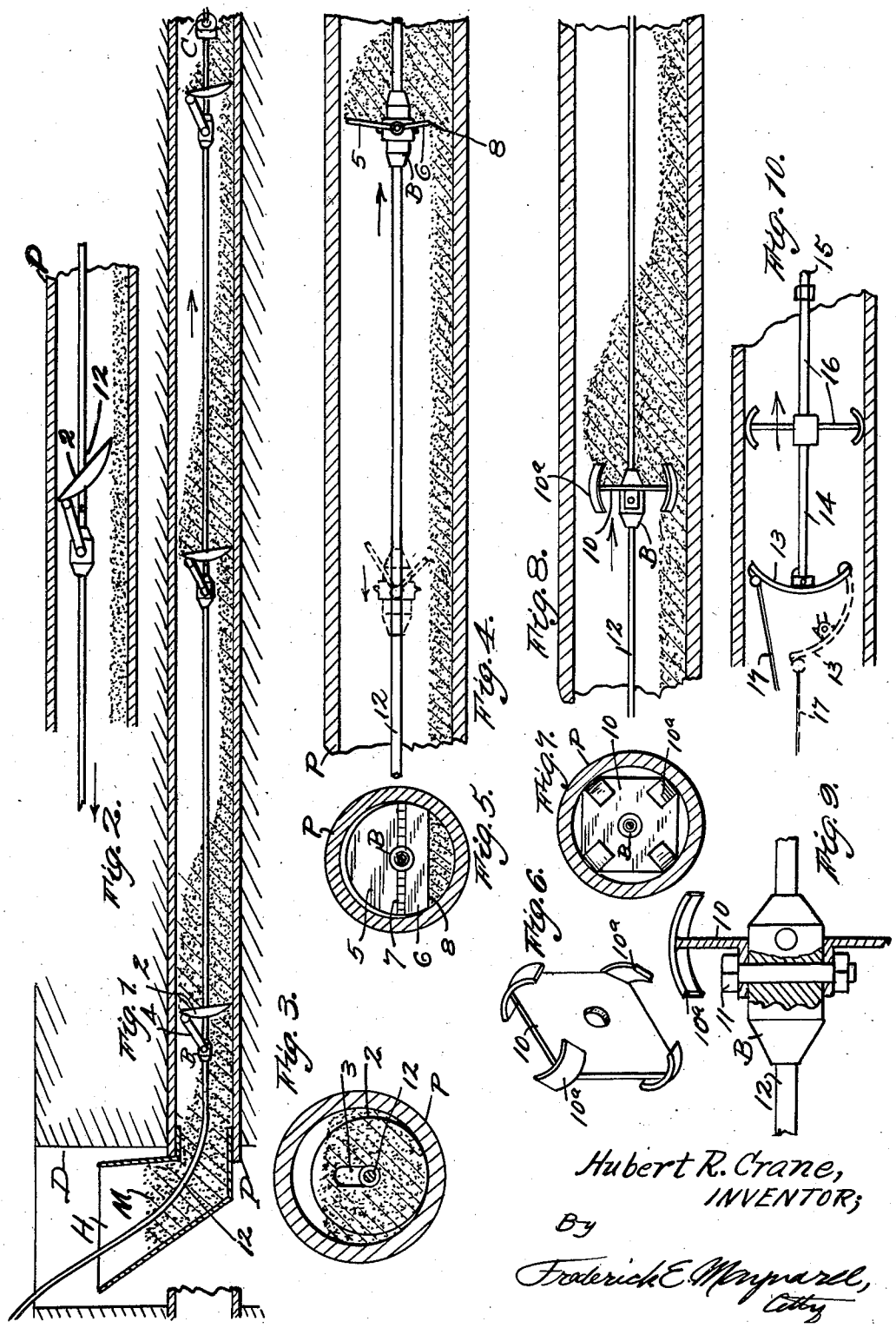
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APPARATUS FOR CHARGING MORTAR INTO PIPE BORES

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APPARATUS FOR CHARGING MORTAR INTO PIPE BORES

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9 Claims. (Cl. 25—38)

This invention is an apparatus for charging plastic cement into pipe bores.

Underground and otherwise installed conduits, particularly iron water pipes or mains are sometimes re-conditioned by the application of a hydraulic cement lining to their bore surface. In order to charge the pipe it is cut open at specially cut ditches.

It is one of the objects of this invention that quite long sections of the underground main pipes may be suitably charged with the necessary amount of mortar so as to greatly reduce the cost of ditching and cutting now required by use of apparatus which can only charge relative quite short cut sections of the pipe, and so as to much reduce the time for complete lining of a long pipe system.

A further object of the invention is to provide a simple, practical, substantial, reliable, effective, easily set up and low operational cost tool for pulling successive batches of mortar concurrently into and distributing the desired amount all along the pipe chamber. Also, an object is to provide a charging tool that may be readily extracted from the pipe after the tool has completed the uniform distribution of the mortar entirely along the chamber of the pipe in readiness for the introduction, in proper time, of a mortar spreading, dehydrating and trowelling apparatus.

Another object of the invention is to provide a mortar charging tool incorporating a plurality of spade-function plates adapted to by-pass a suitable proportion of the mortar which the tool spades are, in the aggregate, designed to lay along the bottom of the bore of the pipe being charged, and additionally involving an elongate operating rod by which full control is had at all times of the set of spades both as to their spacing and speed, and as to their angular position around the rod and in the bore.

A desideratum is to provide a charging tool including a control rod of great strength and of high flexibility not only to permit the tool to safely negotiate bends in the general line of the pipe but especially to enable the assembled string of parts to be readily wormed into the cut open pipe where ditches must be dug, which, it is desirable, for obvious labor reasons and other costs, should be kept down to the least practical cavity dimensions.

Additionally, an object is to provide a simple, low-cost, self-centering and self-clearing spade member which will easily and safely negotiate interior joint shoulders, and ledges and crack edges commonly met with in pipes of the type concerned.

The invention consists of certain advancements in the art of internally cement plastering or lining of the bores of conduits, especially water mains, as set forth in the ensuing disclosure and having, with the above, additional objects and advantages as hereinafter developed, and whose constructions, combinations, and details of means and the manner of operation, and the method will be made manifest in the following description of the herewith illustrative embodiments; it being understood that modifications, variations and adaptations may be resorted to within the scope, spirit and principle of the invention as it is more directly claimed in the addendum.

Figure 1 is a side elevation of an embodiment of the invention involving a controlled drifting or floating disc type of spade assembly and flexible rod line, and Figure 2 is a front face elevation of one of the disc spades, in upright spreading or spading position. Figure 3 is a side elevation showing the disc spade in the retracting position after spreading the mortar.

Figure 4 is a side elevation of a folding wing form of spade; the dotted lines indicating the retracting position, and Figure 5 is a front face elevation; in spading position.

Figure 6 is a perspective of square plate form of spade, and Figure 7 is a cross-section of a pipe showing the plate spade in working position. Figure 8 is a side elevation of plate spade and rod assembly as in operation. Figure 9 is a partial edge view of the plate spade and its mount, in detail.

Figure 10 is a side elevation of a double-drag line form of scoop spade assembly; the retracting position being shown by dotted line figure.

Operators skilled in sewer and pipe cleaning and scraping operations are familiar with sectional, steel spring rod equipment in which sections of rods 12 are securely joined in rigid association by couplings B (as shown for example in Crane Patent No. 2,110,202, of 1938). In the present disclosure such rods are made up in suitable length strings and have in combination and carry and operate one or another of different forms of devices whose function is to by-pass a portion of a volume of cement mortar M in and along a given pipe P.

Fig. 1 illustrates a ditch D which has been opened to provide access to the pipe P at a suitable point in a system and which it is desired to be lined by a complete, internal circumferential plaster of the cement mortar. By this invention

long stretches of the opened pipe can be satisfactorily charged with a needed layer of the mortar along the bottom of the bore of the pipe.

In operation, a pulling cable C is rove through the opened pipe P and at the ditch D this cable is made fast to the first of the rod sections R which is wormed into the ditch and into its exposed end of the pipe. As the rod line sections are joined by couplings B, or so as may be desired, a disc-like spade 2 is threaded at its slightly elongate, center eye 3 onto the rod and its upper edge is attached by a pivoted link 4 to the adjacent coupling B as by a bolt passed through a hole therefor; one of the couplings B being shown in detail in Fig. 9.

A suitable mortar hopper H is shown in the ditch and as each of the spade devices 2 is worked into the hopper a batch of mortar M is poured in ahead of the spade and as this is pulled forward into the bore of the pipe the mortar will be pushed along and at the same time some of it will be by-passed around the edge of the discal spade which is considerably smaller in diameter than the bore of the pipe. Successive batches of mortar and successive spades 2 are introduced at given intervals so that ultimately the spades will have conveyed in enough mortar to have spread a layer of it for the whole length of the opened pipe section. The strong rod 12 as made up will keep the several spades in their given position with their links 4 uppermost. The load of the mortar will operate to relatively push the spades back to a nearly vertical position on the rods.

When it is considered that the mortar layer has been laid evenly, according to precalculation, for the length of the opened pipe then the string of rods and the attached spades may be retracted, toward the ditch, by any suitable power device. In this retraction operation the several spades 2 will automatically tilt to such an oblique angle on the rods that their bottom edges will rise and then glide rearwardly on and along the laid bed of mortar in the pipe. The spades are pulled forwardly through in usual operations.

In Figs. 4 and 5 there is shown a similarly rod-mounted spade device consisting of a pair of semi-discs 5 and 6 having a diametrical hinge 7 passing through the adjacent rod coupling B. When the rod string of this form of spade is pulled forward the load of mortar spreads open the spade device and the bottom of the lower half disc 6 by-passes a portion of the mortar at a chordal lip 8 of the spade. After the layer of mortar has been laid for the length of the opened pipe the rod string and its spades can be retracted and the spades will substantially collapse to the dotted line position shown in Fig. 4, and ride out on the surface of the bed of mortar.

Another form of rod carried and rod actuated spade device is shown in Figs. 6, 7 and 8, as consisting of a substantially square plate spade 10 centralized upon and bolted at 11 on the relative coupling B so as to stand rigidly transversely across the rod axis. A feature of this square spade 10 is that it self-centers the rod in the bore of the pipe P and presents a large front face for pushing ahead its batch of mortar, and, moreover it by-passes a definite amount of the mortar past its straight edges when fully loaded. To centralize this spade its corners have arcuate forwardly and rearwardly directed shoes 10a to approximately but slidably fit the surface of the bore of the pipe P. These shoes not only center the spades (only one of which is shown on a fragment of a rod) but they also ease the plate spades past shoulders and crevices as may occur in an underground pipe system.

A variant form of spreading device is shown in Fig. 10 as including a bowl scoop 13 to the concave center of which is fixed a shank 14 the fore end of which is hitched to a drag line 15. A suitable centering spider 16 is fixed on the shank 14 well ahead of the scoop 13. A draw-back cable 17 is connected to a rim portion of the scoop to tilt it down to the escape position shown in dotted lines.

In the normal use of the invention the implements are pulled fully forwardly through the bore, but if obstructions or too great strains are set up then the tools may be retracted.

What is claimed is:

1. Apparatus for charging installed cylindrical bore conduits with a plastic later to be plastered as a lining in the conduit bore, having in combination, a rod string, and a plurality of plane spade devices rigidly mounted in suitably spaced relation concentrically on and along the line for pushing the plastic along and laying a bed of it on the bottom of the bore; said spades being held in fixed relation and having bottom opposite corners to ride on the circular face of the bore and presenting by-pass bottom edges spaced above the conduit bottom.

2. The apparatus of claim 1; said rod string being flexible, resilient and stiff and the spades being polygonal shaped in face view and having rigid shoes on the rim corners holding the spades concentric in the conduit.

3. Apparatus of the class and for the purpose set forth and including a mortar conveyor having a pulling-in line provided with a series of spaced, flat, spade devices fixed perpendicularly to and concentrically on and operative by the line to advance an interposed mortar charge; the spades being constructed and arranged to push the respective charge ahead and at the same time to by-pass a layer on the bottom of the bore of the conduit the spades having corners to engage the conduit bore face and having rim edges extending between the corners and of such outline as to provide by-pass apertures for mortar.

4. Apparatus as in claim 3; the said line consisting of a series of coaxial rods rigidly attached at contiguous ends by couplings, and said spade devices being rigidly attached to said couplings, in desired spacing order.

5. Means for charging a long, opened section of installed conduit with mortar, comprising, in combination, a batch feeding hopper applicable to a cut end of the conduit, and a connected series of suitably spaced, rigidly related, flat spade devices each operative to gather a portion of the mortar fed into the hopper and to advance it in the bore of the conduit, and rigid shoes rigidly fixed on the rim edges of the spades to center them; the series operative to distribute the mortar as a layer on and along the bottom of the bore for later bore plastering operations the spades having bottom edges of outline to form by-pass apertures for mortar in the conduit and which edges are in constant, definite position in the connected series.

6. Means for spading a supply of mortar along the bottom of the bore of an installed, and opened section of a conduit for a later lining operation; including a stiff draft device pullable through the bore of the conduit, and a series of spaced, flat, non-circular mortar conveying and spading units each rigidly fixed at its center to said de-

vice in a perpendicular position thereon and operative to by-pass a portion of the supply to form the layer said device holding the spades in definite annular relation as to the bore; said units having by-pass bottom edges with bottom, longitudinally elongate, arcuate shoes to facilitate drag through the conduit.

7. The means of claim 6; said units each consisting of a rectangular member having its corners provided with elongate joint bridging shoes.

8. A mortar spading tool for operation in and along the bore of an installed conduit, consisting of a substantially rectangular plate having a major diameter about equal to the bore diameter and operatively dragging on the conduit whose side edges define clearances for by-pass of mortar as the plate is drawn, in a transverse position, along the bore while pushing a supply of the mortar and drag means rigidly connected to and arranged centrally in the plate for holding one said clearance bottommost.

9. A mortar spading tool for operation in and along the bore of a conduit, consisting of a spade unit including a plate-like part having a lip-forming edge at which a marginal by-pass opening is formed by the unit in place in the bore and the plate diametrically fitting and movable along a given bore.

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