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R. C. BAKER ET AL

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BACK-OFF OR HOLDING TOOL FOR WELL CASINGS

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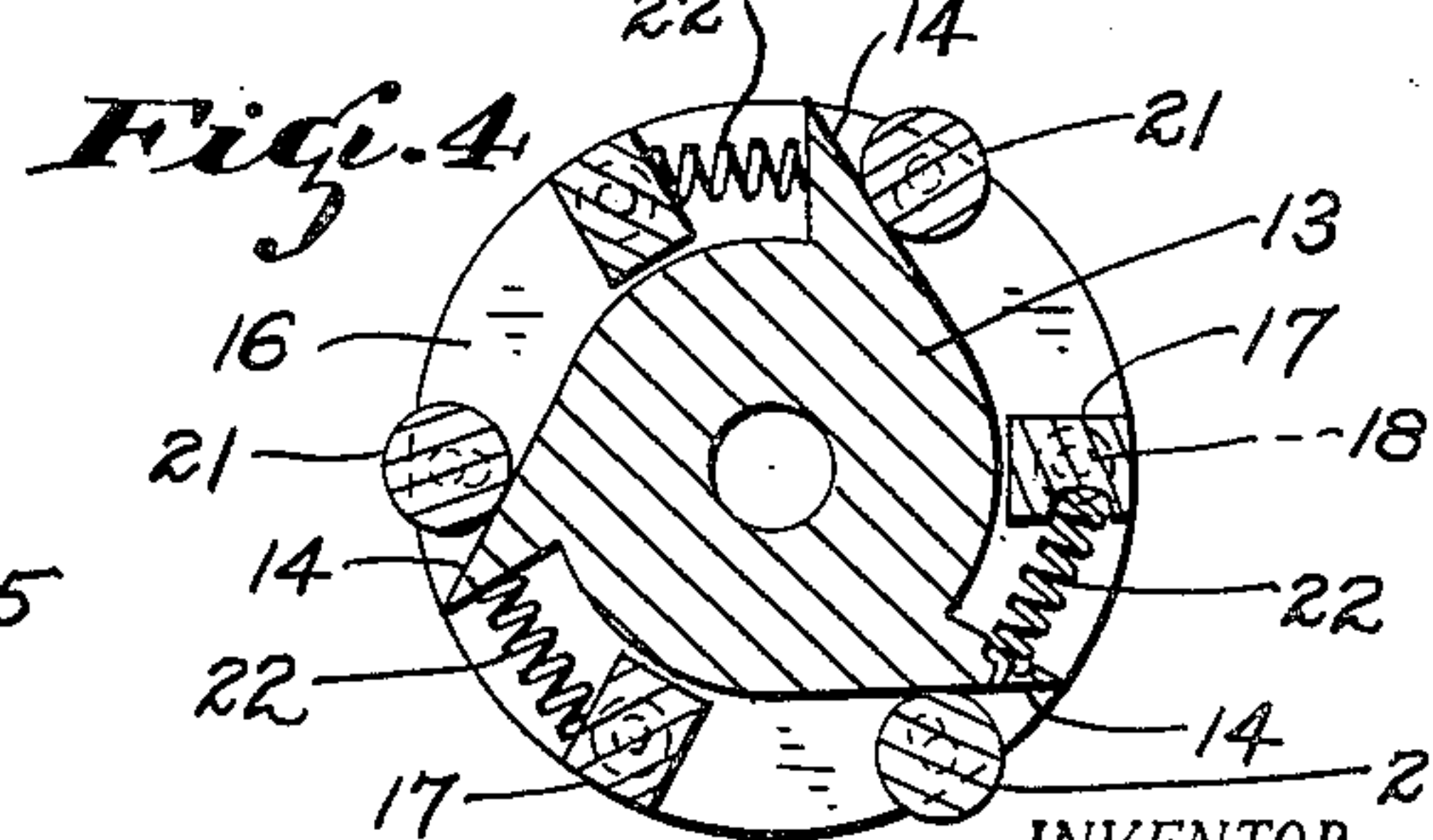
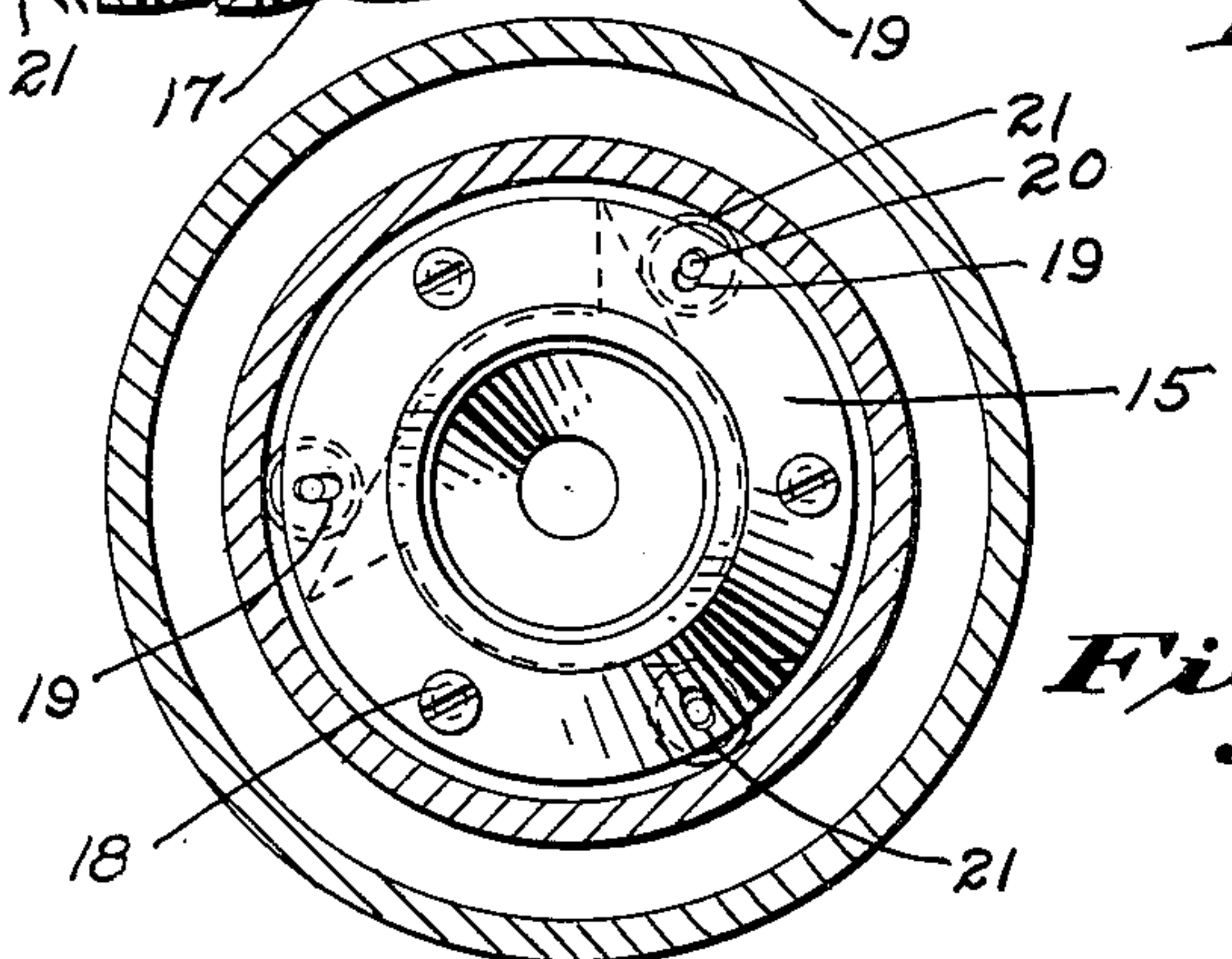
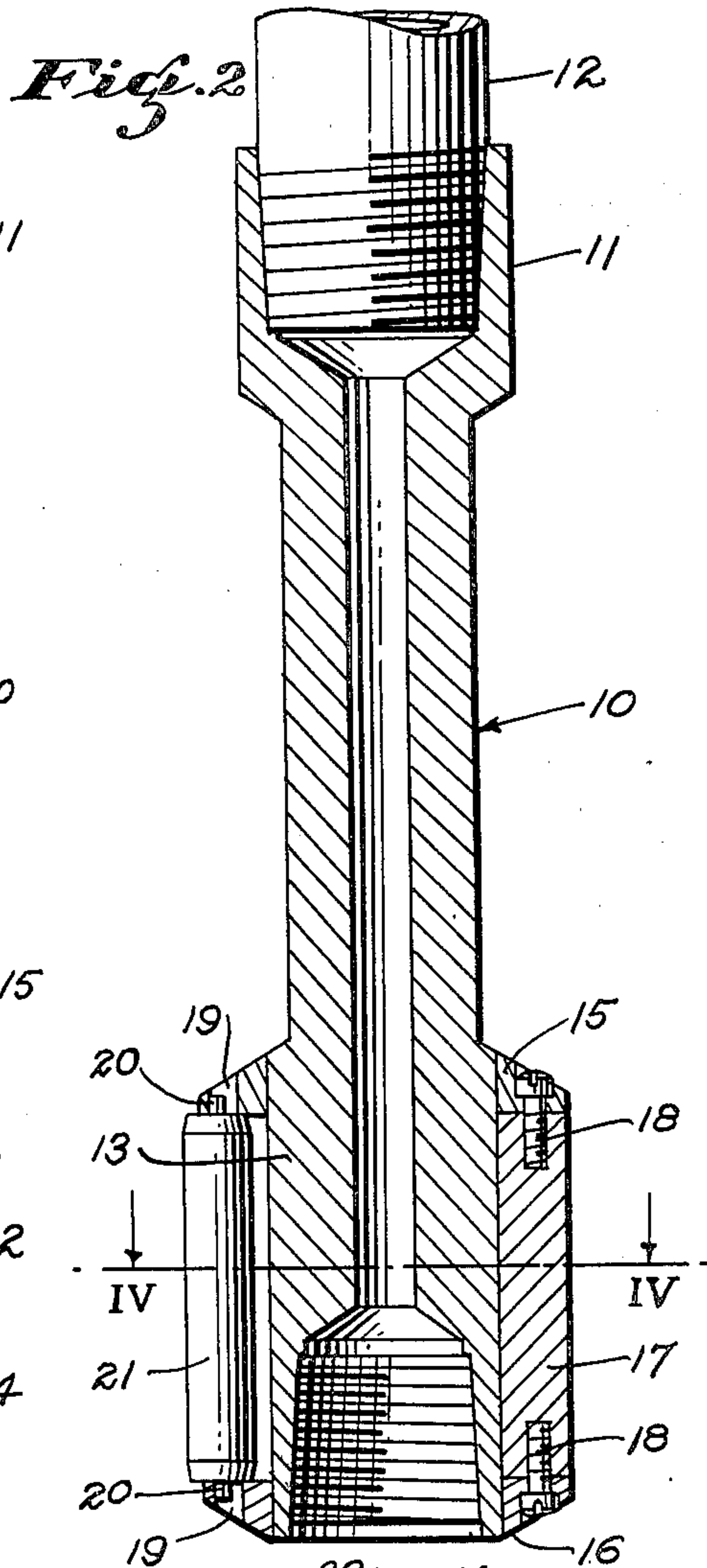
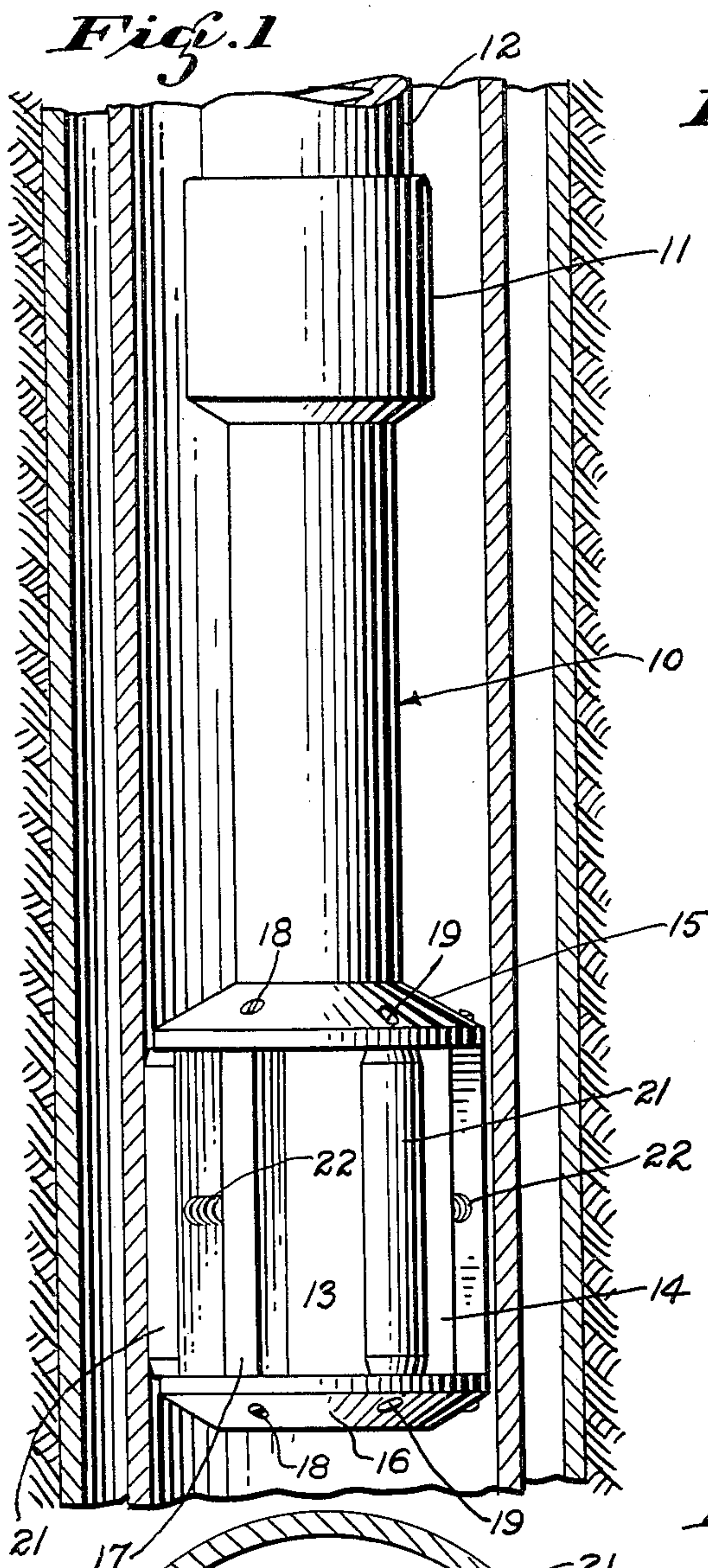


Fig. 3.

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BACK-OFF OR HOLDING TOOL FOR WELL CASINGS

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This invention relates to tools for manipulating well casing while it is in the well bore and more particularly to a tool that may be suspended on a drill stem and inserted into casing to engage and revolve the casing or prevent it from turning as the case may be.

It is the principal object of the present invention to provide a tool that may be projected into a well casing and by being slightly rotated therein will firmly engage the inner surface of the casing and serve as means to turn the casing to back the same off the string or to hold the casing against turning if desired, the tool being so designed that it will maintain a sufficiently secure engagement with the casing to permit one or more lengths to be withdrawn from the well.

This object is accomplished through the provision of a tool head for connection with a drill stem by which it may be projected within a well casing. The tool head is provided with spaced longitudinally extending cams between which are positioned floating rollers. The rollers are pressed outwardly by springs into engagement with the inner casing wall and upon rotation of the tool head in one direction are engaged by the cams to urge them into firm contact with the casing wall. Further rotation of the tool head imparts turning movement to the casing through the friction of the rollers. By revolving the tool head in the opposite direction the rollers will release the casing.

One form which the invention may assume is exemplified in the following description and illustrated by way of example in the accompanying drawing, in which:

Fig. 1 is a view in elevation disclosing a device embodying our invention affixed to the lower end of a drilling string and projected within a well casing disposed in a well bore.

Fig. 2 is a central vertical section through our improved tool.

Fig. 3 is a view in transverse section through a well bore and the well casing and disclosing the tool projected within the casing, the drill stem being disconnected from the tool.

Fig. 4 is a view in transverse section

through the tool head taken on line IV—IV of Fig. 2.

Referring more particularly to the drawing we show a tool head generally indicated at 10. The free end of the tool head is provided with a socket 11 for the threaded reception of a drill string 12. The lower end of the tool head is slightly enlarged as at 13 and this enlarged portion is provided with three exteriorly formed longitudinally extending cams 14.

The cams 14 may be more or less in number as desired, but are preferably equally spaced about the periphery of the enlarged portion 13 of the tool head.

A roller carrier is mounted on the tool head for a limited amount of rotative movement relative thereto. This carrier includes an annular collar 15 disposed above the upper ends of the cams 14. The mounting of the collar enables relative rotative movement between the collar and tool head. A similar collar 16 is disposed just below the cams 14 and is fixed in spaced relation to the collar 15 by means of spacer bars 17 and screws 18. The number of spacer bars being equal with the number of cams 14 on the tool head. Each of the collars 15 and 16 are provided with radially extending slots 19, which slots receive trunnions 20 formed on opposite ends of rollers 21. The number of rollers also corresponding to the number of cams 14 and spacer bars 17. The collars and rollers are held from axial movement relative to the head by reason of the collars engagement with opposite ends of the cams.

From the description so far, it will be understood that the rollers are free for limited circumferential movement about the tool head due to the fact that they are carried by the moveable collars 15 and 16. The rollers are also capable of limited movement in a radial direction with respect to the tool head though being supported in the elongated slots 19.

Thus, by reference to Fig. 4 it will appear that rotation of the tool head in one direction will cause the cams 14 to engage the rollers 21 and move them radially outwardly causing them to contact the inner wall of the

casing into which the tool head has been lowered. Further rotation of the tool head in the same direction causes the rollers to be jammed between the cams and the casing and a very secure engagement is obtained so that upon still further rotation of the tool head, the casing wall be caused to turn. When the tool head is revolved in the opposite direction the cams will release the rollers and permit them to move inwardly and release the casing.

Expansible springs 22 may be interposed between the spacer bars 17 and the cams 14, as shown, to maintain the cams in engagement with the rollers and insure positive and quick gripping action upon rotation of the tool head.

In operation when it is desired to turn a length of casing or hold it against turning, it being understood that the device can be made either left or right hand, as conditions may demand, the tool head is fixed to the end of the drill stem and lowered to a position within the casing. When in this position it is obvious from the foregoing description that the tool head and casing act in effect as a one-way roller clutch or over-riding clutch, as turning movement of the tool head in one direction will cause it to firmly engage the casing and turning movement in the opposite direction will release this engagement.

It is also possible to utilize the device for removing one or more lengths of casing from the well after it has been unscrewed as the engagement between the tool and the casing is sufficient to withdraw the casing from the bore with the drill stem as the latter is removed.

It may be desirable, where the tool is used extensively for removing the sections of casing from the well, to provide a roughened surface on the rollers 21. This, however, is not entirely necessary and is, therefore, not shown in the accompanying drawing.

While we have illustrated and described the preferred form of our invention, it is to be understood that various changes may be resorted to by those skilled in the art without departing from the invention as defined in the appended claims.

Having thus described our invention, what we claim and desire to secure by Letters Patent is:

1. A tool for gripping well casing while the same is in a well bore which comprises a head member adapted to be lowered into a well casing, cam means arranged coaxially of said head on the periphery thereof, collars surrounding the head at opposite ends of said cam means for rotation with relation to the head, and rollers having their opposite ends journaled in said collars for floating movement radially of the head whereby rotation of the head will cause the same cam means to engage the rollers and urge them

outwardly into contact with the inner casing wall.

2. A tool of the character described comprising a head member adapted to be connected to a drilling string and to be inserted into a well casing, cam means arranged coaxially of said head at the periphery thereof, a roller carrier mounted on the head and secured from axial movement relative to the head but free for rotative movement thereon, rollers carried by said roller carrier for engagement with said cam means, said rollers being arranged coaxially of the head and being free for radial movement relative to the head, said cam means causing radial outward movement of the rollers upon turning of the head in one direction whereby the rollers may be urged outwardly into secure contact with the inner surface of the well casing.

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