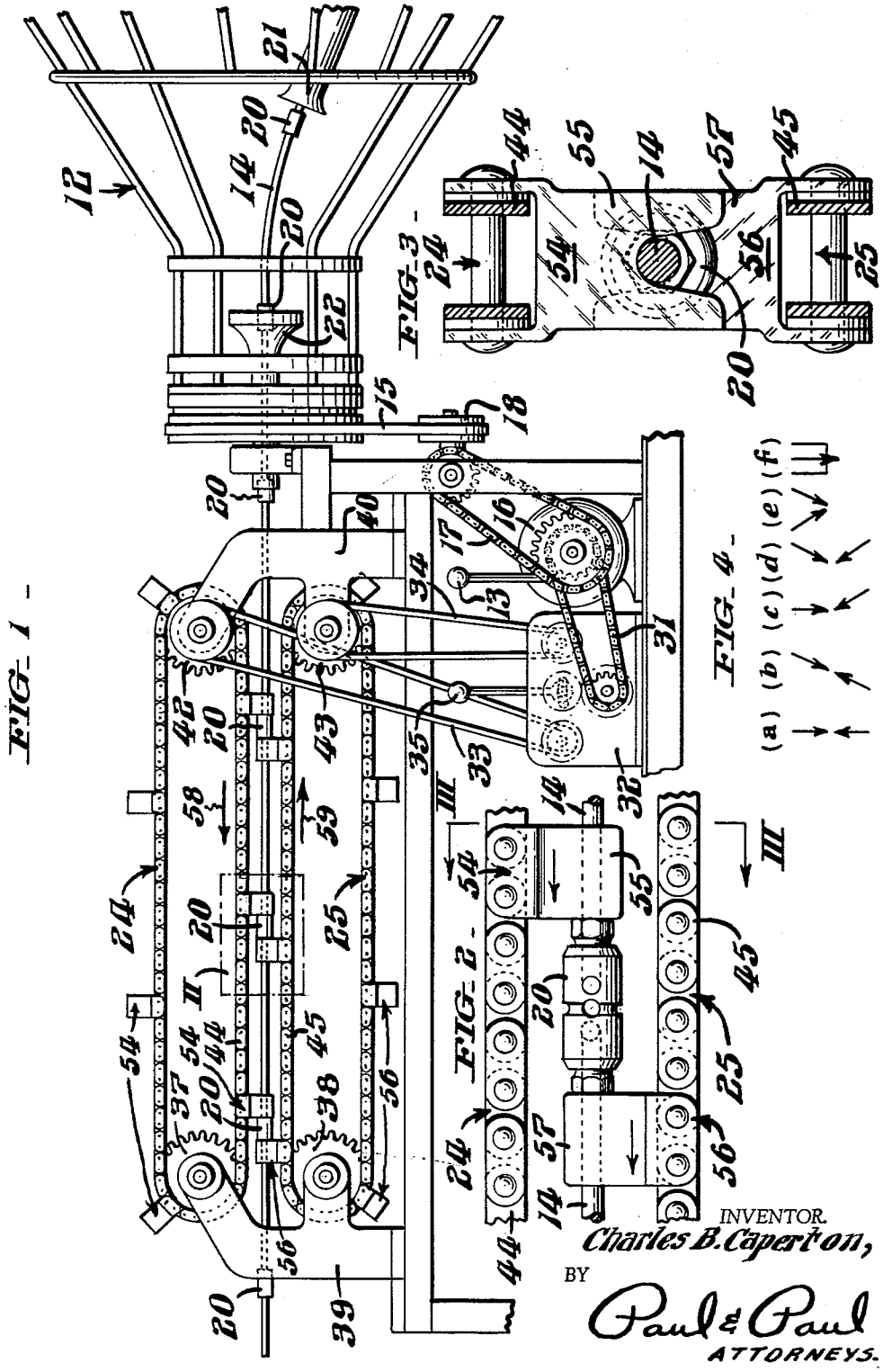
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TWO-BELT DRIVE FOR RODDING MACHINE

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TWO-BELT DRIVE FOR RODDING MACHINE

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This invention relates to a rodding machine for handling sectional rod of the type used in sewer cleaning and clearing. More particularly, the invention provides an improved form of drive for such a rodding machine.

As is known, a sectional rod is composed of a large number of individual sections of rod, each for example 39" or 48" long, coupled together end-to-end by couplers. The couplers may be of the type shown in Crane patent 2,152,636.

One form of rodding machine for handling sectional rod is shown in Ciaccio Patent 2,544,256. As shown in that patent, the sectional rod is pushed axially by means of pusher blocks or dogs mounted on and carried by an endless sprocket chain which is driven by a suitable sprocket transmission. The dogs have a yoke portion which straddles the rod, and when a dog, carried along by the endless sprocket chain, comes into the engagement with one of the couplers, it pushes the coupler along, thereby advancing the sectional rod axially. The direction of movement of the endless chain is reversible, and the sectional rod is moved in one direction or the other according to the direction of movement of the endless sprocket chain.

In the Ciaccio patent, an elongate guide channel is employed to guide the pusher dogs during the time they are pushing the couplers along in the axial direction of the rod. It is sometimes desirable, at the same time that the pusher dogs are pushing the sectional rod along axially, that the rod and the couplers be rotated in order to facilitate progress of the tool through the pipe, or into or out of an obstruction. Such rotation of the rod and coupler may be effected by rotation of the cage, or by other means. It sometimes happens that the rods become slightly bent in use and, when this happens, if the pushed rods are also being rotated, the rotating rod and couplers tend to move in an eccentric manner. This causes the pusher dogs to tend to turn in the guide channel, or to tend to move laterally therein, and this tends to bind the pusher dogs in the channel. An extra strain is then put on the endless chain and the drive action tends to become jerky and lacking in smoothness.

The object of my present invention is to provide an improved stabilized drive for a rodding machine which makes unnecessary the use of the guide channel, thereby avoiding the undesirable binding action mentioned above.

Another object of my invention is to provide an improved drive the direction of which may be reversed without the delay, which is present in the Ciaccio type of drive, required for the pusher dog to move along the rod from one coupler to the next adjacent coupler.

In accordance with my invention, two belt drives are provided. One belt drive is used for feeding the sectional rod out of the rodding machine. The other is used for reeling the rod back into the machine. Only one of the belt drives is driven at a time; the other serves as a stabilizing device making unnecessary the use of a guide channel.

My invention will become clear from a consideration of the following detailed description of a preferred embodiment selected for illustration in the drawing, in which:

FIG. 1 is a diagrammatic side elevational view showing my improved form of drive;

FIG. 2 is an enlarged view of that portion of FIG. 1 shown in the dot-and-dash line rectangle identified II in FIG. 1;

FIG. 3 is a cross-sectional view along the line III—III of FIG. 2; and

FIG. 4 represents schematically some of the relative positions in which the two belts may be mounted.

In describing the preferred embodiment of the invention illustrated in the drawing, specific terminology has been resorted to for the sake of clarity. However it is not the intention to be limited to the specific terms so selected, and it is to be understood that each specific term includes all technical equivalents which operate in a similar manner to accomplish a similar purpose.

Referring now to the drawing, FIG. 1 is a fragmentary representation of a rodding machine having a conical cage 12 in which the sectional rod 14 is stored in coiled form. During feeding out, and reeling in, of the sectional rod 14, the cage 12 is not ordinarily driven, but when the tool, at the far end of the rod, reaches the obstruction, the cage 12 is driven as by a suitable motor or engine 16 through a clutch controlled by lever 13, a sprocket and chain transmission 17, and a drive pulley 18.

The sectional rod 14 comprises a plurality of individual steel rods each having a length for example of 39" or 48" coupled together end-to-end by couplers 20. The couplers 20 may be of the type shown in Crane Patent 2,152,636. A guide tube 21 guides the sectional rod into coiled formation in the cage during reeling in of the rod and assists in the uncoiling of the coiled rod without entanglement during feeding out of the rod. A flared guide funnel 22 at the apex of the conical cage 12 guides the rod into the drive head portion of the machine during feedout and into the cage during reeling in.

In accordance with my present invention, the drive head includes a pair of endless chains or endless belts 24 and 25 one above and the other below the path along which the rod is to pass during feeding out from and reeling back into the cage 12. In the drawing, the endless belts 24 and 25 are shown to be supported by a pair of spaced-apart double-armed support standards 39 and 40, each supporting a pair of sprockets 37, 38 and 42, 43, respectively. One sprocket of each pair is above and the other below the path along which the rod passes.

The sprockets 42 and 43 are driven sprockets; the sprockets 37 and 38 are idler sprockets. While the sprockets 42 and 43 are driven sprockets, only one of these sprockets is driven at a time. During that time, the other serves as an idler sprocket.

The sprockets 42 and 43 may be driven by any suitable mechanism but are illustrated in FIG. 1 of the drawing as being driven by the motor or engine 16 through a chain and sprocket transmission 31, a speed-changing mechanism 32, and V-belts 33, 34. The lever 35 of the speed-changing unit 32 controls the selection of the drive, by making a connection to one of the V-belts 33 and 34.

Secured to the upper endless belt 24 at regularly spaced intervals are pusher dogs 54 having yoke portions 55 which are adapted to straddle the sectional rod 14, as best seen in FIG. 3. The spacing between the pusher dogs 54 is made substantially equal to that between the couplers 20 on the sectional rod 14. The pusher dogs 54 and manner in which they are secured to the endless belt 24 may be similar to that shown in Ciaccio Patent No. 2,544,256.

The lower endless belt 25 is similarly equipped with pusher dogs 56, at the same regular spaced intervals. Each of the pusher dogs 56 has a yoke portion 57 and is similar in construction to the pusher dogs 54 of the upper belt.

As indicated by the arrows in FIG. 1, the under or work portion 44 of the upper belt 24, when driven by the V-belt 33 and sprocket 42, moves in the direction of the arrow 58 while the over or work portion 45 of the lower endless belt 25, when driven by V-belt 34 and sprocket 43,

moves in the direction of the arrow **59**, the opposite direction. As previously indicated, only one of the endless belts is driven at a time. Assume that the control lever **35** is moved into position to drive the V-belt **33** and sprocket **42**. This drives the upper endless belt **24**, and the under portion **44** moves in the direction of arrow **58**. The pusher dogs **54** which are in the under or work portion **44** are straddling the rod **14** and move in a direction which as viewed in FIG. 1 is from right to left. As the pusher or work dogs **54** move, they engage the couplers **20** and the couplers **20** are moved in the same direction, from right to left. The couplers **20** then engage and move, from right to left, the pusher dogs **56** which are mounted in the over or work portion **45** of the lower belt **25**. The endless belts **24**, **25** are made substantially taut about their respective sprockets. Thus, the dogs which are on the work portion of endless belt **25** which, in the present example, is not being driven by its sprocket, provide a considerable amount of axial stabilization for the axially-rotating rod, sufficient to make unnecessary the provision of a guide channel such as is provided in the Ciaccio patent. Thus, the binding action of the guide channel is avoided and the driving operation is made more smooth.

It will be seen that when the sectional rod **14** is to be returned to the cage **12**, the lower endless belt **25** is made the driving belt and the upper endless belt **24** is made the idler belt. In this case, it is the work portion of belt **24** which provides the axial stabilization to the lengthwise-moving axially-rotating sectional rod.

It will also be seen that when the direction of the drive is reversed, there is no time lost. The dog, which had been the driven dog and which now becomes the driving dog, is immediately adjacent the coupler and, in contrast to the Ciaccio arrangement, no time is needed for a dog to move along a rod section from one coupler to the next.

While the preferred embodiment of this invention has been described in some detail, it will be obvious to one skilled in the art that various modifications may be made without departing from the invention as hereinafter claimed. For example, I have shown and described the two endless belts as being in the same vertical plane normal to the horizontal. This positional relationship is represented schematically by the arrows in FIG. 4(*a*). While prefered, this is not an essential positional arrangement. If desired, the two belts may be in the same plane but the plane may be tilted relative to the horizontal, as depicted by the arrows in FIG. 4(*b*). Or, the two belts may be in different planes, one of which is tilted relative to the horizontal, as depicted by the arrows in FIG. 4(*c*), or both of which are tilted relative to the horizontal, as depicted in FIGS. 4(*d*) and 4(*e*). Or, one of the two belts may be within the other, as depicted by the arrows in FIG. 4(*f*). The preferred arrangement, however, is one in which the yokes of the dogs of the two belts straddle the rod in opposing, or at least partially opposing, directions, as this provides stabilization, in addition to avoidance of time delay when reversing direction of drive.

In the arrangement where one belt is within the other, as depicted by the arrows in FIG. 4(*f*), time delay is, of course, avoided when reversing the direction of the drive, but, in this arrangement, the two belts do not have the advantage of providing adequate stabilization since the yokes of the dogs do not straddle the rods in opposing or partially opposing directions. In such arrangement, a guide channel, such as used in the Ciaccio patent, may be employed. It will also be understood that where one belt is within the other as in FIG. 4(*f*), at least the lower belt would have to be a double-chain type; the upper belt could also be a double-chain belt, but need not be. In either event, the dogs of the upper belt would have to be provided with longer yokes to enable them to extend down sufficiently to straddle the rod.

Having described my invention, I claim:

1. In a rodding machine for handling sectional rod comprising individual sections of rod coupled end-to-end by couplers and having a drive head for driving the sectional rod axially, said drive head including first and second endless belts mounted on said machine, each belt having adjacent coextensive work portions closely paralleling the coupled rod in said drive head, each belt having a plurality of successive pusher dogs mounted thereon at spaced intervals, the spacing between said successive dogs on the same belt being substantially equal to the spacing between couplers of said sectional rod, each dog when in work position having a yoke portion adapted to straddle the rod, the dogs of one belt in work position contacting one end of the couplers and the dogs of the other belt in work position contacting the opposite end of the same couplers; power means for driving said first belt in one direction and for driving said second belt in the opposite direction; control means for said power means for driving one or the other of said first and second belts but not both concurrently, said power driven belt driving the other belt through the work dogs of both belts and the rod couplers.

2. Apparatus as claimed in claim 1 characterized in that said first and second belts are mounted on said machine in such relative positions that the yokes of the work dogs of the two belts straddle the rod in at least partially opposing directions.

3. Apparatus as claimed in claim 2 characterized in that said first and second belts are mounted on said machine one above the other, and in that the yokes of work dogs of the upper belt straddle the rod generally downwardly, and the yokes of work dogs of the lower belt straddle the rod generally upwardly.

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