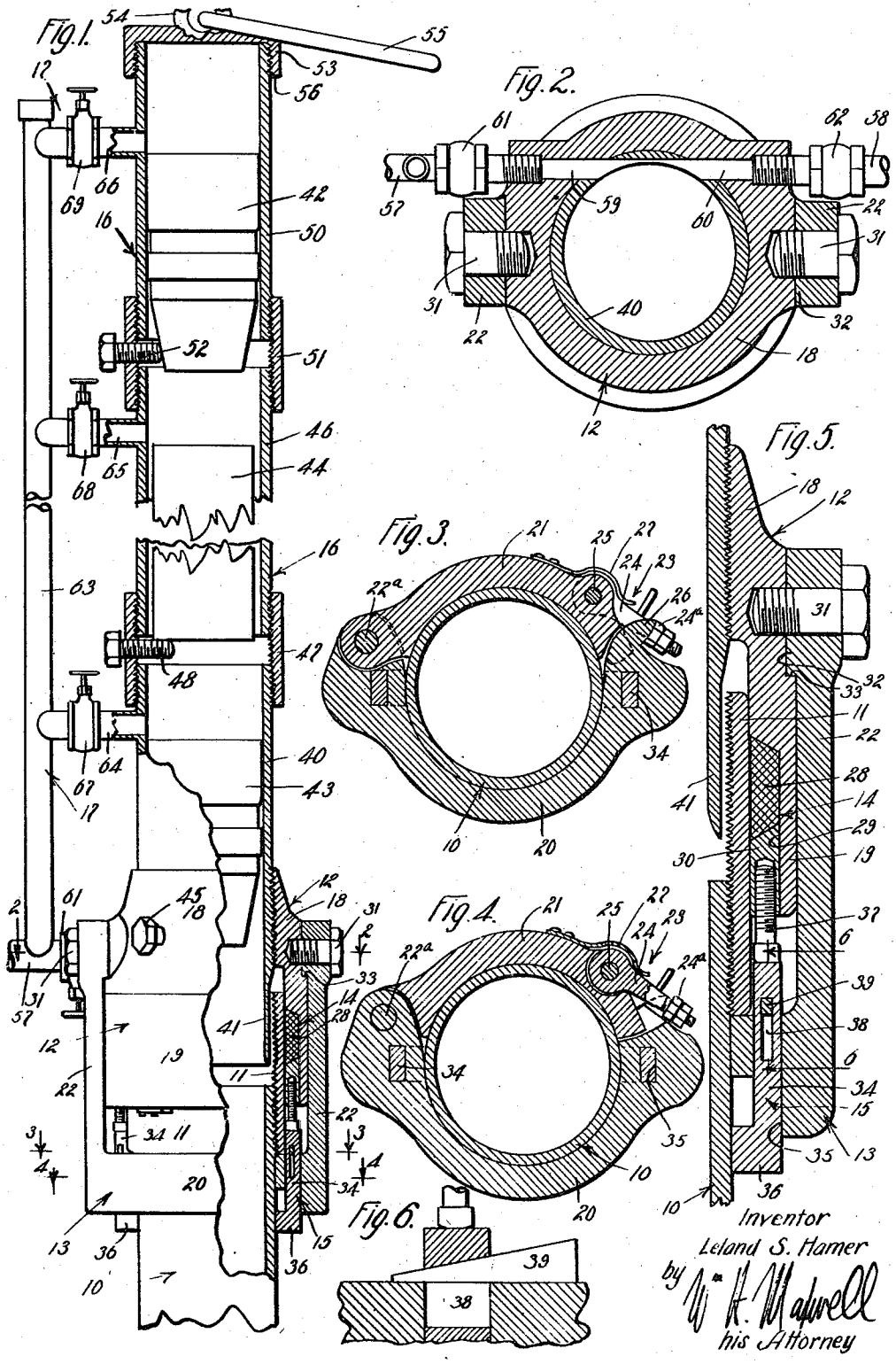
WELL CAPPING DEVICE

Filed April 4, 1923



Patented Mar. 13, 1928. 1,662,311

UNITED STATES PATENT OFFICE.

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WELL-CAPPING DEVICE.

Application filed April 4, 1923. Serial No. 629,319.

This invention relates to a well capping device, and it is an object of the invention to provide an effective, improved device of this general character.

In my copending application entitled Well caps, filed May 9, 1922, Serial No. 559,531, in which application the general type of well cap herein set forth is fully described and is claimed, I have referred to certain situations wherein it is desirable to quickly place a cap on or remove it from a casing. During the cementing of a well it is particularly undesirable to remove the cap from the casing as this not only interferes with circulation but also allows air to get into the casing and interfere with the cementing operation. The usual cementing processes require the insertion of one or more devices into the casing during the cementing operation, thus ordinarily making it necessary to remove the cap at a time or times when its removal is detrimental.

It is an object of this invention to provide an improved construction for quick detachable well caps of the general character to which the above mentioned copending application is broadly directed.

Another object of this invention is to provide a device to be used in combination with a well casing during the carrying out of a cementing process, or the like, which permits of devices or objects being inserted into the well casing at any time during the carrying out of the process without removal of the device from the casing.

It is another object of my invention to provide packing means in connection with a well cap for making it tight on a casing, or the like, and means adapted to be operated by an elevator, or the like, for actuating the packing.

The various objects and features of my present invention will be best and more fully understood from the following detailed description of a typical preferred form and application thereof, throughout which description reference is had to the accompanying drawings, in which:

Fig. 1 is a fragmentary sectional view showing my improved cap in place on a well casing, and in condition ready for carrying out a cementing process, or the like;

Fig. 2 is an enlarged plan section, taken as indicated by line 2—2 on Fig. 1;

Fig. 3 is an enlarged plan section, taken as indicated by line 3—3 on Fig. 1;

Fig. 4 is an enlarged plan section, taken as indicated by line 4—4 on Fig. 1;

Fig. 5 is an enlarged detail sectional view of a portion of Fig. 1; and

Fig. 6 is a sectional view taken as indicated by line 6—6 on Fig. 5.

Throughout the drawings, numeral 10 designates, generally, a typical well casing, and numeral 11 designates a coupling mounted on the upper end of the casing 10.

The device provided by my invention includes, generally, a cap 12, adapted to be arranged over the coupling 11; means 13, for releasably securing the cap in position in connection with the coupling 11; means 14, for packing the cap with the coupling 11; operating means 15, for the packing 14; a magazine 16, in connection with the cap, adapted to hold objects so that they can be delivered to the casing while the device is in position in connection with the casing and coupling; and means 17, for discharging objects from the magazine structure into the casing.

The cap 12 may be a cast member having a main or body part 18 and an annular flange part 19 which projects from the main part 18, and is adapted to receive the coupling 11.

The means provided by the present invention for releasably securing the cap in connection with the coupling, includes generally, a yoke 20, adapted to more or less closely receive the casing 10; a gate 21, adapted to close the yoke to retain the casing 10 in it; and arms 22, which connect the structure formed by the yoke and gate with the cap. The gate 21 is pivotally connected with one side of the yoke 20 by means of a suitable pivot pin 22^a, and is releasably connected with the other side of the yoke 20 by a spring catch mechanism 23. The yoke and gate are designed and proportioned so that they, together, form a ringlike structure which more or less closely embraces the casing 10 when the gate is closed. When a spring latch mechanism 23 is employed to hold the gate 21 closed the mechanism may include a T latch 24 pivotally connected with one of the parts, say—for instance—the gate 21, by a pivot pin 25, and lugs 26 provided on the other part to cooperate with the head 24^a of the latch. The head 24^a of the latch is screw threaded on the body of the latch so that it can be set against the lugs 26 to set the mechanism against being released. It is desirable to provide a spring 27, or the like,

in connection with the latch 24 to normally yieldingly hold it in position to cooperate with the lugs 26, and to design and proportion the various parts of the mechanism so that it automatically operates to connect the gate and yoke upon the gate being closed.

In accordance with the preferred form of my invention, there are two arms 22 arranged substantially diametrically opposite each other with relation to the axis of the device, and rigidly connect with the sides of the yoke 20. In practice the arms and the yoke can be advantageously cast or otherwise formed integrally, as I have illustrated in the drawings. The arms 22 extend upwardly from the sides of the yoke to the main part 18 of the cap, and are pivotally connected with the main part of the cap by suitable pivot pins 31. I prefer to provide lugs 32 on the inner sides of the arms at their upper ends concentric with the axis of the pivot pins 31 so that they seat in suitable sockets 33 formed in the cap and operate to relieve the pivot pin 31 of strain when the device is in operation. The arms 22 being connected with the cap and related to the yoke in the manner just described, and as I have clearly illustrated throughout the drawings, connect the yoke with the cap so that it can be conveniently swung out to clear the casing and coupling when the device is being arranged on or removed from position in connection with the casing and coupling. Further, the gate 21 being pivotally connected with one side of the yoke, it is necessary to swing or manipulate only one part to clear the casing when the gate is released. Attention is also called to the fact that the arms and yoke form a particularly rigid, strong, construction, and that the yoke and gate form a casing encircling structure which is particularly simple and strong, and which may be secured and released by manipulation of a single member, in the present case the latch device.

The packing means 14, which I have illustrated in the drawings as typical of that which may be employed in carrying out my invention, includes a body of packing 28, arranged in a recess 29 which extends upwardly in the flange part 19 of the cap, and a ring 30 slidably carried in the recess 29 back of the body of packing, as I have clearly illustrated in Figs. 1 and 5. When the ring 30 is forced or otherwise moved upwardly in the recess it expands the packing 28 between the flange portion of the cap and the coupling 11 so that the cap and coupling are tightly packed together.

The packing actuating means 15, in accordance with my present invention, includes plungers 34, carried by the casing encircling structure formed by the yoke and gate so that their lower end portions 36 project below the structure formed by the yoke and gate and are movable to a position where they do not project from said structure. The plungers are slidably carried in suitable openings 35 formed in said structure and, in the present case, in openings formed in the yoke 20 preferably at or close to the points where the arms 22 connect with the side parts of the yoke. The lower end portions 36 of the plungers in projecting below the casing encircling structure are in position to be engaged by an elevator, or like device, that may be applied to the casing below the device, so that they are moved upwardly upon the elevator being brought up into engagement with the ring structure. The movement of the plungers is communicated to the ring 30 of the packing means by screw members 37 carried by the ring 30 so that they project downwardly and are in line with the plungers when the device is in position on the casing and coupling. The screw parts may, of course, be adjusted to project various distances from the ring and thereby provide an adjustment in the packing and packing actuating means. Openings 38 are formed through the plungers 34 at the upper side of the ring structure, and wedges 39 are provided so that they can be arranged in the openings 38 to lock or secure the packing in an actuated position. It will be obvious, of course, that the packing may be actuated or tightened at any time without the employment of an elevator, as I have above described, by driving or otherwise forcing the wedges through the openings 38. When the wedges 39 are in position holding the packing they can be very easily and quickly released by driving them out of the openings 38.

The magazine 16 includes a plurality of sections or parts arranged in connection with the cap 12, preferably in connection with the main part 18 of the cap 12 and so that they are concentric with the casing and collar. The lower section 40 of the magazine 16 is carried by the main part 18 of the cap so that its lower end portion 41 extends into the upper end of the coupling 11 when the device is in place on a casing and coupling. The lower section 40 of the magazine may be formed of a piece of casing, or the like, and, in the present case, is formed of a piece of casing of the same diameter as the casing 10. However, the exterior of the lower end portion 41 of the section 40 is turned down so that the section fits freely into the coupling 11 in the manner illustrated in Figs. 1 and 5. The lower end portion 41 of the section 40 in extending into the coupling covers the upper end of the coupling so that objects are delivered from the magazine into the casing 10 without danger of being caught by the coupling. In the form of construction illustrated in

the drawings, the section 40 screw threads into the main part of the cap and extends some little distance above the main part of the cap.

The magazine 16, which I have chosen to illustrate in the drawings, as a typical magazine structure, such as may be employed in carrying out my invention, is intended to carry upper and lower plugs or swabs 42 and 43, respectively, and a stick or timber 44, between the swabs. The lower section 40 is intended to carry the lower swab 43 and means is provided in connection with the lower section to hold or retain the swab 43 in it. I find it convenient to hold the swab 43 in the section 40 by means of a screw 45 screw threaded in the main part 18 of the cap to extend through the section 40 so that it projects into the section under the swab. When it is desired to release the swab the screw 45 is turned until its inner end is withdrawn from within the section 40. The magazine 16 is provided with a middle section 46 to carry the timber 44. The section 46 is a comparatively long section of casing, or the like, in that the timber is usually comparatively long. The section 46 is connected with the upper end of the section 40 by a suitable coupling 47. As a means for holding or retaining the timber 44 in the section 46 I arrange a screw 48 in the coupling 46 so that it can be extended into the magazine structure under the timber. The screw 48, like the screw 45, may be retracted to release the timber.

The upper swab 42 is carried in a section 50 mounted on the upper end of the section 46 by a suitable coupling 51. The section 50, like the other sections of the magazine, may be formed of a section of casing and may be of a diameter or size to properly carry the swab 42. A screw 52 is carried by the coupling 51 so that it extends into the magazine in a manner to hold or retain the swab 42 in the section 50. In the present form of construction the section 50 is the uppermost section and is, therefore, closed by a suitable cap 53. The cap is provided with an eye 54 to receive a suitable bail 55, and has a downwardly facing shoulder 56 which can be engaged by an elevator, or the like, arranged around the section 50 if it is desired to lift or handle the device from its upper end.

With the general arrangement and form of construction which I have just described for the magazine 16, it may be made or built up to accommodate any number or arrangement of objects that may require insertion into the casing 10. For instance, the magazine may be extended by adding sections to it and may be reduced by taking sections from it. In practice, if it is desired to insert only a single swab into the casing the sections 46 and 50 may be removed and the cap 53 applied directly to the upper end of the section 40. In practice, however, it is desirable to construct the device for one particular class of work and to make the magazine structure more or less permanent.

In the particular form of the invention illustrated in the drawings, there are two pipe lines 57 and 58 which are connected into the device through openings 59 and 60 provided in the main part of the cap. The supply lines 57 and 58 are provided with control valves 61 and 62, respectively.

The means 17, which I have herein set forth for ejecting or discharging objects from the magazine 16, is a fluid pressure means, and includes a pipe connection between the supply pipe 57 and the upper part of each of the sections of the magazine. In accordance with the preferred arrangement the fluid pressure means includes a main pipe 63 which has connection with the supply pipe 57, and pipes 64, 65 and 66 which connect the pipe 63 with the sections 40, 46 and 50, respectively. Means are provided for controlling the flow from the supply pipe 57 to the sections of the magazine, and, in the present case, includes valves 67, 68 and 69, arranged in the pipes 64, 65 and 66, respectively, as I have clearly illustrated in Fig. 1. When the valve 67 is open fluid pressure is transmitted from the supply pipe 57 through the pipes 63 and 64 into the upper part of the section 40 so that it will force the swab 43 downwardly in the section and into the casing 10. It will be obvious how the valves 68 and 69 likewise provide control means whereby fluid pressure from the pipe 57 may be admitted into the sections 46 and 50 above the timber and swab so that the timber and swab may be discharged from the magazine, as desired. It is to be understood, of course, that when the control valves are open to discharge the objects from the magazine that the retaining screws are manipulated to release the objects.

In applying the device to a casing and coupling the cap 12 is arranged on the coupling so that its flange part 19 extends over the coupling, while the lower portion 41 of the magazine section 40 extends into the coupling. The yoke 20 is then swung into position where it embraces the casing and the gate 21 is closed. The packing actuating means 15 is then operated to actuate the packing either by bringing an elevator, or the like, up under the ring structure formed by the yoke and gate to force the plungers 34 upwardly, or by driving the wedges 39 in the openings 38. The packing is sent in the actuated position by the presence of the wedges 39 in the openings 38. When the device has thus been mounted on the casing and coupling fluid can be admitted into the casing as desired from the supply pipes 57 and 58 through the control valves 61 and 62.

Further, the swabs and timber carried by the magazine can be ejected from the magazine into the casing when desired by suitable manipulation of the control valves 67, 68 and 69, and can, of course, be thus ejected from the magazine into the casing 10 without removing the device and without in any way interfering with circulation in the casing. To remove the device it is merely necessary to release the latch so that the gate will open and then swing the yoke away from the casing so that it will clear the coupling when the device is removed. The device may be handled in any suitable manner, for instance, by means of an elevator arranged under the ring structure formed by the yoke and gate or under the cap 53.

Having described only a typical preferred form of my invention I do not wish to limit myself to the specific details hereinabove set forth but wish to reserve to myself any changes or variations that may appear to those skilled in the art or fall within the scope of the following claims; further, I wish to have the various phases of my invention considered broadly and without specific reference to unrelated details that I may have set forth and without specific reference to other phases which are independent, for example, various phases of my invention relating to the magazine are to be considered generally with relation to the structure which engages under the coupling and are not to be considered limited in any sense to any specific form or type of such structure that I may have set forth and may have claimed specifically as another feature of my invention.

Having described a preferred form of my invention, I claim:

1. A device adapted to be used in combination with a casing having a coupling on its end embodying, a cap adapted to be arranged in connection with the coupling, a structure adapted to be arranged around the casing under the coupling and including a yoke and a gate for closing the yoke, and a pair of hinged arms connecting the yoke with the cap so that the cap is held in connection with the coupling by said structure.

2. A device adapted to be used in combination with a casing having a coupling on its end embodying, a cap adapted to be arranged in connection with the coupling, a structure adapted to be arranged around the casing under the coupling and including a yoke and a gate for closing the yoke, and a pair of arms rigidly connected with the yoke and movably connected with the cap so that the cap is held in connection with the coupling by said structure.

3. A device adapted to be used in combination with a casing having a coupling on its end embodying, a cap adapted to be arranged in connection with the coupling, a structure adapted to be arranged around the casing under the coupling and including a yoke and a gate for closing the yoke, and a pair of arms rigidly connected with the cap so that the cap is held in connection with the coupling by said structure.

4. A device adapted to be used in combination with a casing having a coupling on its end embodying, a cap adapted to be arranged in connection with the coupling, a structure adapted to be arranged around the casing under the coupling and including a yoke and a gate for closing the yoke, and a pair of arms rigidly connected with the yoke and pivotally connected with the cap about an axis substantially diametrical of the device so that the cap is held in connection with the coupling by said structure.

5. A device adapted to be used in combination with a casing having a coupling on its end embodying, a cap adapted to be arranged in connection with the coupling, a structure adapted to be arranged around the casing under the coupling, a pair of arms arranged at opposite sides of the device and being connected with said structure and being pivotally connected with the cap about an axis substantially diametrical of the device.

6. A device adapted to be used in combination with a casing having a coupling on its end embodying, a cap adapted to be arranged in connection with the coupling, a structure to be arranged around the casing under the coupling and including a yoke, a gate pivotally connected with one side of the yoke, and a spring latch device for connecting the gate with the other side of the yoke so that it closes the yoke, a pair of arms connected with the yoke and pivotally connected with the cap so that the cap is held in connection with the coupling by said structure.

7. A device adapted to be used in combination with a casing having a coupling on its end embodying, a cap adapted to be arranged in connection with the coupling, means for packing the cap and coupling together, a structure adapted to be arranged around the casing under the coupling and having connection with the cap so that it holds it on the coupling, and means for actuating the packing including a part projecting from the said structure.

8. A device adapted to be used in combination with a casing having a coupling on its end embodying, a cap adapted to be arranged in connection with the coupling, means for packing the cap and coupling together, a structure adapted to be arranged around the casing under the coupling and having connection with the cap so that it

holds it on the coupling, and means for actuating the packing including a part projecting downwardly from the said structure.

9. A device adapted to be used in combination with a casing having a coupling on its end embodying, a cap adapted to be arranged in connection with the coupling, means for packing the cap and coupling together, a structure adapted to be arranged around the casing under the coupling and having connection with the cap so that it holds it on the coupling, and means for actuating the packing including a plunger carried by said structure so that it will actuate the packing upon being moved upwardly and has a part projecting downwardly from said structure.

10. A device adapted to be used in combination with a casing having a coupling on its end embodying, a cap adapted to be arranged in connection with the coupling, means for packing the cap and coupling together, a structure adapted to be arranged around the casing under the coupling and having connection with the cap so that it holds it on the coupling, and means for actuating the packing including a part projecting from said structure to be engaged by an elevator or the like brought into engagement with the structure, and means for setting the packing in an actuated position.

11. A device adapted to be used in combination with a casing having a coupling on its end embodying, a cap adapted to be arranged in connection with the coupling, means for packing the cap and coupling together, a structure adapted to be arranged around the casing under the coupling and having connection with the cap so that it holds it on the coupling, and means for actuating the packing including a part projecting from said structure to be engaged by an elevator or the like brought into engagement with the structure, and means in connection with the packing, and actuating means for adjusting the amount the packing is actuated upon actuation of the actuating means.

12. A device adapted to be used in connection with the casing having a coupling on its end embodying, a cap adapted to be arranged in connection with the coupling, a structure adapted to be assembled around the casing under the coupling and connected with the cap to hold it on the coupling, and a magazine carried by the cap so that it extends freely into the coupling, the magazine being adapted to carry an object so that it can be released therefrom into the casing.

13. A device adapted to be used in combination with a casing having a coupling on its end embodying, a cap having a main part and a flange part adapted to be arranged over the upper end of the coupling, and there being a recess in the lower portion of the flange part, packing carried in the recess, a structure adapted to embrace the casing below the coupling including a yoke, a gate pivotally connected to one side of the yoke, and a spring latch for releasably connecting the gate with the other side of the yoke to close the yoke, operating means for the packing including a plunger carried by said structure so that it has a part projecting downwardly therefrom to be engaged by an elevator or the like, wedge means for actuating and holding the plunger, a pair of arms rigidly connected with the side parts of the yoke and pivotally connected with the cap about an axis substantially diametrical of the cap, a magazine in connection with the cap including a lower section carried concentrically by the main portion of the cap so that it extends freely into the coupling, and a plurality of other sections arranged end to end above the lower section, a cap closing the upper end of the uppermost section of the magazine, means in connection with each of the sections of the magazine for releasably holding an object in it, a supply pipe connected into the cap, and pipe connections between the supply pipe and the sections of the magazine whereby pressure can be delivered to the sections to discharge objects from them into the casing.

14. A device to be used in combination with a casing having a coupling on its end and an elevator associated with the casing, a cap adapted to close the coupling, packing carried by said cap, and means operatively connecting said elevator and said packing whereby the raising of said elevator is adapted to make a tight connection between said cap and said coupling.

In witness that I claim the foregoing I have hereunto subscribed my name this 30th day of March 1923.

LELAND S. HAMER.