

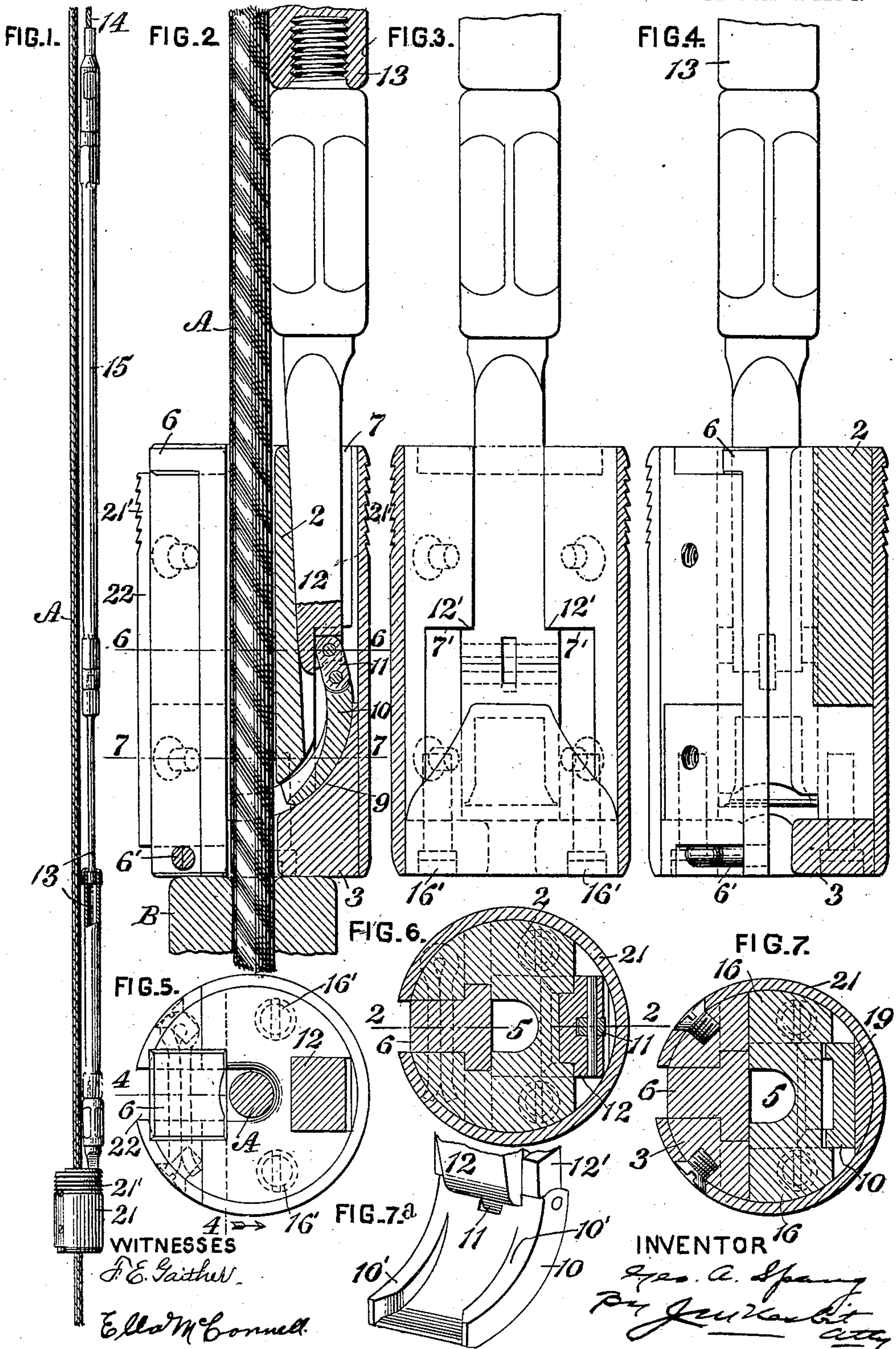
G. A. SPANG.
ROPE KNIFE.

APPLICATION FILED DEC. 16, 1909.

Patented Sept. 6, 1910.

2 SHEETS—SHEET 1.

969,571.



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2 SHEETS—SHEET 2.

FIG. 8.

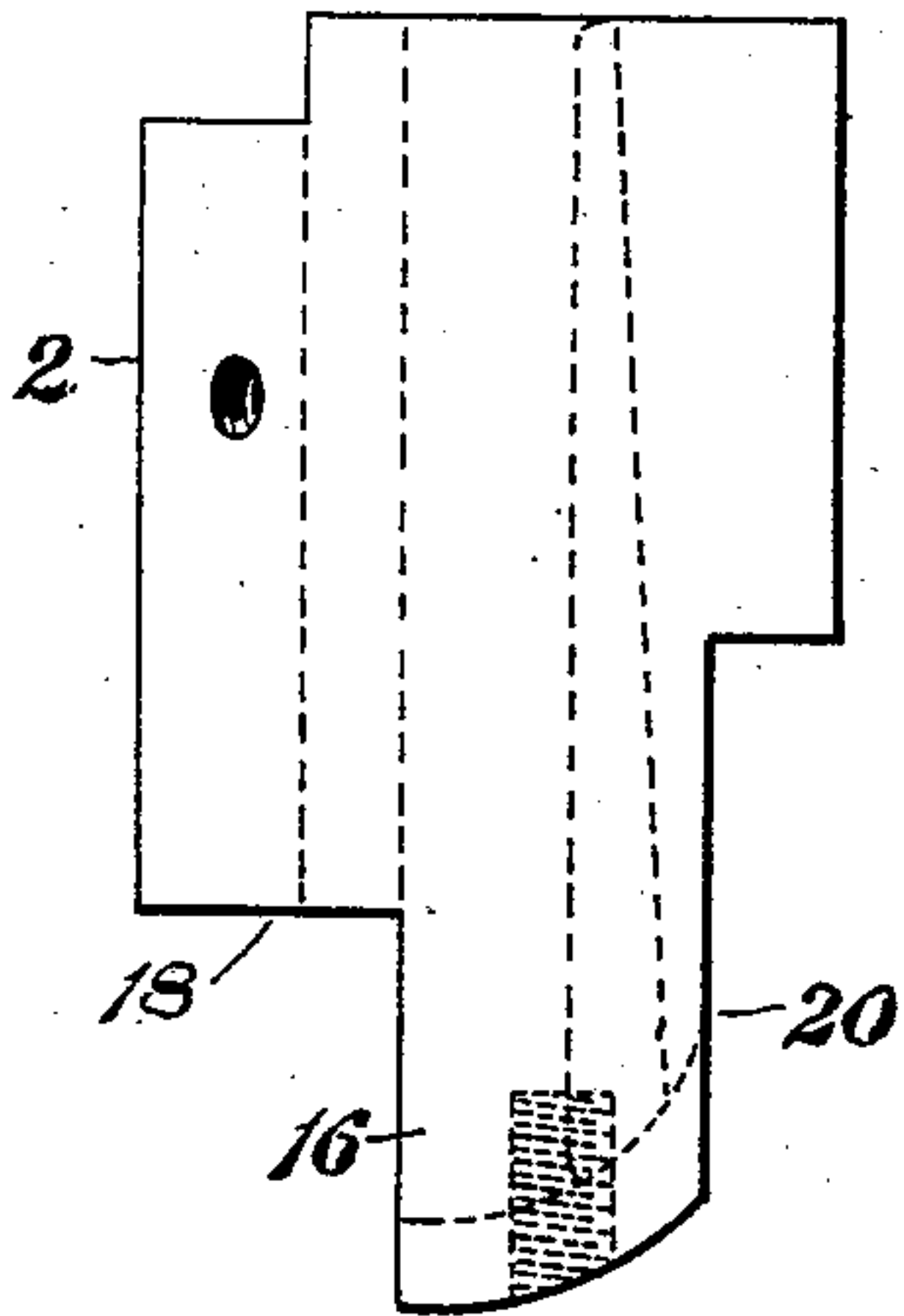


FIG. 9.

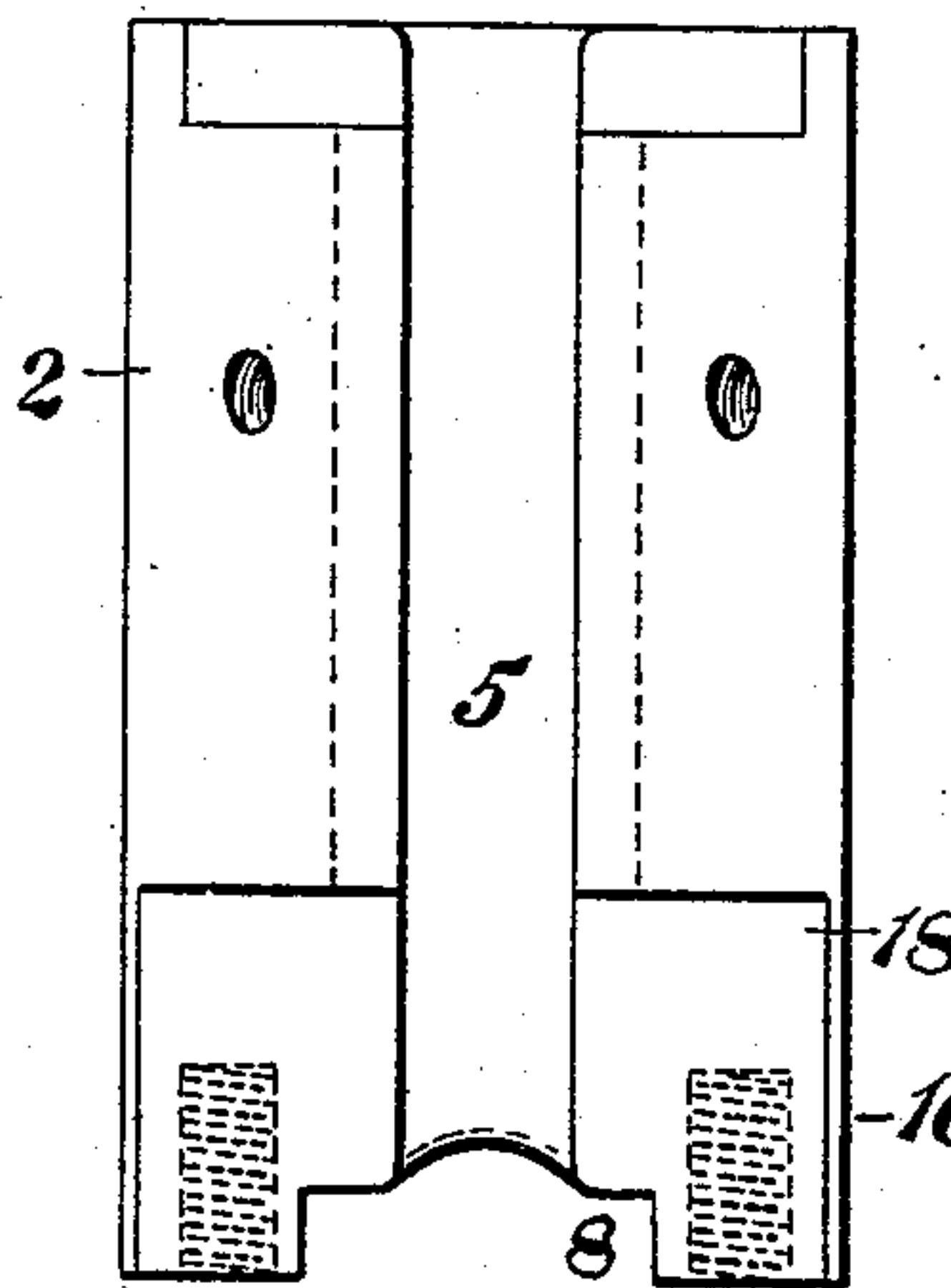


FIG. 10.

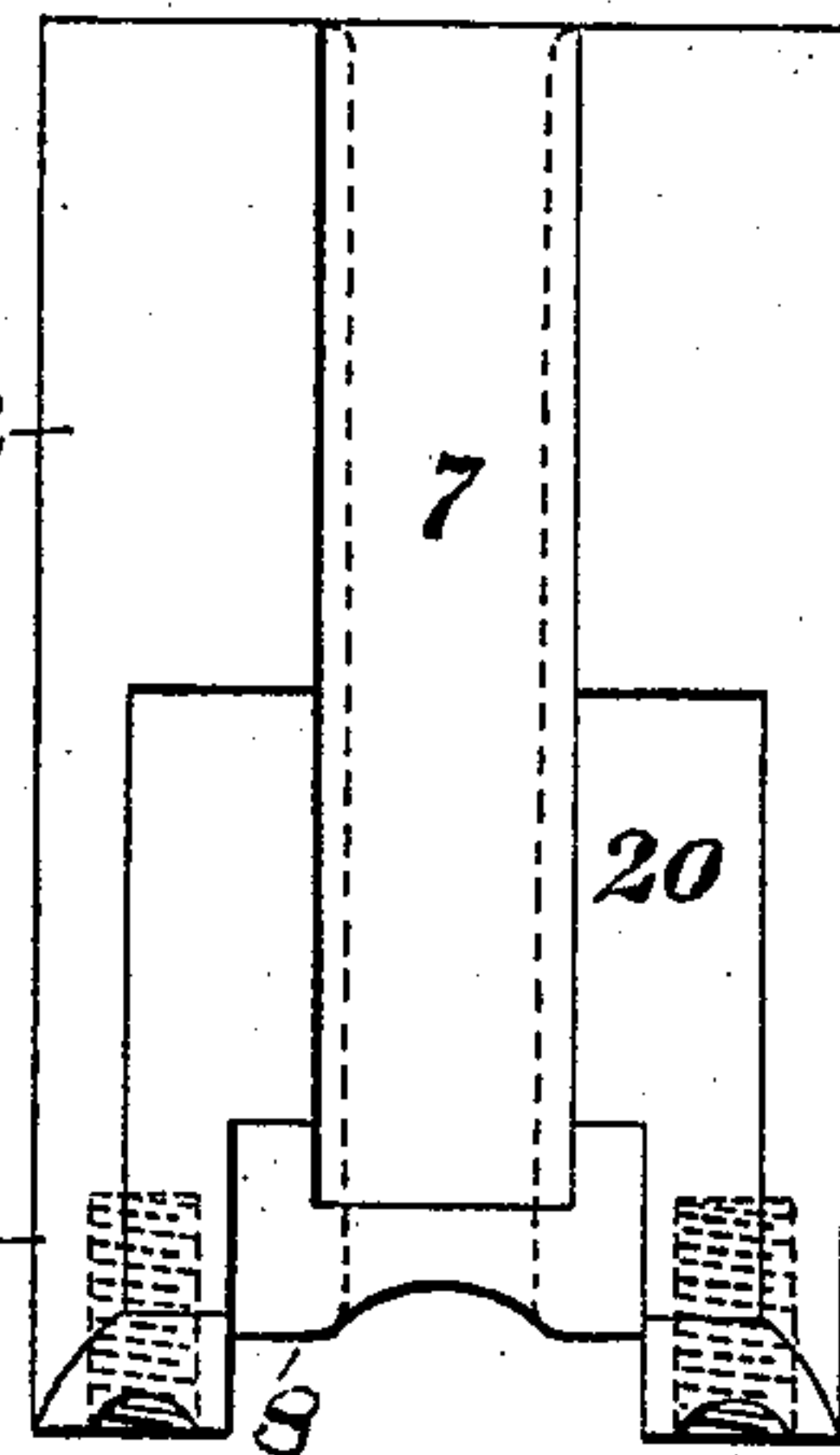


FIG. 11.

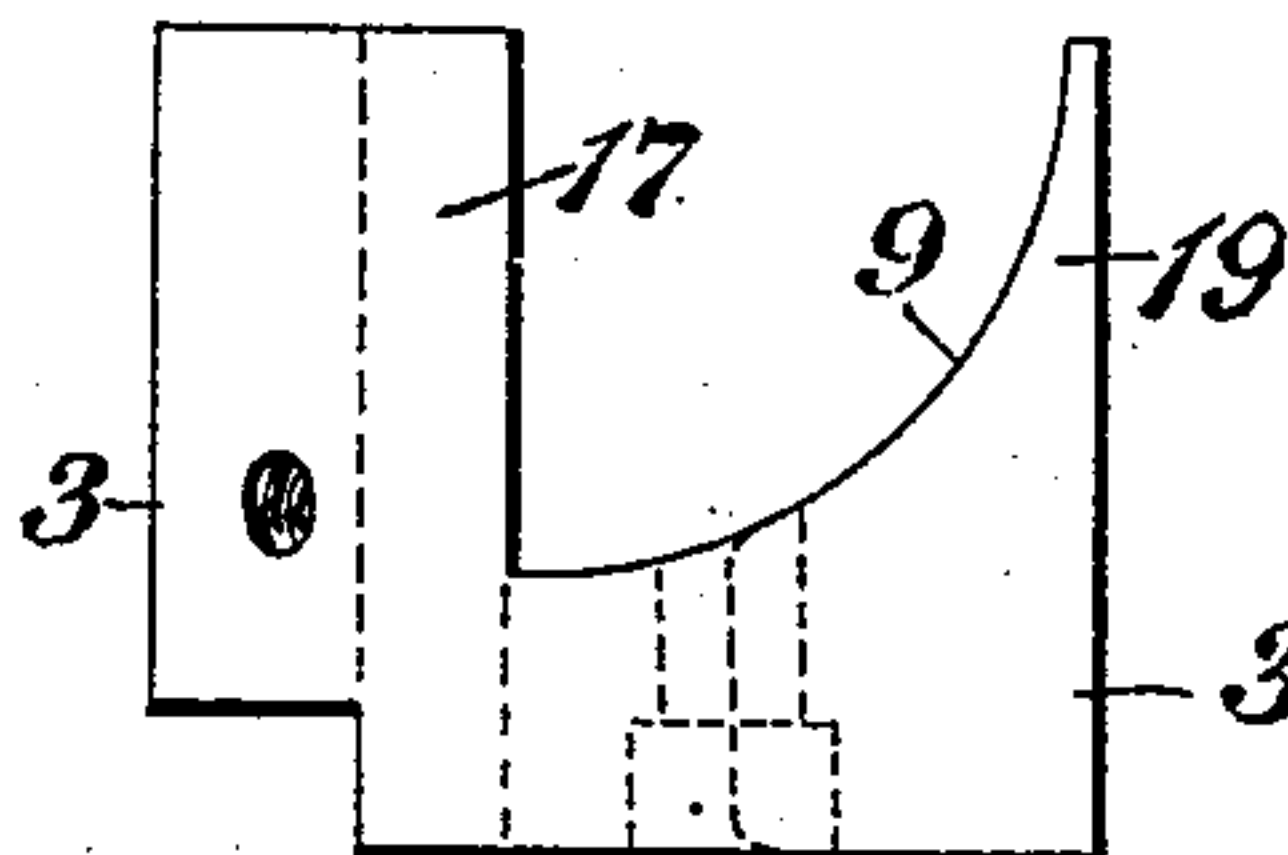


FIG. 12.

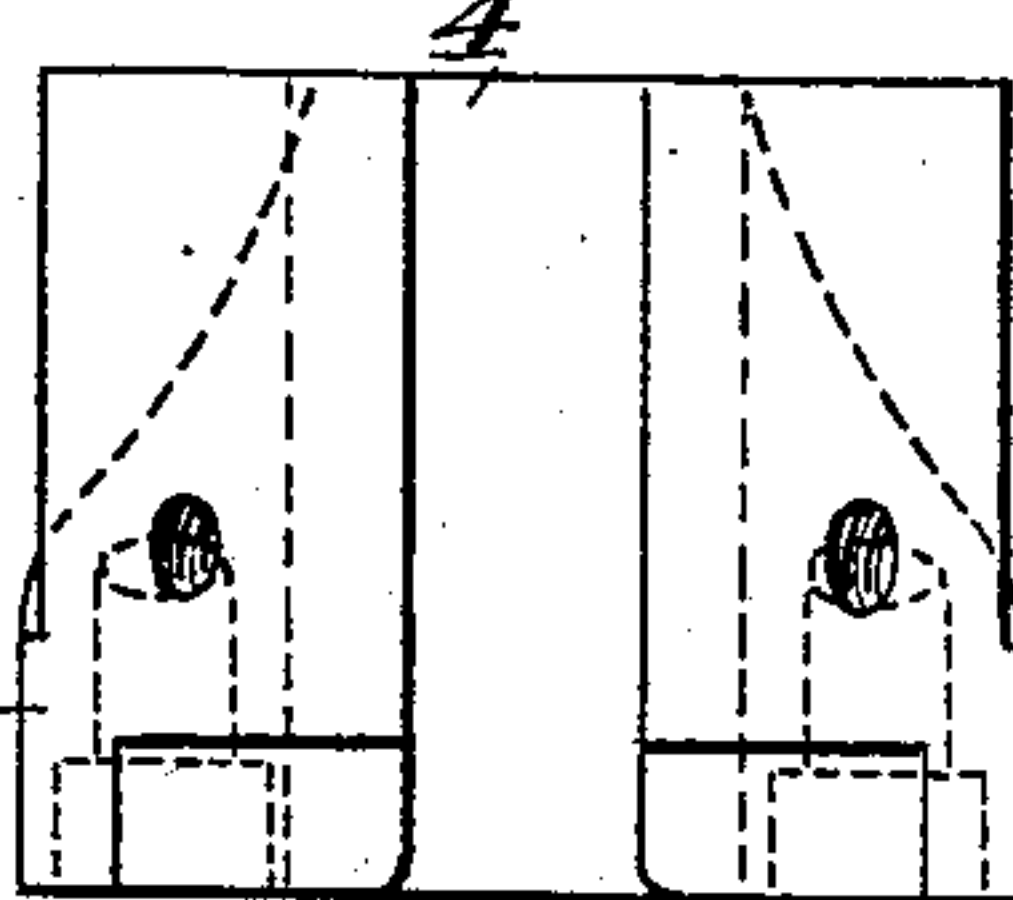


FIG. 13.

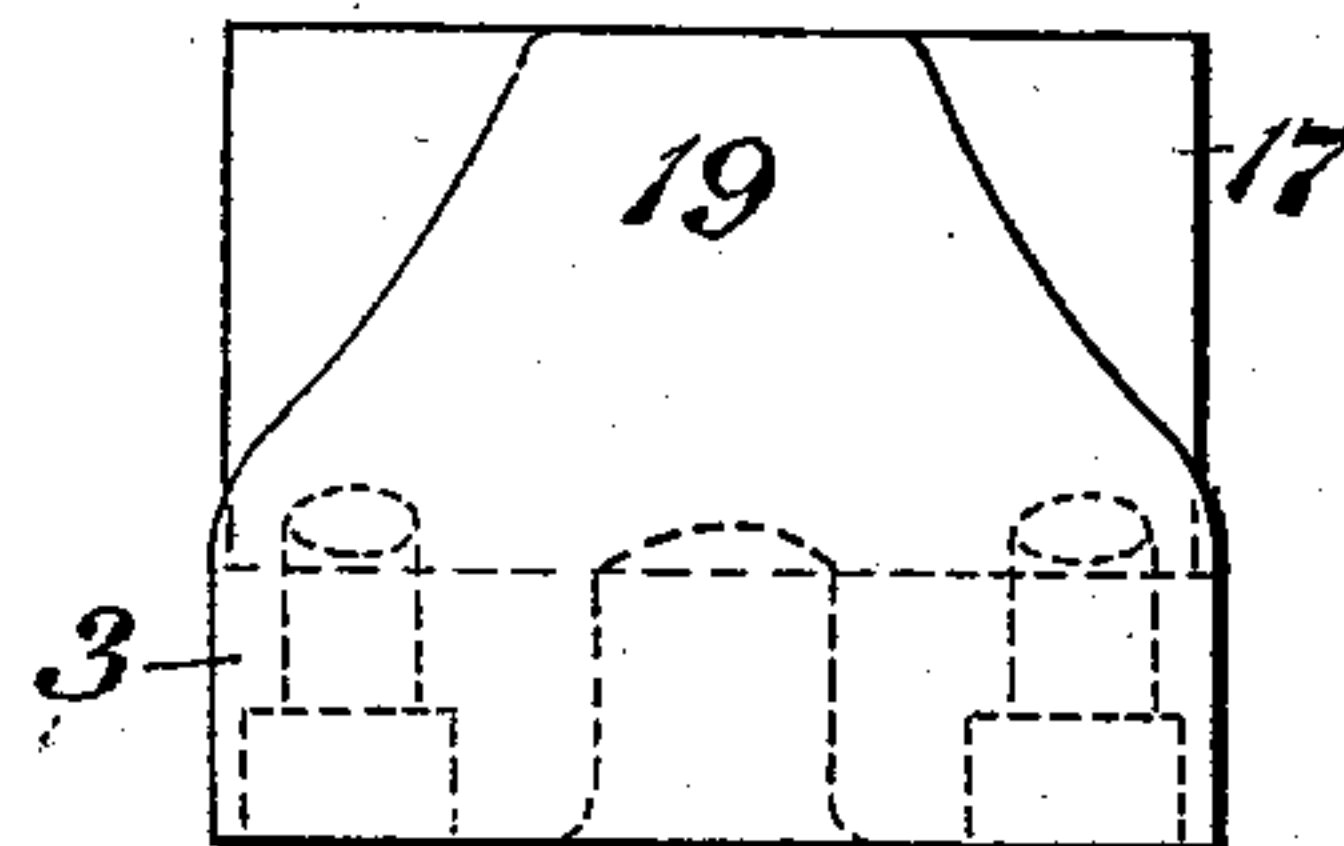


FIG. 14.

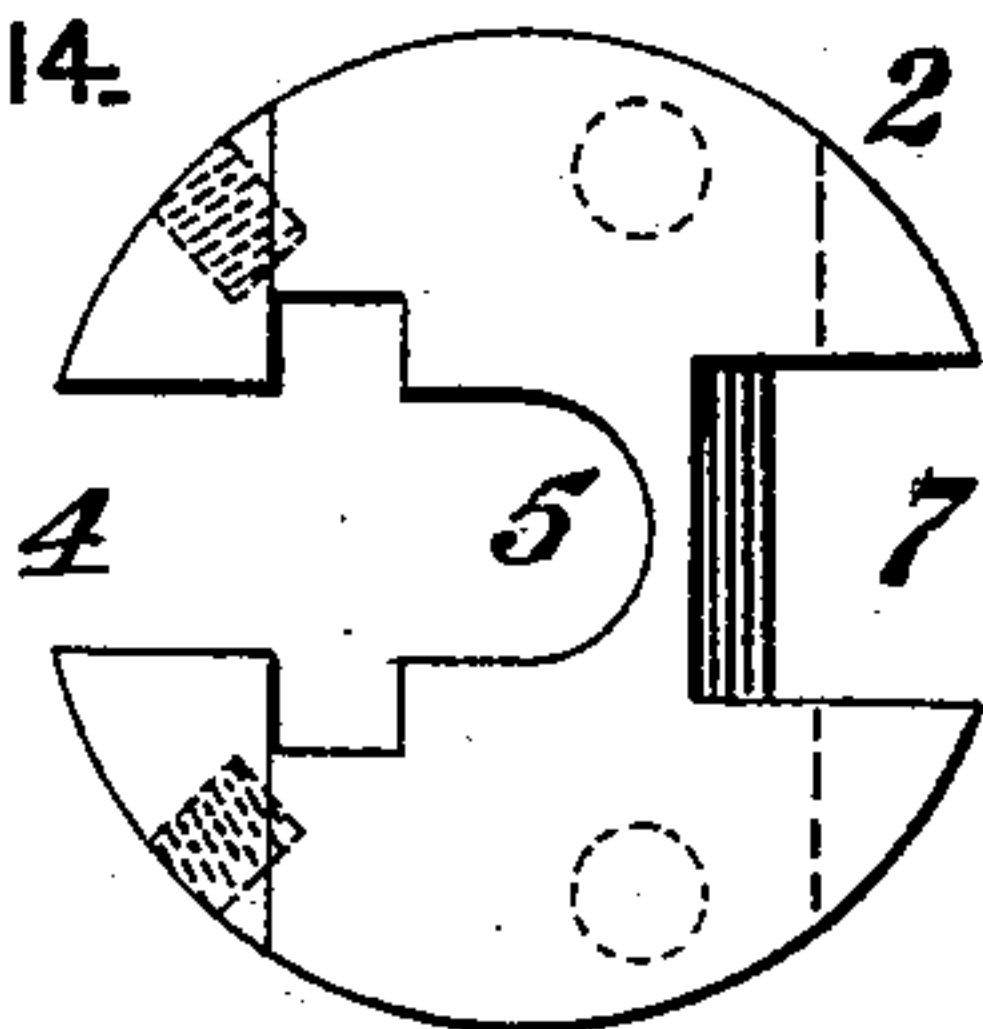


FIG. 18.

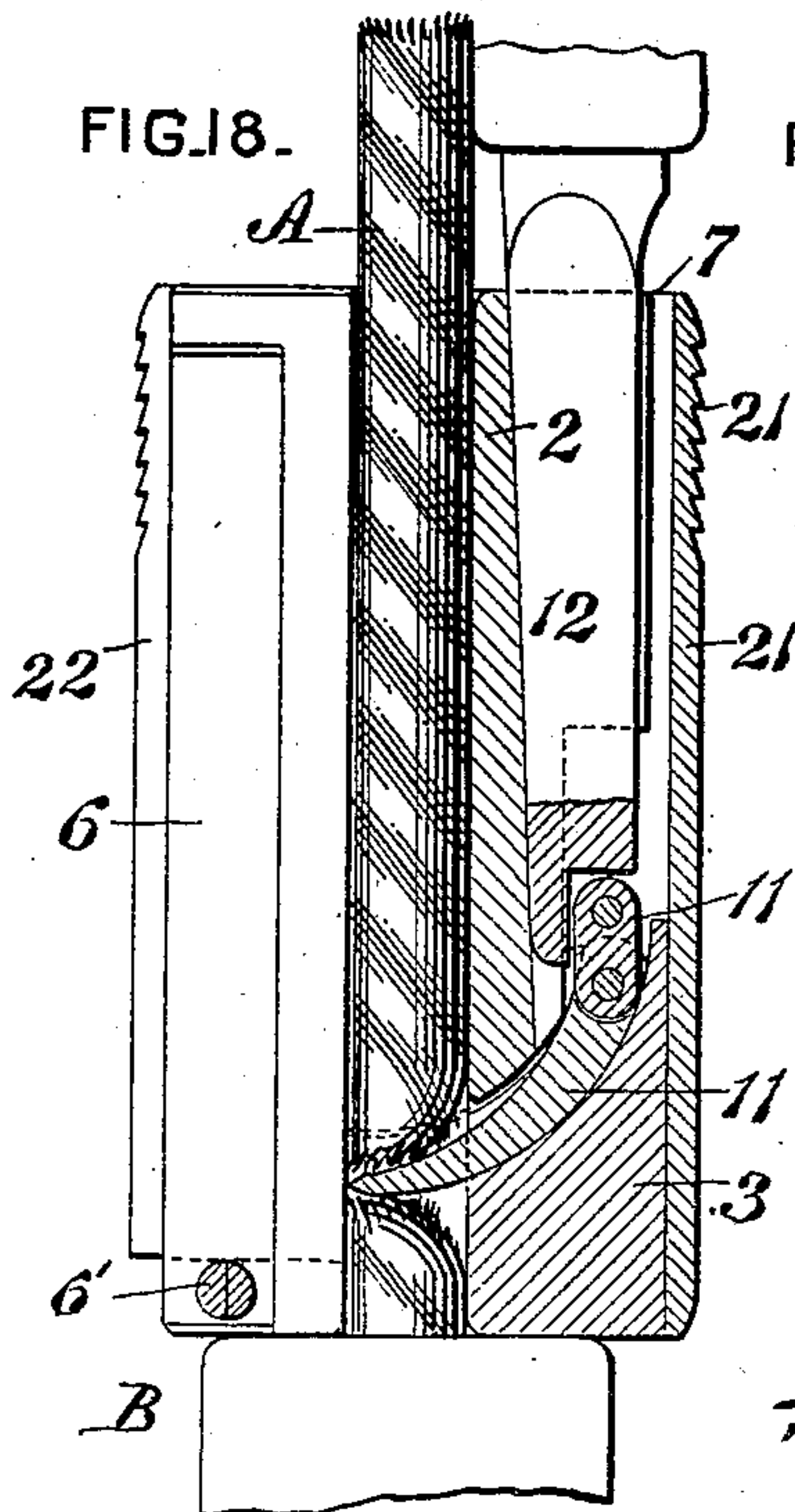


FIG. 16.

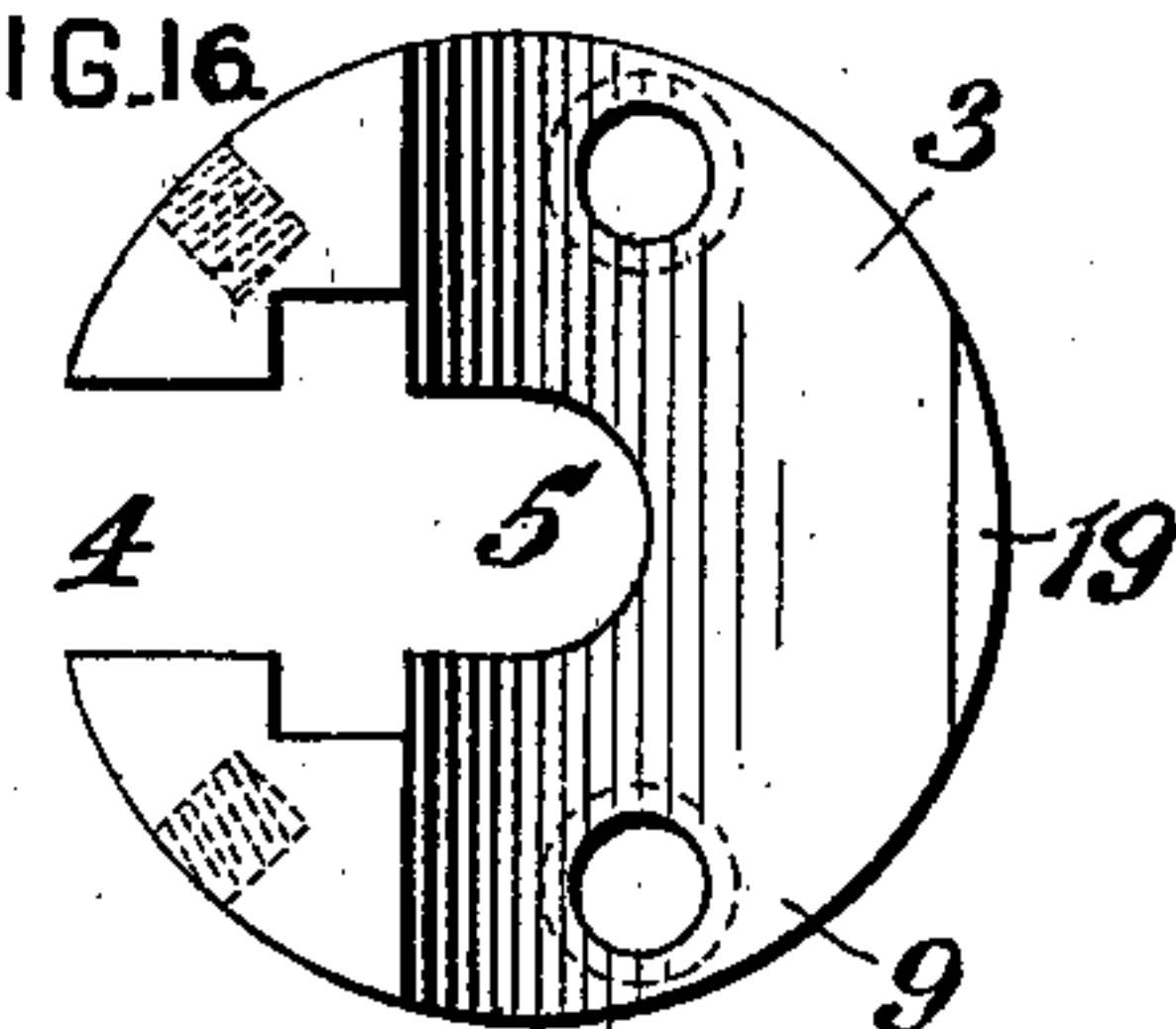


FIG. 15.

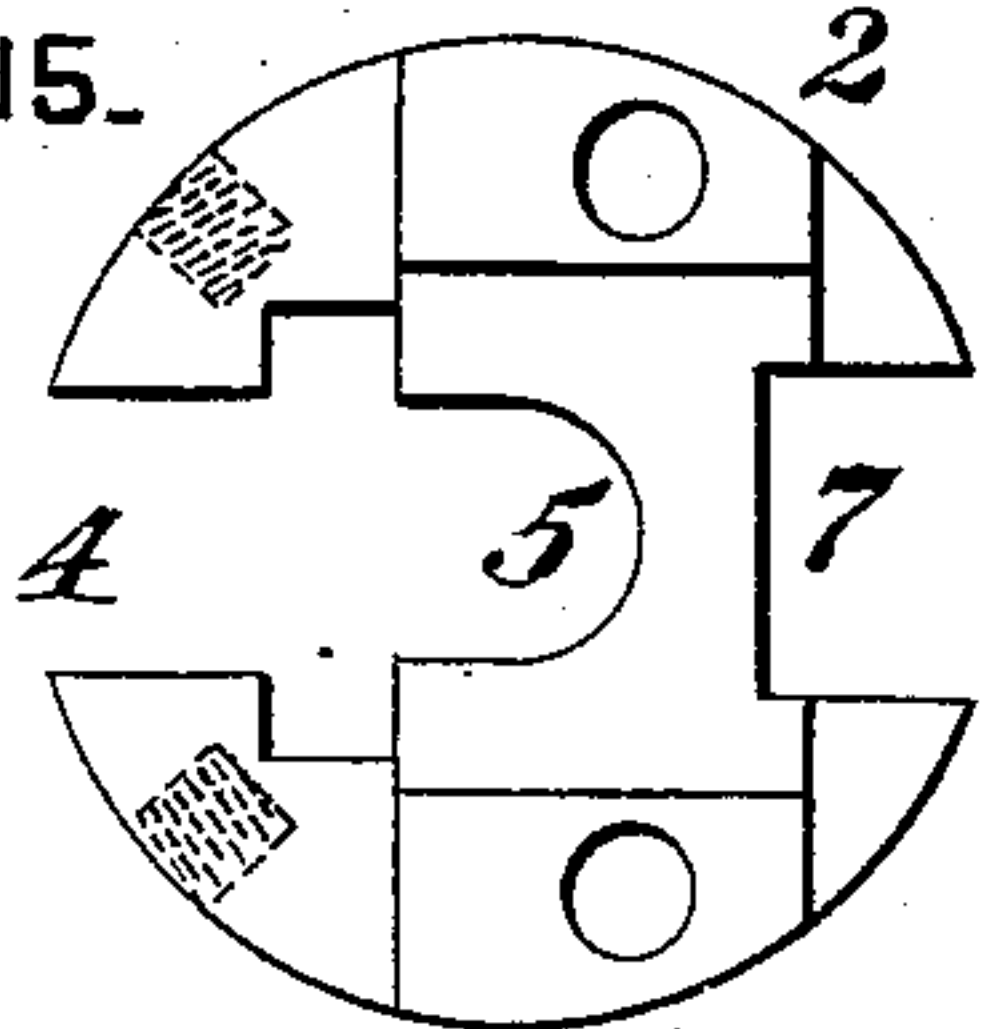
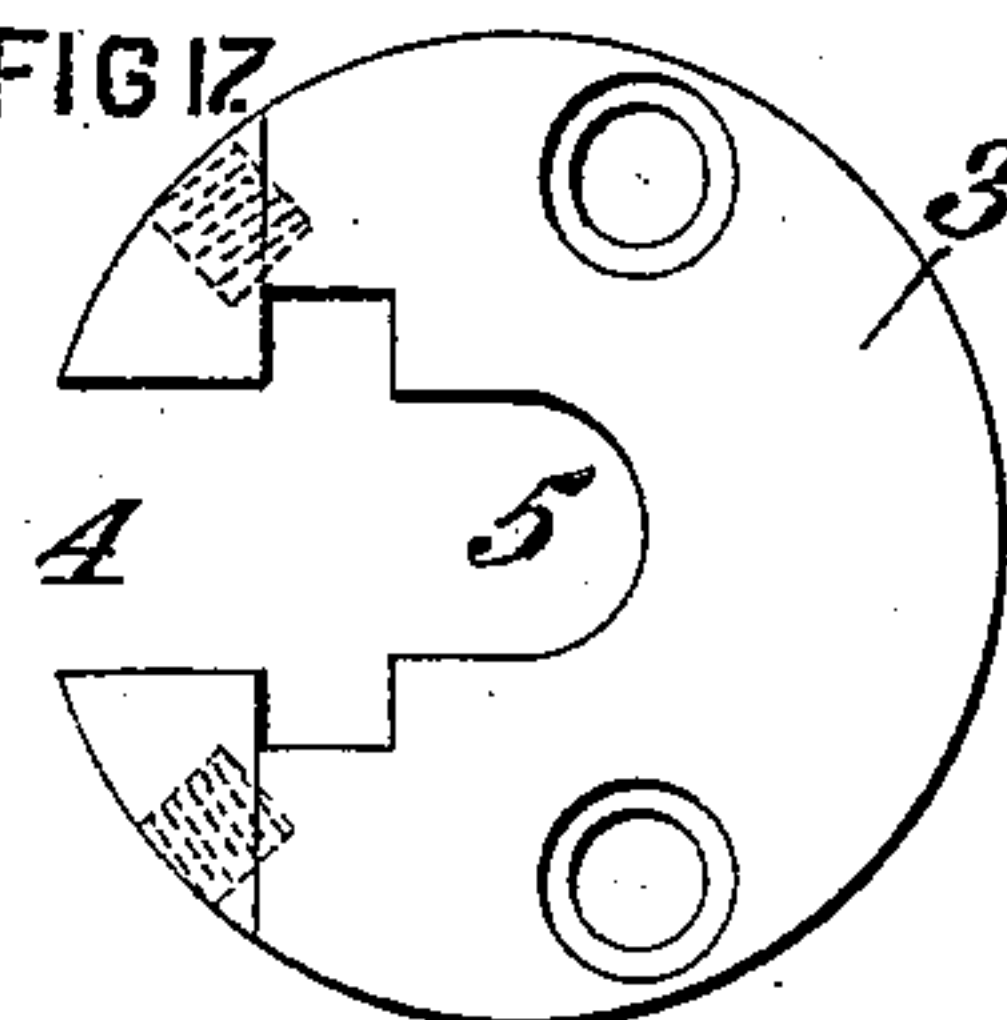


FIG. 17.



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UNITED STATES PATENT OFFICE.

GEORGE A. SPANG, OF BUTLER, PENNSYLVANIA.

ROPE-KNIFE.

969,571.

Specification of Letters Patent.

Patented Sept. 6, 1910.

Application filed December 16, 1909. Serial No. 533,471.

To all whom it may concern:

Be it known that I, GEORGE A. SPANG, a resident of Butler, in the county of Butler and State of Pennsylvania, have invented certain new and useful Improvements in Rope-Knives, of which the following is a specification.

Wire cables are now generally used in oil and gas well operations, having largely superseded Manila cables. However, much difficulty has been experienced in cutting them. In cutting wire cables, as when removing them from appliances that have become stuck in wells, cutting devices that operate efficiently on Manila cables fail in most instances to work satisfactorily for cutting wire.

While a number of devices have been designed heretofore with the requirements of wire cutting in view, such of them as have come under my observation have been deficient for one reason or another, the principal trouble resulting from the indirect modes of applying the cutting force to the knife, also deficiency in the mode of directing the knife during the cutting operation.

My purpose in constructing the present tool is to overcome the difficulties referred to by providing a cutter of improved form, with improved means for applying the driving force thereto.

Structurally, the invention includes various improvements in forming and assembling the several parts of the tool.

In the accompanying drawings, Figure 1 is an elevation of the improved tool shown in position on a cable, together with the tool actuating means. Fig. 2 is a vertical section on line 2—2 of Fig. 6, the member closing the open side of the rope passage being shown in elevation. Fig. 3 is an elevation of the tool viewing the same at the right hand of Fig. 2, the inclosing sleeve or jacket being in section, and in Fig. 4, one-half of the opposite side of the tool is shown in elevation and the other half in section taken on line 4—4 of Fig. 5. Fig. 5 is a top plan of the tool. Figs. 6 and 7 are sectional plans on lines 6—6 and 7—7, respectively, of Fig. 2. Fig. 7^a is a detail of the cutter. Figs. 8, 9 and 10 are elevations of different sides of the upper member of the tool body, and Figs. 11, 12 and 13 are similar elevations of the lower member. Fig. 14 is a top plan of the upper member, and Fig. 15 a bottom plan of the same, while Figs. 16

and 17 are like top and bottom plans of the lower member. Fig. 18 is a vertical section of the tool similar to Fig. 2, the cutter being shown projected across the rope passage.

Referring to the drawings, 2 indicates the upper member of the two-part tool body and 3 the lower member, the parts interfitting and secured together as will be presently explained. This two-part body is slotted inwardly at one side from top to bottom as indicated at 4, the inner portion 5 of the slot forming the passage for rope or cable A, the slot being open when placing the tool on the cable, as will be understood. With the cable within the slot, the latter is closed by the flanged key or bar 6, inserted at the upper end of the body and extending to the bottom of the latter and secured by cotter 6'.

The tool body is recessed downwardly from its upper end at one side of cable passage 5, opposite slot 4, as indicated at 7, the recess extending to the lower end of that side of the upper body member 2. At the juncture of body members 2 and 3, the recess is continued downwardly and laterally in a curved line and intersects rope passage 5. In the present adaptation, the extension of the recess is formed at the bottom of member 2, as indicated at 8, the curved face 9 of lower member 3 forming the bottom of the recess extension and serving as a guide to direct the curved cutter 10 moving thereover to and from the rope passage. The cutter has a cutting edge at its lower end, and at each side is reinforced by flanges 10', the latter engaging the abutment after the rope has been cut and protecting the cutting edge. In the present adaptation, key or bar 6 forms this abutment. The upper end of the curved cutter 10 is flexibly connected, in the present instance, by link 11 to the lower end of stem 12 movable vertically in recess 7, the tool being supported and operated by this stem which, as shown in Fig. 1, may be connected to the blow-transmitting jar 13, the latter, in turn, connected directly to the operating cable 14, or through the medium of a sinker bar 15. The vertical movement of stem 12 within the body is limited by stem shoulders 12' engaging the depression side offsets 7', so that the operating stem cannot become disengaged from the body, either when operating the cutter or when lowering the tool. Furthermore, this limitation

defines the length of the stroke of the cutter which if unrestricted might result in breaking the same.

The mode of applying force to the cutter by transmitting it directly though flexibly to the operating stem, together with the curved formation of the cutter and the curved path through which it travels, result in cutting wire cables in a most effective manner, this regardless of whether the cable is of large size, such as used for drilling, or a smaller cable—for instance one for operating a bailer.

The mode of operating rope knives is so well understood that only brief reference need be made thereto. The tool is placed on the cable as above described and is lowered thereon until it meets an obstruction which stops further downward movement. This obstruction is usually the upper end B of a rope socket, Fig. 2, to which the tools are connected, though such obstruction may consist of a knot in the rope, such as is commonly formed in connecting it to a bailer. Whatever the obstruction may be, and even though less substantial than a rope socket, *i. e.*, more yielding to downward pressure, use of the improved tool under varying conditions has demonstrated its high efficiency in severing the cable.

The structural details of the upper and lower members of the tool body are illustrated in Figs. 8 to 17. The downward recess in lower part 3 resulting in the formation of curved face 9 provides a socket-like depression in which fits the central downward extension 16 of upper member 2, the lower extremities of the latter at opposite sides of recess 8 being curved to fit depression 9 and adapted to receive screws 16' countersunk in lower member 3 for securing the parts together. Similarly, the vertical upwardly extending portion 17 of member 3 fits the angular side depression 18 in upper member 2. At the opposite side of the lower member, the upper extension 19, having its inner face curved to form part of surface 9, extends upwardly into depression 20 in the upper member opposite depression 18.

The upper and lower body members are preferably inclosed in a tube-like sleeve 21, extending from top to bottom of the body, and slotted on one side at 22 complementary with slot 4. The sleeve fully protects the body members and, in the present adaptation, closes the stem recess 7, also fully protecting the stem and the knife. This sleeve together with the interfitting body parts provide a very stout tool, preventing movement or displacement of the parts relatively to each other. The upper portion of the sleeve may be grooved or indented at 21' to provide a roughened surface to facilitate gripping the tool with a fishing tool when

necessary to remove it from a well by such means.

While I have shown and described the preferred embodiment of the invention and entered into considerable detail with regard to structural features of such embodiment, it will be understood that the invention is not thus restricted.

I claim:—

1. A rope knife comprising a body having a rope passage and a stem passage, the latter curved and intersecting the rope passage, a cutter operative in the portion of the stem passage which intersects the rope passage, a stem operative in the stem passage, and a link flexibly connecting the stem and cutter.

2. A rope knife comprising a body having a rope passage and a stem passage, the latter curved and intersecting the rope passage, a cutter operative in the portion of the stem passage which intersects the rope passage, a stem having limited movement in the stem passage and flexibly connected to the cutter, and cutter operating and tool sustaining means connected to the stem.

3. A rope knife comprising a body having a rope passage extending therethrough, the body having a curved passage intersecting the rope passage, a curved cutter operative in the curved passage, and cutter operating means.

4. A rope knife comprising a body having a rope passage extending therethrough and a stem passage extending downwardly from its upper end, a portion of the stem passage curved and intersecting the rope passage, a stem operative in the stem passage, and a curved cutter operative in the curved portion of the stem passage and operatively connected to the stem.

5. A rope knife comprising a body having a rope passage extending therethrough, the body having a cutter passage curved downwardly and laterally and intersecting the rope passage, and a cutter operative in said passage.

6. A rope knife comprising a body having a rope passage extending therethrough and a stem passage extending downwardly from its upper end with the lower portion of said passage curved and intersecting the rope passage and forming a curved abutment, a stem operative in the stem passage, and a cutter complementary with the abutment and operatively connected to the stem.

7. A rope knife comprising a body having a rope passage extending therethrough and a stem passage extending downwardly from its upper end with the lower portion of said passage curved and intersecting the rope passage, a curved cutter operative in the curved portion of the passage with a cutting edge at its lower end and with its upper end in line with the upper portion of

the passage, a stem operative in the stem passage, and a flexible connection between the lower end of the stem and the upper end of the cutter.

5 8. A rope knife comprising a body having a rope passage extending therethrough from top to bottom, the body formed in two parts—one above the other—with means securing said parts together, the body
10 formed with a cutter passage at the juncture of the two parts which passage intersects the rope passage, a cutter operative in said passage, and cutter actuating means.

15 9. A rope knife comprising a body having a rope passage extending therethrough from top to bottom, said passage being open laterally from top to bottom through one side of the body, removable means closing said passage, the body formed in two parts—
20 one above the other—with means securing the parts together, the body formed with a cutter passage at the juncture of said parts with said passage intersecting the rope passage opposite said removable device, a cutter
25 operative in the cutter passage with the cutter edge pressing the rope against said closing device when severing the same, and cutter operating means.

30 10. A rope knife comprising a body having a rope passage extending therethrough from top to bottom, the body formed in two members—one above the other—with means uniting the same, the lower member recessed downwardly with the bottom of the recess
35 curved and intersecting the rope passage, the lower portion of the upper member fitting within the lower member and recessed upwardly at its lower extremity to form a cutter passage above the curved bottom of
40 the depression in the lower member, the upper member having a passage extending

upwardly from the recess, a cutter operative in the cutter passage, and a cutter operating stem.

11. A rope knife comprising a body having a rope passage extending therethrough 45 from top to bottom, the body formed in two members—one above the other—with means uniting the same, the lower member recessed downwardly from its upper end with 50 one side and the bottom of the recess curved and the other side disposed vertically, the upper body member having its lower end shaped to fit within the recessed bottom member, the body formed with a cutter passage 55 at the juncture of the upper and lower body members which intersects the rope passage, the curved portion of the recess in the lower body member forming the bottom of the cutter passage, a curved cutter operative 60 in said passage, the upper body member having a passage extending upwardly from the cutter passage and cutter operating means in said passage.

12. A rope knife comprising a body having a rope passage extending therethrough 65 with the passage open through one side of the body, a removable device closing the open side, the body recessed to provide a cutter passage intersecting the rope passage, 70 a cutter in said passage, cutter operating means, and a sleeve inclosing the body and slotted complementary with the open side of the rope passage.

In testimony whereof I affix my signature 75 in presence of witnesses.

GEORGE A. SPANG.

Witnesses:

CHAS. LEPSCH,
JAMES O. CAMPBELL,
JAMES E. WISE.