Oct. 7, 1941. R. J. KENT 2,257,963

ROD WITHDRAWING TOOL

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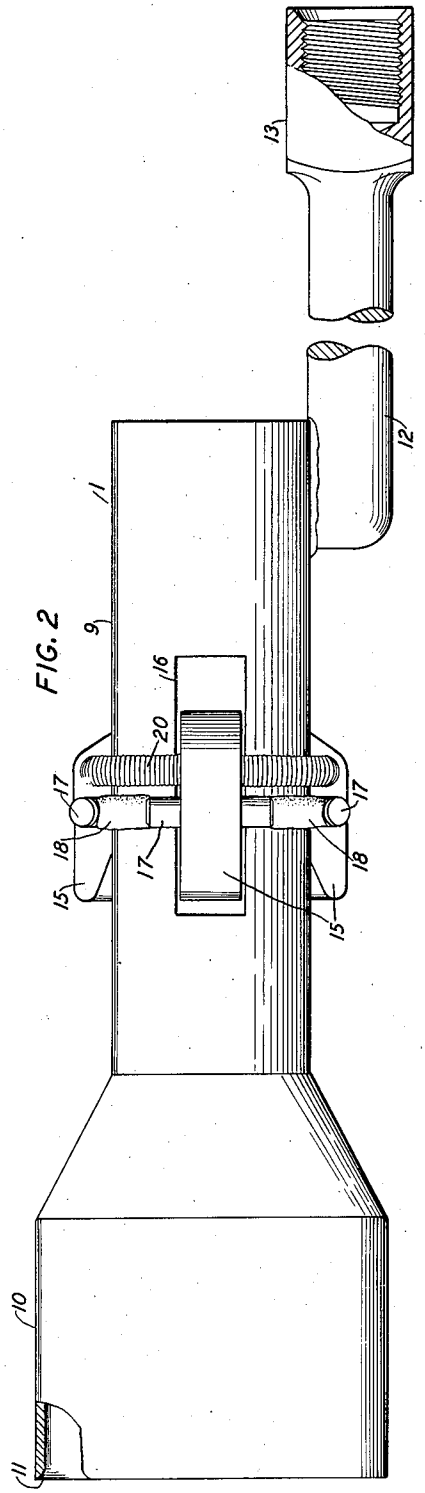

FIG. 2

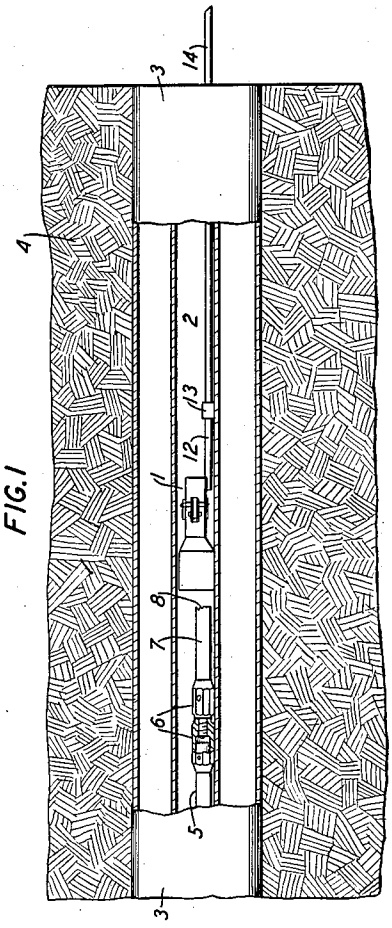

FIG. 1

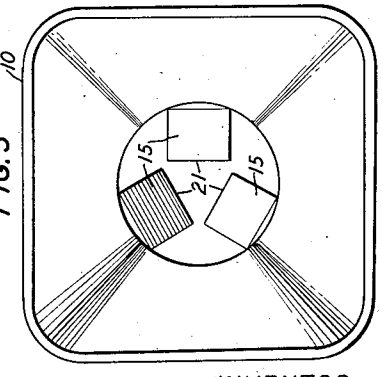

FIG. 3

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FIG. 4A

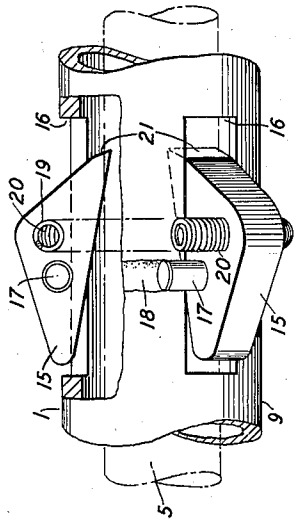


FIG. 6

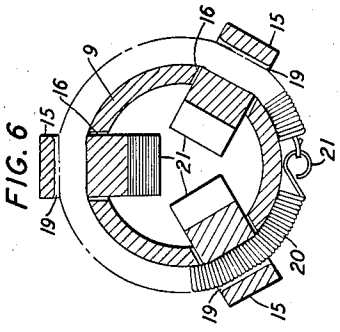


FIG. 4

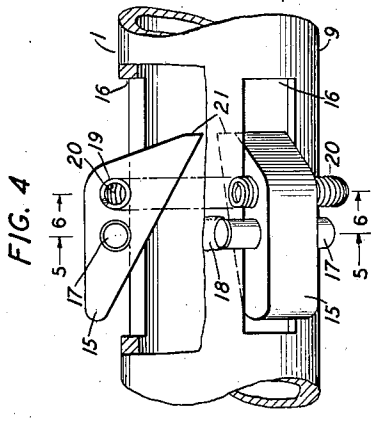
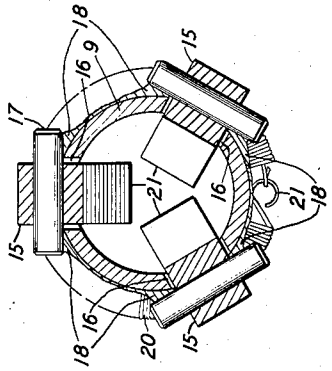


FIG. 5



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ROD WITHDRAWING TOOL

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Application November 2, 1939, Serial No. 302,572

2 Claims. (Cl. 294—19)

This invention relates to rod withdrawing tools and more particularly to tools for withdrawing rods from ducts.

The object of the invention is to provide a tool for withdrawing a rod from a duct. The tool may be used, for instance, in withdrawing from a duct a rod or a portion of a rod left in the duct by reason of breaking of the rod or breaking or disconnection of a coupling on the rod.

A feature of the invention resides in means provided in the tool for grasping a rod.

Another feature resides in the body structure of the tool.

Other features reside in the form and arrangement of the parts in combination.

In the drawings,

Fig. 1 is a side elevational view, partly in section, of a multiple duct buried in earth or concrete, a rod disposed in one of the ducts and the tool of this invention in a position to be thrust into engagement with the rod. This figure is drawn to a reduced scale relative to the other figures in the drawings;

Fig. 2 is a side elevational view of the tool;

Fig. 3 is an end view of the front end of the tool, taken from the left of Fig. 2;

Fig. 4 is a side view, partly in section, of a portion of the tool;

Fig. 4A is a view of the same portion shown in Fig. 4 and with a portion of the rod extending longitudinally through that portion of the tool and grasped by the tool;

Fig. 5 is a cross-sectional view of the part shown in Fig. 4 and taken on the line 5—5; and,

Fig. 6 is a cross-sectional view of Fig. 4 taken on the line 6—6.

In the running of cables of an electrical system through underground ducts it is common practice for the cabling crew to thrust a rod through a required duct from one manhole to another, each of which is in communication with the duct system. The rod may be equipped with a suitable tool for cleaning out obstructions in the duct or may be used as a pilot for a cable or winch rope and which in turn may be used to pull in the cable to be laid in the duct. The rod in some instances is made of suitable lengths of relatively hard wood with a portion of a separable coupling device provided on each end so that sections of the rod may be readily coupled together in end-to-end relation to form a relatively long sectionalized rod. The rod sometimes becomes broken in the duct or the sections may become uncoupled so that when an attempt is made to withdraw the rod from the duct a portion of the sectionalized rod remains in the duct at some point between the two manholes. The problem then is to remove this portion of the rod from the duct.

As shown in Fig. 1, the tool 1 has been thrust into a duct 2 in a multiple duct system 3 which is buried in earth or concrete 4. The tool 1 is in a position from which it can be thrust into engagement with a rod 5. The rod 5 is equipped with a coupling 6 and may have become uncoupled at this point from another section 7 of the rod or the section 7 may have become broken as shown at 8. The rod 5 is of much smaller diameter than the duct 2 and normally lies at the bottom of the duct. The coupling 6 is a two-part male and female coupling and has a larger outside diameter than the rod 5 so that the rod 5 and the section 7 thereof are held slightly elevated from the bottom of the duct 2 by the coupling 6.

The tool 1 as shown in Fig. 2 comprises a tubular body member 9 and a bell-mouthed tubular end portion 10 which is joined at its smaller end to the body member 9 and forms the front end of the tool. The body member 9 has a sufficiently large internal diameter to readily and longitudinally receive the rod 5 and coupling 6. The tool 1 may therefore be passed any required distance along the rod 5. The larger end of the bell-mouthed end portion 10 should be of slightly smaller diameter than the duct 2 and may be of square cross-sectional form as shown in Fig. 3 or of any other form adaptable for passage through the duct 2. The mouth of the end portion 10 is inwardly rounded at the edge portion as shown at 11 in Fig. 2 to facilitate passage of the tool 1 about the rod 5 and the coupling 6. The rear end portion of the body member 9 is equipped with a thrust rod 12 which is secured to the outer surface of the body member 9 and extends rearwardly of the body member 9 and in a plane parallel to the outer surface of the body member 9. Since the thrust rod 12 is located on the outside of the body member 9 and is clear of the bore of the tool, it will not interfere with passage of the tool any required distance along the rod 5. The free end of the thrust rod 12 is enlarged and internally bored and threaded as shown at 13 to permit coupling of the thrust rod 12 to a suitably threaded bar 14 shown in Fig. 1 and which serves as an extension of the thrust rod 12 to permit operation of the tool within the duct 2 from a remote point such for instance as a manhole, not shown but, which is in communication with the duct 2.

The body member 9 carries a set of pivotally supported gripping fingers 15 and has rectangular apertures 16 formed in its wall at suitably spaced points to accommodate the gripping fingers 15. The rectangular apertures 16 are located in about the central portion of the body member 9 and extend longitudinally thereof and are spaced about equal distances apart. Each gripping finger 15 is transversely apertured at a point offset from its center and is pivotally sup-

ported on a pin 17, the fingers 15 being free to turn on the pins 17 and the pins 17 being secured at their end portions on spaced lugs 18 formed on the outer surface of the body member 9 and located on opposite sides of the rectangular apertures 16. The spaced lugs 18 may be simply deposits of metal formed on the outer surface of the body member 9 and forming welds between the ends of the pins 17 and the body member 9 or may be of any particular form and structure found suitable for the purpose. The gripping fingers 15 are triangular in form and are transversely apertured at 19 to allow passage therethrough of a helical spring 20, the aperture 19 being located offset from the pivotal point of support of the gripping finger 15 and nearer the apex of the gripping finger than the pin 17 and toward the rear of the body member 9. The helical spring 20 is disposed in the form of a ring about the body member 9, the ends of the spring being hooked together as shown at 21, Fig. 6. The points of passage of the spring 20 through the gripping fingers 15 relative to the pivotal points of support of the fingers and the diameter of the ring formed by the spring 20 are such that the spring 20 tilts the gripping fingers 15 on the pins 17 and urges sharpened end portions 21 of the gripping fingers 15 through the apertures 16 and toward the axial center of the body member 9. The sharpened end portions 21 of the gripping fingers 15 are of chisel-like form and converge about the axial center of the body member 9 and are directed toward the rear of the body member 9. The portions of the gripping fingers 15 extending within the body member 9 cooperatively form, in a sense, a relatively small but enlargeable triangular passageway within the body member 9. The gripping fingers 15 are arranged to allow the tool 1 to be telescopically passed about the rod 5 when the point of entrance of the rod 5 is through the bell-mouthed end portion 10 and toward the rear of the tool. In this movement of the tool 1 about the rod 5, the gripping fingers 15 rock on their pivotal points of support so that the sharpened end portions 21 are displaced from their normal positions and are moved outwardly toward the inner wall surface of the body member 9. Figs. 2, 3, 4, 5 and 6 show the gripping fingers 15 in their normal positions; and Fig. 4A shows the positions of the gripping fingers 15 when the rod 5 is within the tool 1.

When the gripping fingers 15 are rocked on their pivotal points of support to allow passage of the tool 1 about the rod 5, the helical spring 20 is stretched since the point of passage of the spring 20 through the finger 15 is nearer the apex of the finger 15 than the pivotal point of support of the finger and towards the rear of the tool 1. The spring 20 is therefore constantly urging the sharpened end portions 21 of the gripping fingers 15 toward the rod 5 and in position to engage the edge portion of the coupling 6 on the rod 5 or even to slightly dig into the outer surface of the rod 5 when a pulling action is applied to the tool 1. If the tool 1 is moved along the duct 2 from the position shown in Fig. 1 and so that the tool 1 is telescopically passed about the section 7 of the rod 5, and over the coupling 6 and so that the coupling 6 lies in the rear portion of the tool and beyond the pointed ends 21 of the gripping fingers 15, any rearward pull applied to the tool 1 will bring the pointed ends 21 of the fingers 15 against the left-hand edge of the coupling 6. The spring 20 will prevent the pointed ends of the fingers 15 from jumping over the left-hand edge portion of the coupling 6 when a further pulling action is applied to the tool 1. Withdrawal of the tool 1 from the duct 2 will then result in withdrawal also of the rod 5 from the duct 2.

In the event that a break has occurred in a rod system and the part remaining in the duct 2 has no coupling near the point of breakage, the rod in most cases may be withdrawn from the duct 2 by means of the tool 1, even without moving the tool beyond a coupling since the sharpened ends 21 of the gripping fingers 15 will dig into the outer surface of the rod when the tool is pulled back toward the manhole. This gripping action of the tool 1 is shown in Fig. 4A.

What is claimed is:

1. A rod withdrawing tool comprising in combination, a tubular body transversely apertured at spaced points, the transverse apertures being arranged around a common central point, a bell-mouthed front end on said body, a set of equally spaced pins mounted on said body and extending across the transverse apertures in said body, a set of bevel pointed fingers pivotally supported on said pins and extending inwardly through the transverse apertures in said body and angularly converging about the axial center of said body, the pointed ends of said fingers being directed toward the rear of said body, helical spring means arranged in the form of a completely closed ring extending around said body and transversely through each of said fingers at a point between the pivotal point of support and the pointed end thereof and urging the bevel pointed ends of said fingers toward the axial center of said body, a thrust rod secured to an outer side surface of said body and extending in parallel with and rearwardly of said body in a plane entirely clear of the bore of said body and an enlarged internally threaded end portion on said thrust rod.

2. In a rod withdrawing tool comprising a tubular body adapted to be passed longitudinally about the rod and having a series of spaced apertures formed in the side wall of the body, in combination, a set of pins mounted on said body and extending transversely across said apertures, a set of triangular fingers pivotally supported on said pins, each of said fingers being pivotally supported at a point offset from its apex and having an aperture formed directly under the apex, a helical spring arranged in the form of a ring and closely embracing said body, said spring extending through the apertures in said fingers directly under the apices of the fingers and tilting said fingers so that a portion of each of said fingers extends within the bore of said body, the inwardly directed ends of said fingers being sharpened to engage the rod, a thrust rod attached to an outer surface of said body and extending rearwardly of said body and in a plane parallel with the longitudinal axis of said body and said thrust rod being entirely clear of the line of bore of said body.

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