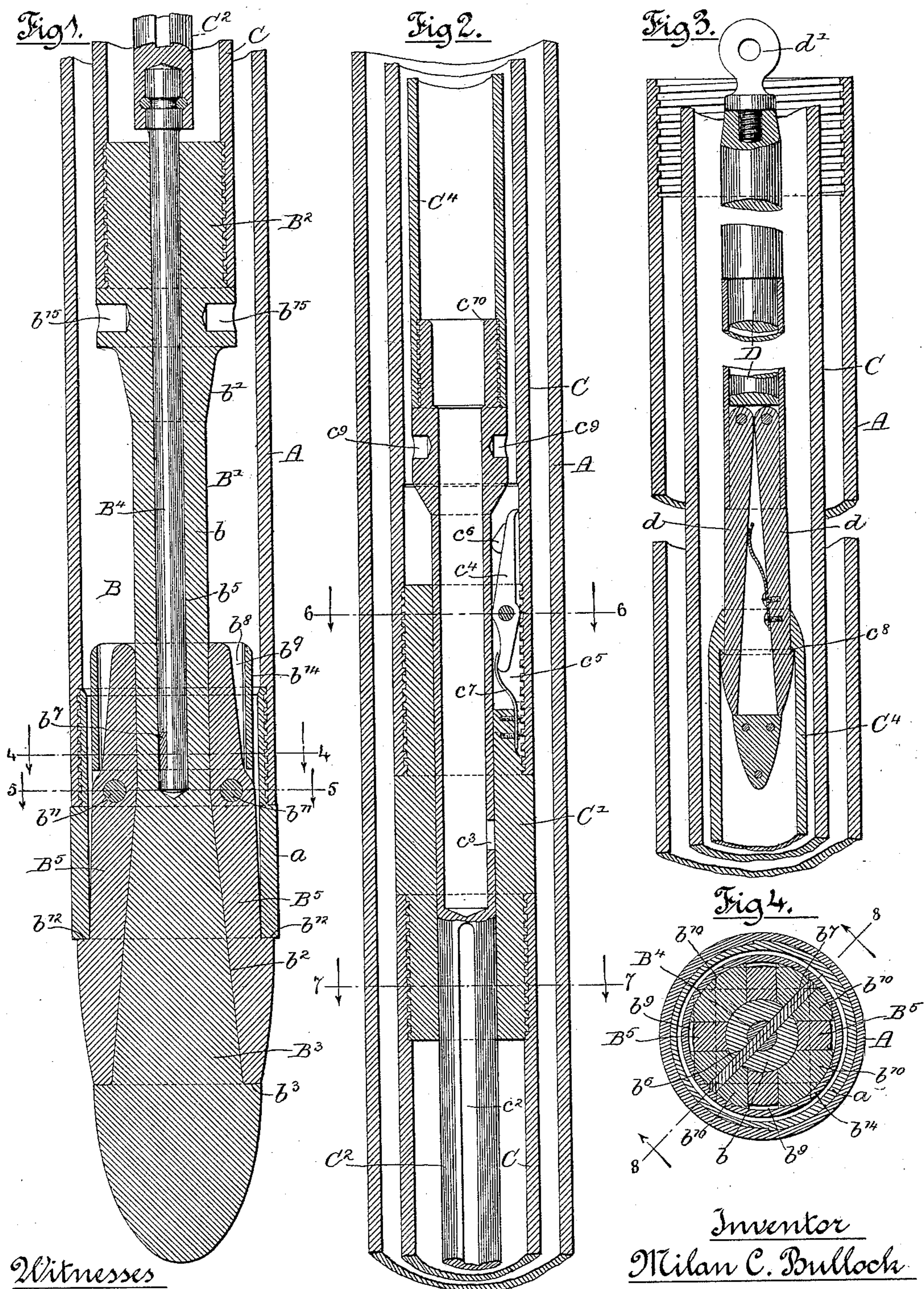


2 Sheets—Sheet 1.

DEVICE FOR REMOVING CASING TUBES IN ROCK AND EARTH DRILLING.

Patented Aug. 19, 1890.



Witnesses

Wm. L. Heming.

Louis H. F. Whitehead.

Inventor
Milan C. Bullock.

By - Layton, Poole & Brown
Attorneys.

(No Model.)

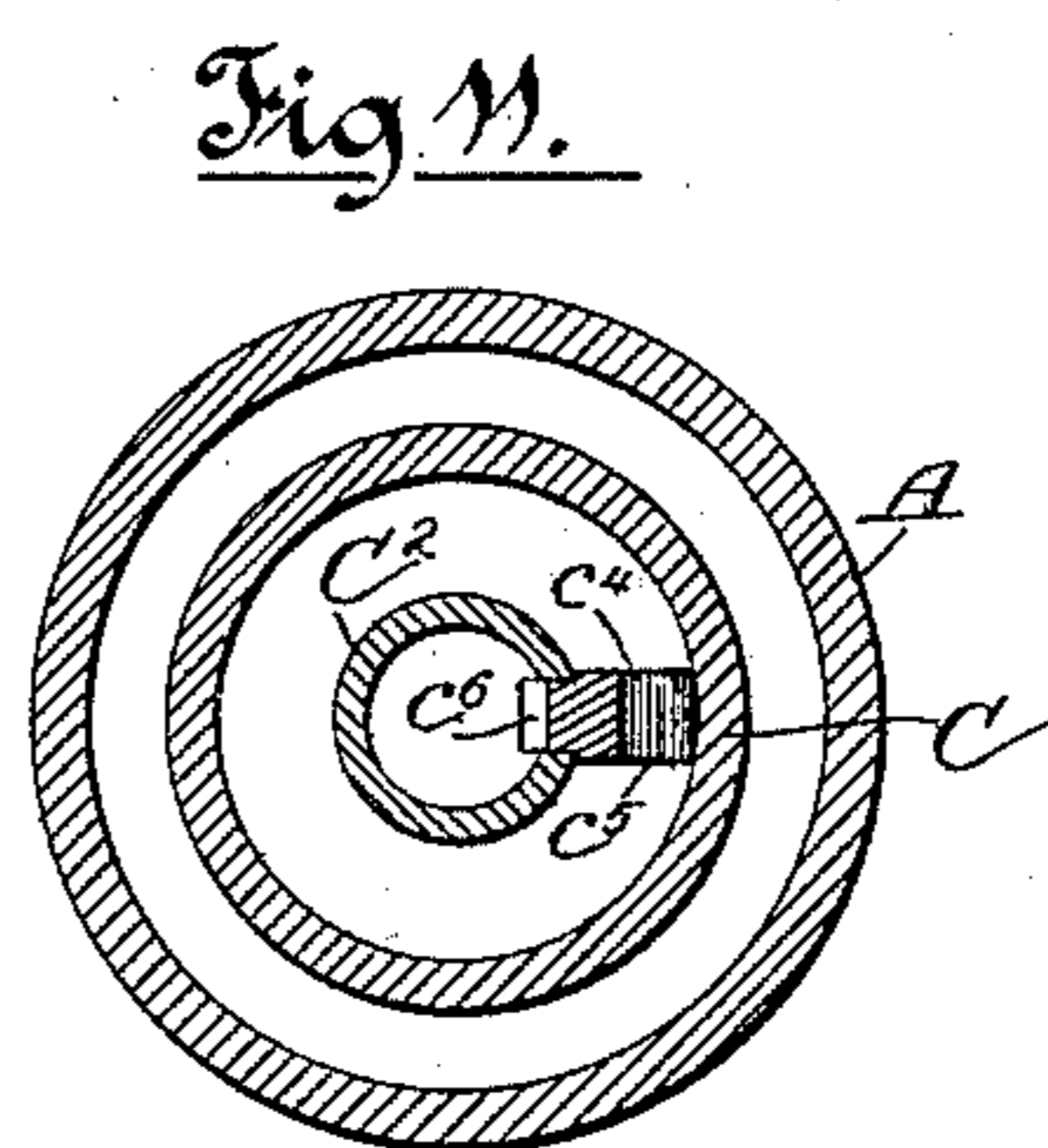
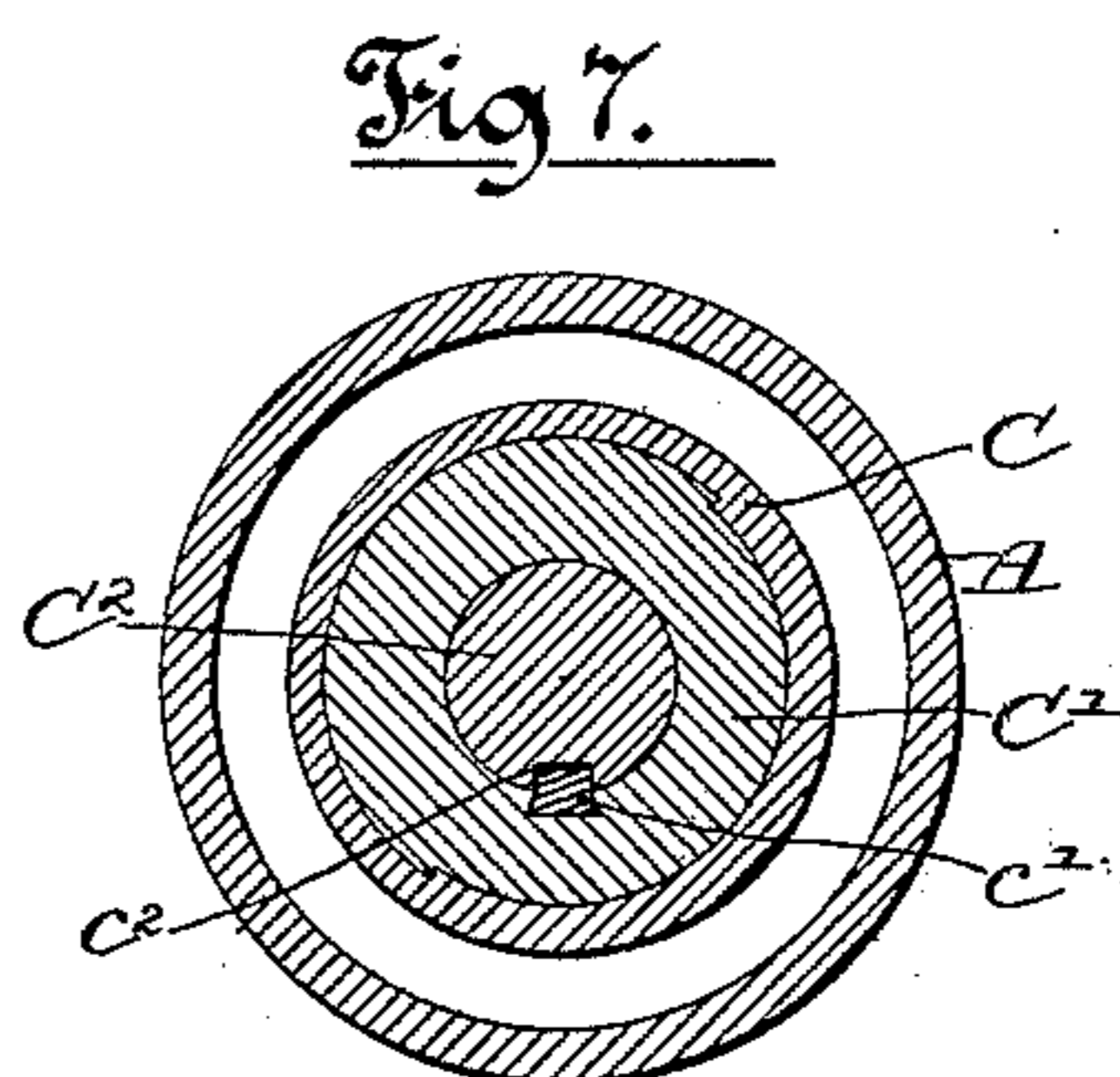
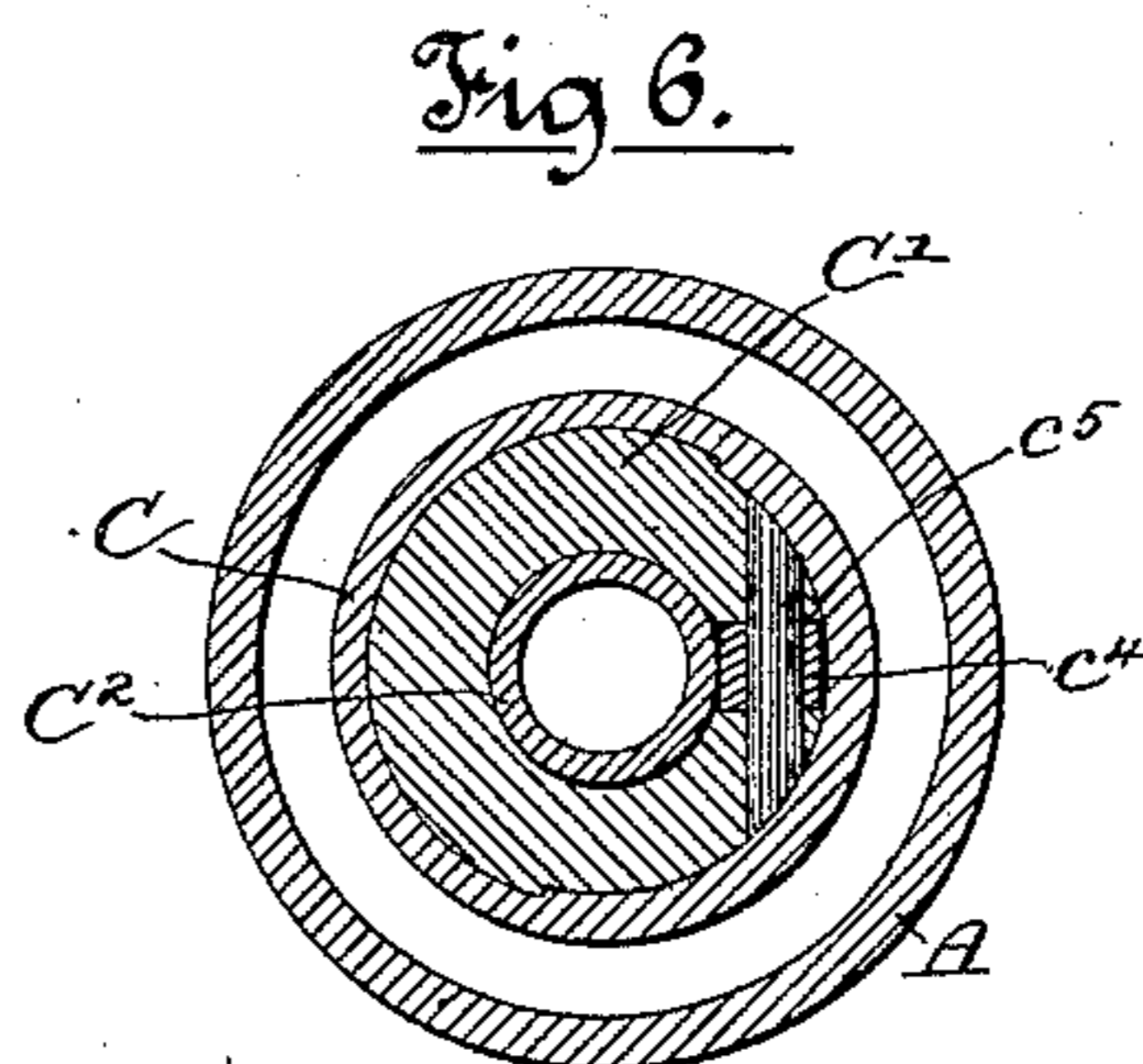
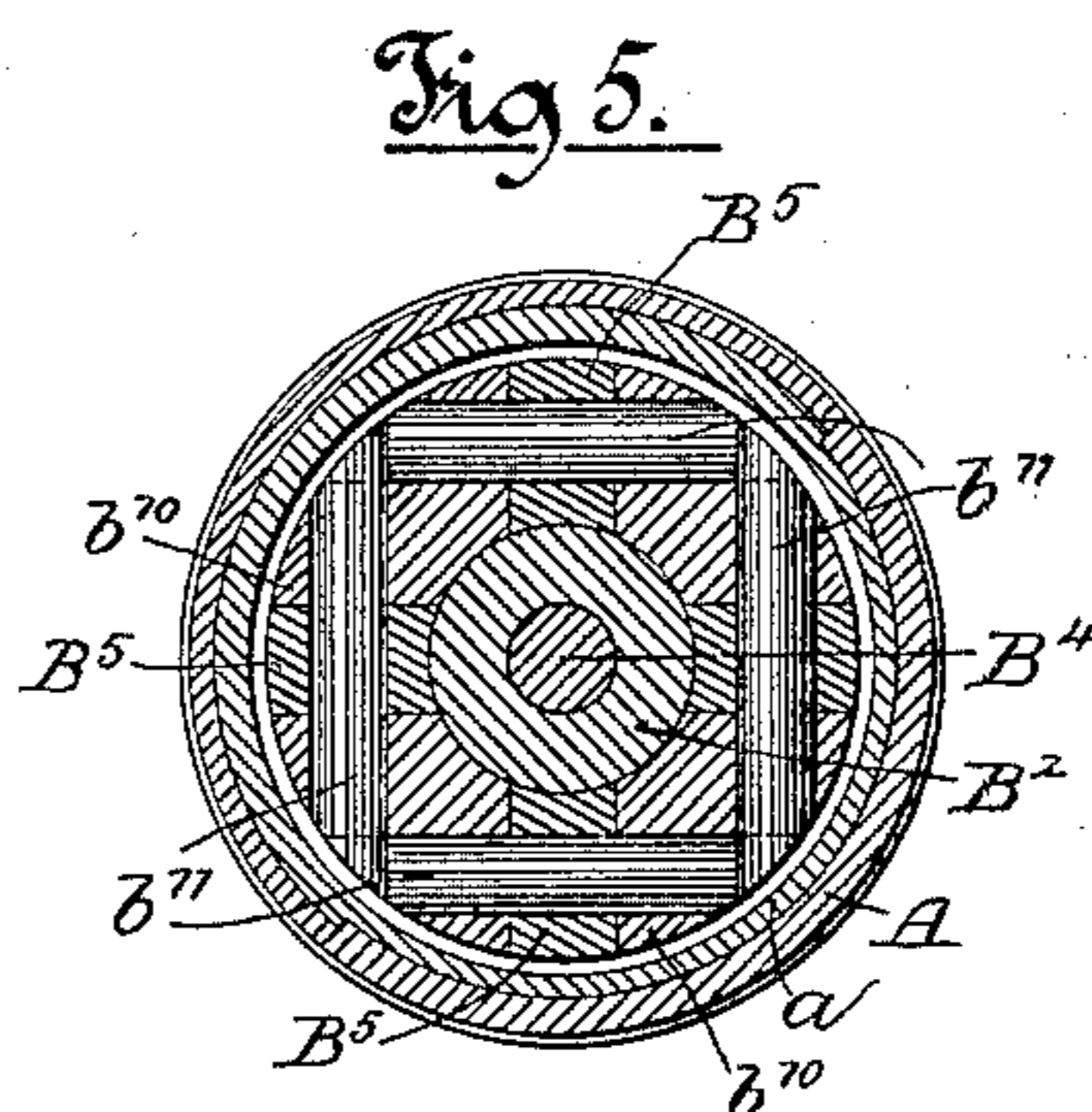
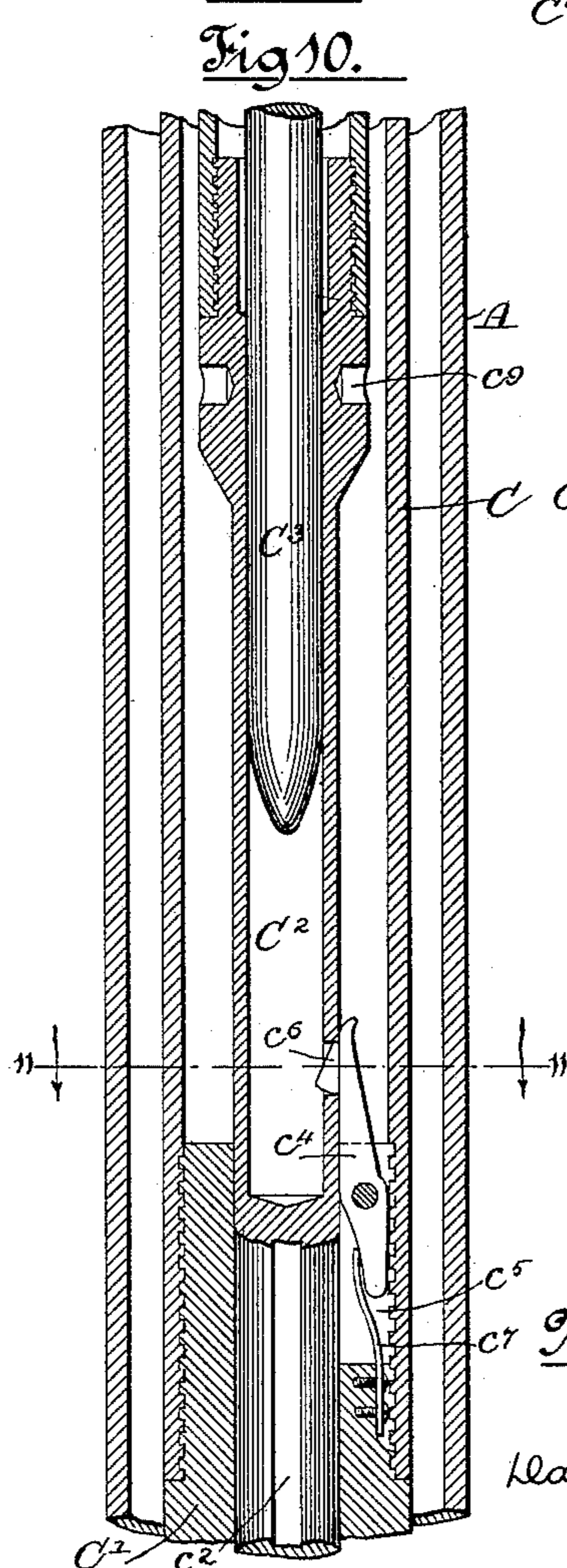
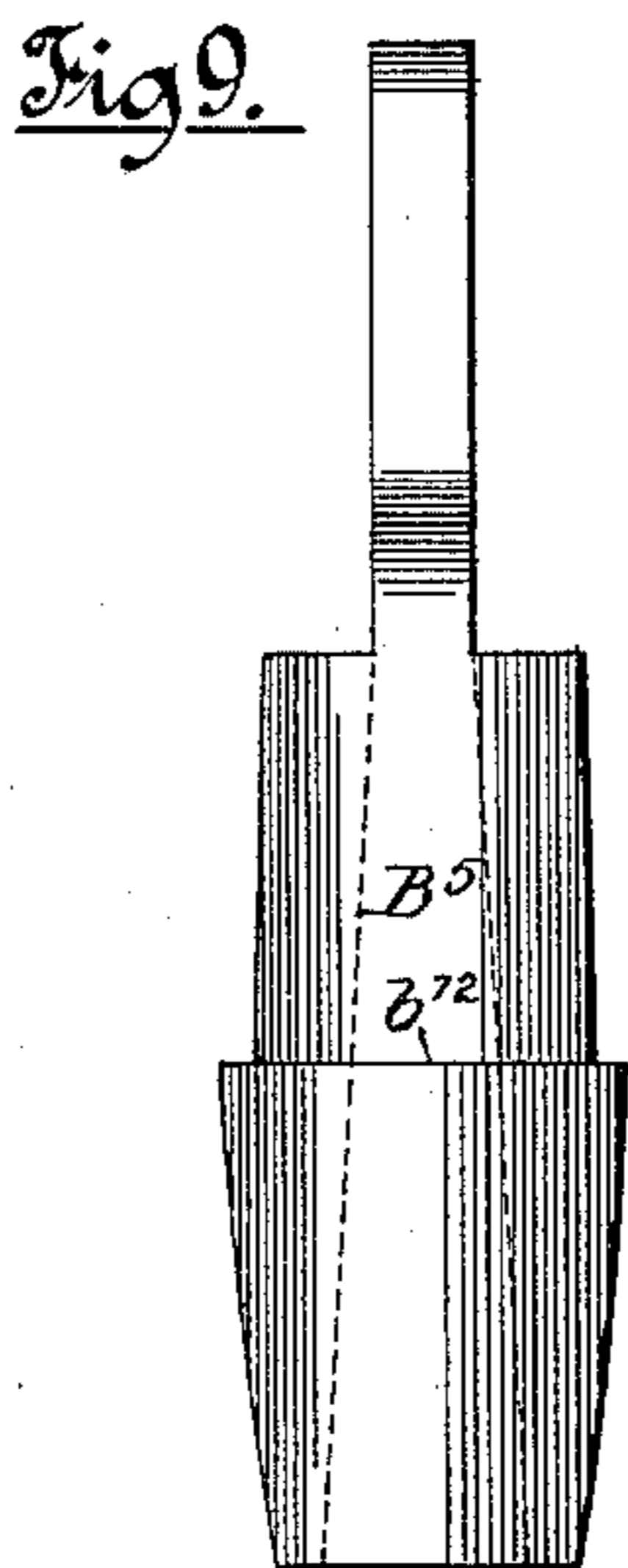
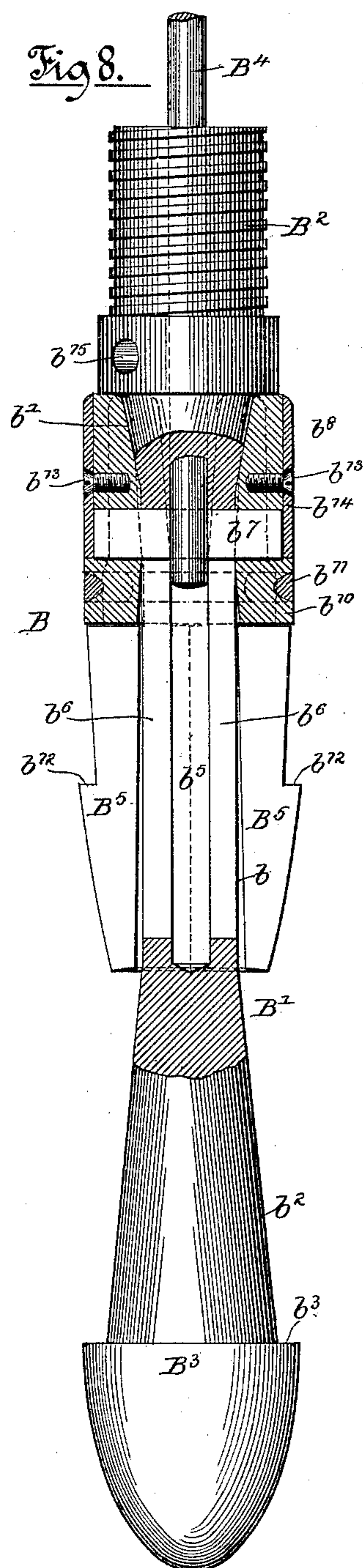
2 Sheets—Sheet 2.

M. C. BULLOCK.

DEVICE FOR REMOVING CASING TUBES IN ROCK AND EARTH DRILLING.

No. 434,860,

Patented Aug. 19, 1890.



Witnesses
Wm. J. Hemming.
Louis M. J. Whitehead

Inventor
Milan C. Bullock
 — by —
 Haytun, Poole & Brown
Attorneys.

UNITED STATES PATENT OFFICE.

MILAN C. BULLOCK, OF CHICAGO, ILLINOIS.

DEVICE FOR REMOVING CASING-TUBES IN ROCK AND EARTH DRILLING.

SPECIFICATION forming part of Letters Patent No. 434,860, dated August 19, 1890.

Application filed August 20, 1889. Serial No. 321,423. (No model.)

To all whom it may concern:

Be it known that I, MILAN C. BULLOCK, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Devices for Removing Casing-Tubes Used in Rock and Earth Drilling; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to novel devices adapted for use in connection with rock-drilling apparatus employed for boring wells, prospecting, and similar purposes, and more particularly to an improved device by means of which the removal of a casing-tube from a bored hole may be more easily accomplished. It often occurs in drilling a hole and after inserting therein a casing-tube that the said casing-tube must be lifted out of the hole or removed—as, for instance, when it is desired to substitute a larger casing-tube. After the hole has reached a considerable depth, the length and consequent weight of the casing-tube often become too great for its tensile strength, especially with the added resistance opposed to its withdrawal by the friction and other obstructions within the hole. In such cases it becomes impossible to remove said casing by drawing it out by power applied to its upper end. To overcome this objection, I have devised the construction set forth in this application, and by means of which the lower end of the casing may be supported and power applied thereto, so as to wholly or partially sustain the casing-tube and thereby enable it to be removed from the hole without danger of breakage.

The invention consists in the details of construction and combinations of parts, hereinafter fully described, and pointed out in the appended claims.

In the drawings, Figures 1, 2, and 3 illustrate in central vertical section the lower end of a casing-tube and the lower portion of my improved devices for sustaining and lifting said casing-tube, said parts being in operative position therein. Figs. 4 and 5 are

horizontal sectional views taken, respectively, on the lines 4 4 and 5 5 of Fig. 1. Figs. 6 and 7 are horizontal sectional views taken, respectively, on the lines 6 6 and 7 7 of Fig. 2. Fig. 8 is a detail view, in side elevation and partly in vertical section, on the line 8 8 of Fig. 4, of the devices for engaging the lower end of the casing-tube to be removed. Fig. 9 is a detail view, in side elevation, of one of the gripping-dogs. Fig. 10 is a view in central vertical section, illustrating the parts shown in Fig. 2 in different positions. Fig. 11 is a horizontal sectional view taken on the line 11 11 of Fig. 10.

In said drawings, A indicates a casing-tube, which is provided at its lower end with a casing-shoe *a* of familiar construction.

B indicates, as a whole, a grapple adapted to be passed downwardly within the casing-tube and to engage the lower end thereof by means of devices forming part of the same, hereinafter described. The said grapple B embraces a relatively heavy plunger *B'*, preferably formed of steel and provided between its ends with a contracted portion or spindle *b* and at opposite ends with enlargements or heads *B² B³*, provided with conical surfaces *b' b²* adjacent to the spindle, said surfaces tapering outwardly from said spindle. The enlargement or head *B³* is rounded upon its lower or advance end, and is provided with a shoulder *b³* adjacent to the conical part *b²*.

The plunger *B'* is provided with a central longitudinal axial recess or passage *b⁵*, which extends from the upper end of the same to a point about opposite the upper end of the enlargement *B³*. *b⁶* is a longitudinal slot formed in the contracted portion *b* of said plunger. A cross-bar *b⁷* is passed through and is adapted to slide in said slot, said cross-bar *b⁷* being connected with the lower end of a rod *B⁴*, located within the recess *b⁵* and extending outwardly above or beyond the same. Attached to the ends of said cross-bar *b⁷* and surrounding the plunger *B'* is a supporting ring or collar *b⁸*, which is provided interiorly with a series of vertical slots *b⁹ b⁹*, which in their lower parts extend entirely through said collar *b⁸*, thereby forming fingers *b¹⁰ b¹⁰*, Fig. 8. The said collar *b⁸* is adapted to slide upon

the plunger B' and is formed with a central aperture tapered outwardly at either end, whereby it may fit over or receive the inner ends of the conical enlargements before mentioned.

B⁵ B⁵ indicate a series of expansible gripping-dogs pivoted within the said slots b⁹ b⁹ by means of pivot-pins b¹¹ b¹¹ and extending above and below said pivots, the said pins being inserted at their ends within the fingers b¹⁰ b¹⁰ of the said ring or collar b⁸. The rear faces of the gripping-dogs B⁵ B⁵ are so located within the collar that they will bear against the plunger B' and will be expanded or contracted by reason of the contact of the said rear faces with the said conical enlargement at either end of the plunger as said dogs are brought opposite the same in their sliding movement upon the plunger. Those portions of the dogs above their pivotal points rest within the slots in the collar b⁸, but in their lower portions they extend somewhat below the ends of the fingers b¹⁰ b¹⁰ and are provided on their outer faces with shoulders b¹² b¹², which are adapted when expanded to pass under the lower end of the casing to be removed, as will be more fully described. The length of the gripping-dogs is such that when the collar b⁸ is at the lower limit of its movement the lower end of said dogs will rest upon the shoulder b³ of the plunger B', so that any weight coming upon the shoulders b¹² b¹² is brought finally upon the plunger.

For convenience in construction it is preferable to form the collar b⁸ in sections comprising an upper cylindric shell b¹⁴, provided interiorly with segmental pieces b¹⁰ b¹⁰, Fig. 4, which are held in position by means of two screws b¹³ b¹³, which secure two of said segmental pieces to the upper cylindric shell, and these, in connection with the pivot-pins b¹¹ b¹¹, which rest at one end in said segmental pieces, which are secured to the shell b¹⁴ and at their opposite ends in the detached segmental pieces, hold said latter pieces in position. The cross-bar b⁷, which is attached to the lower end of the actuating-rod, as above described, is secured at its extremities to the said sections, which are secured to the ring b¹⁴ by the screws b¹³ b¹³.

The upper head B² of the plunger B' is cylindric and is provided with screw-threads, by means of which the lower end of a lifting-tube C is secured thereto. b¹⁵ b¹⁵ are spanner-holes formed in said head B², whereby a spanner may be engaged therewith for disconnecting the same from the lifting-tube C. The said lifting-tube C extends upwardly through the hole to a point above the surface of the ground, and is there connected with a suitable machine by means of which it may be lifted out of the hole. Near the lower end of said lifting-tube is located a screw-threaded tubular coupling C', which serves to connect two sections of said lifting-tube, and is provided interiorly with a spline or feather c', Fig. 7. To the upper end of the rod B⁴ is se-

cured an actuating-rod C², said parts being connected by suitable means, which in the present instance consist of keys adapted to enter key-seats formed on the rods B⁴ and C² in the manner illustrated. The actuating-rod C² extends upwardly within the lifting-tube through and above the coupling C', and is of suitable size to fit closely within said coupling. Said rod is solid in its lower portion, and is there provided with a longitudinal slot or groove c², into which projects the spline or feather c' of the coupling C'. Said spline c' prevents said rod from turning within the coupling, but allows a relative endwise or vertical movement of said parts. The upper portion of said actuating-rod is hollow or tubular and is provided with a recess or aperture c³. A spring-actuated detent c⁴ is arranged upon the coupling C', and is adapted to engage said aperture c³ when the rod C² and parts connected therewith are lifted. The said detent c⁴ is pivoted between its ends within a recess c⁵, formed in the upper end of the coupling C', and is provided on its inner face above its pivotal point with a lug c⁶, which is adapted to enter said aperture c³. c⁷ is a spring arranged to bear against the lower end of said detent to force its upper end inwardly, or into position to engage with the rod C². In Fig. 10 I have shown the several parts in the positions they will assume when said detent is in engagement with the aperture of the rod C². In said Fig. 10 is also shown an unlocking key or plunger C³, which is adapted to fit within the tubular upper end of the lifting-rod, so that when the lug c⁶ of the detent c⁴ projects through the perforation c³, and thus locks said rod in its elevated position and the gripping-dogs in their contracted position by lowering the said unlocking key or plunger C³ within the upper end of said rod the lug will be pressed outwardly so that its rounded end only stands in the said aperture, so that it may be disengaged from the said perforation when the actuating-rod is vertically moved. C⁴ is a harpoon-sheath, within which the upper end of the said actuating-rod is secured by a screw-threaded joint, at which is formed an annular shoulder c¹⁰. Said harpoon-sheath C⁴ extends upwardly within the lifting-tube, and is provided near its upper end with an internal annular shoulder or flange c⁸ for engagement with a lifting implement or harpoon, hereinafter to be described. The upper end portion of the actuating-rod C² is enlarged and provided with spanner-holes c⁹, whereby a spanner may be engaged therewith to unscrew and disconnect said parts.

The endwise or upward movement of the gripping-dogs is accomplished by means of a harpoon or lifting implement D, having expansible jaws d d, capable of being automatically locked together or in their retracted position when they are compressed.

In two pending applications for Letters Patent filed by me June 29, 1889, Serial Nos. 278,571 and 278,572, I have shown and de-

scribed harpoons embodying this construction, and which may be used in connection with the device herein shown.

The several parts of my invention being
 5 constructed and arranged as described, the operation and manner of using the same are as follows: The parts being in the position just described—that is to say, the gripping-dogs are retracted and held in their elevated position
 10 by the engagement of the detent c^4 with the actuating-rod—the grapple is lowered into a casing-tube to be removed by means of the lifting-tube, which is connected with suitable machinery at the surface of the ground, by
 15 which said lifting-tube may be lowered and raised. The grapple is lowered until the shoulders $b^{12} b^{12}$ of the dogs $B^5 B^5$ reach a point below the lower end of the casing-shoe a . The unlocking-key C^3 is then lowered within the
 20 lifting-tube and harpoon-sheath by means of a rope until it enters the tubular portion of the actuating-rod and forces the lug c^6 of the detent outwardly from engagement with the perforation c^3 , after which said key is lifted out
 25 of the tube. The disengagement of the detent from the actuating-rod allows the said rod and gripping-dogs connected therewith to fall by gravity, and as said dogs fall their lower ends will be expanded by the lower enlargement
 30 b^2 of the plunger B' . This movement will bring the shoulders $b^{12} b^{12}$ under the casing-shoe a , while the lower ends of said dogs rest upon the annular shoulder b^3 of the plunger. In this position power is applied to the lift-
 35 ing-tube to raise the same, and also the casing A , as may be necessary, until the casing can be finally lifted out of the hole by force applied to the upper end thereof. Thereupon the casing is secured in place by any means
 40 desired and the lifting-tube lowered a sufficient distance to permit the gripping-dogs to be raised relative to the plunger to retract them, which is accomplished as follows: Said implement is dropped through the lifting-
 45 tube (by means of a rope connected with an eye d' on its upper end) until it enters the harpoon-sheath and by the expansion of its jaws engages with the flange c^8 . As said implement is drawn upwardly the harpoon-
 50 sheath will be lifted, carrying with it the actuating-rod C^2 , rod B^2 , and the dogs $B^5 B^5$, and thereby retracting the lower ends of said dogs by reason of the upper enlargement b' of the plunger. It will be manifest that as
 55 the actuating-rod is lifted within the coupling c' the lug c^6 on the detent c^4 pivoted therein will enter the perforation c^3 in said actuating-rod and thus hold the dogs in their elevated position. The harpoon is then fur-
 60 ther lowered within the harpoon sheath until its jaws are compressed by contact of the annular shoulder c^{10} , formed therein, with the upper end of the tubular portion of the actuating-rod C^3 , and the jaws being auto-
 65 matically locked together the harpoon can be drawn upwardly through the mouth of the harpoon-sheath and out of the lifting-tube.

The lifting-tube and grapple are then withdrawn, after which the casing is removed from the hole.

I claim as my invention—

1. The herein-described apparatus for removing casing-tubes, comprising a lifting-tube, expansible gripping-dogs provided on their outer faces with shoulders adapted to
 75 engage the lower end of the casing to be removed, an actuating-core attached to the lower end of the lifting-tube and engaging the said dogs, and an actuating-rod connected with said gripping-dogs, substantially as de-
 80 scribed.

2. The herein-described apparatus for removing casing-tubes, comprising a lifting-tube, an actuating core or plunger attached to the lower end of said lifting-tube and hav-
 85 ing a shoulder near its lower end, expansible gripping-dogs engaging said core and arranged for contact with the shoulder thereof, said gripping-dogs being provided with shoulders adapted to engage the lower end of the
 90 casing-tube to be removed, and an actuating-rod connected with said gripping-dogs, substantially as described.

3. The herein-described apparatus for removing casing-tubes, comprising a lifting-
 95 tube, an actuating core or plunger attached to the lower end of the said lifting-tube and having an intermediate contracted portion with outwardly-tapering ends, a collar surrounding said core or plunger, a series of
 100 gripping-dogs pivoted to said collar and bearing against the said core or plunger, and an actuating-rod connected with said collar, substantially as described.

4. The herein-described apparatus for re-
 105 moving casing-tubes, comprising a lifting-tube, an actuating core or plunger attached to the lower end of said lifting-tube and having a central aperture and a longitudinal slot, a sliding actuating-rod arranged within said
 110 aperture, a cross-bar located near the lower end of said rod and passing through the said slot, and a series of expansible gripping-dogs surrounding said core or plunger and connected with said cross-bar, substantially as
 115 described.

5. The herein-described apparatus for removing casing-tubes, comprising a lifting-
 120 tube, an actuating core or plunger attached to the lower end of said lifting-tube and having an intermediate contracted portion and outwardly-tapering ends, and provided with a longitudinal slot, a series of gripping-dogs adapted to engage the lower end of the cas-
 125 ing to be removed, surrounding and bearing against said core or plunger, a longitudinally-sliding collar affording pivotal support for said dogs, an actuating-rod arranged within a central aperture in said core or plunger and connected with said sliding collar through
 130 the said longitudinal slot in said plunger, and a detent arranged upon said lifting-tube and adapted to engage said rod when at the upward limit of its movement, whereby the dogs

will be held in their retracted position, substantially as described.

6. The herein-described apparatus for removing casing-tubes, comprising a lifting-tube, a core or plunger attached to the lower end of said lifting-tube, a plurality of longitudinally-movable expansible gripping-dogs engaging said plunger, an actuating-rod connected with said gripping-dogs; said actuating-rod being provided with a tubular upper portion having a perforation therein, and a spring-actuated detent pivoted to the tube and adapted to engage and pass through the said perforation when the actuating-rod is at the upward limit of its movement, said tubular part of the actuating-rod being adapted to receive a suitable tool for pressing said detent outwardly to unlock said rod, substantially as described.

7. The herein-described apparatus for removing casing-tubes, comprising a lifting-tube, a core or plunger attached to the lower end of said lifting-tube, a plurality of longitudinally-movable expansible gripping-dogs engaging said plunger, an actuating-rod connected with said gripping-dogs, said actuating-rod being provided with a tubular upper portion having a perforation therein, a harpoon-sheath connected with the said actuating-rod, by means of which said rod and dogs can be lifted, and a spring-actuated detent pivoted to the lifting-tube and adapted to engage and pass through the said perforation when the actuating-rod is at the upward limit of its movement, said tubular part of the actuating-rod being adapted to receive a suitable tool for pressing said detent outwardly to unlock said rod, substantially as described.

8. The herein-described apparatus for removing casing-tubes, comprising a lifting-tube, a spline or feather located therein, a core or plunger attached to the lower end of said lifting-tube, a plurality of longitudinally-

movable expansible gripping-dogs engaging said plunger, an actuating-rod connected with said gripping-dogs, said actuating-rod being provided with a tubular upper portion having a perforation therein, a groove or featherway formed in said actuating-rod and adapted to engage the said spline or feather, and a spring-actuated detent pivoted to the lifting-tube and adapted to engage and pass through the said perforation when the actuating-rod is at the upward limit of its movement, said tubular part of the actuating-rod being adapted to receive a suitable tool for pressing said detent outwardly to unlock said rod, substantially as described.

9. The herein-described apparatus for removing casing-tubes, comprising a lifting-tube, a coupling located therein and formed with a guide-aperture, a core or plunger attached to the lower end of said lifting-tube, a plurality of longitudinally-movable expansible gripping-dogs engaging said plunger, an actuating-rod connected with said gripping-dogs and passing upwardly through the guide-aperture in said coupling, said actuating-rod being provided with a tubular upper portion having a perforation therein, and a spring-actuated detent pivoted to said coupling and adapted to engage and pass through the said perforation when the actuating-rod is at the upward limit of its movement, said tubular part of the actuating-rod being adapted to receive a suitable tool for pressing said detent outwardly to unlock said rod, substantially as described.

In testimony that I claim the foregoing as my invention I affix my signature in presence of two witnesses.

MILAN C. BULLOCK.

Witnesses:

C. CLARENCE POOLE,
HARRY COBB KENNEDY.