June 17, 1930. J. R. McWANE 1,765,022

APPARATUS FOR REMOVING CORES FROM CAST IRON PIPES AND THE LIKE

Filed July 2, 1928 2 Sheets-Sheet 1

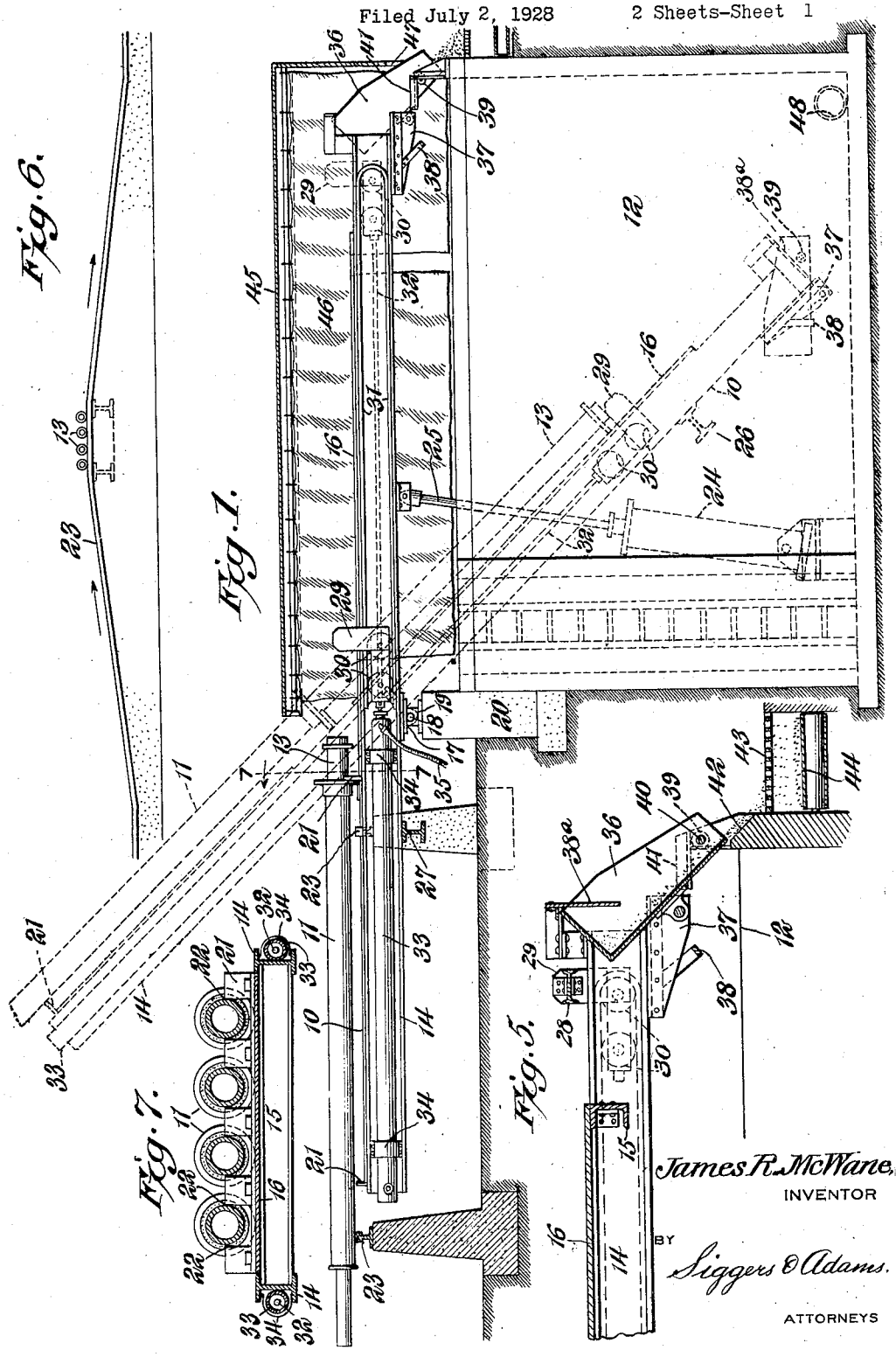


Fig. 6.

Fig. 1.

Fig. 7.

Fig. 5.

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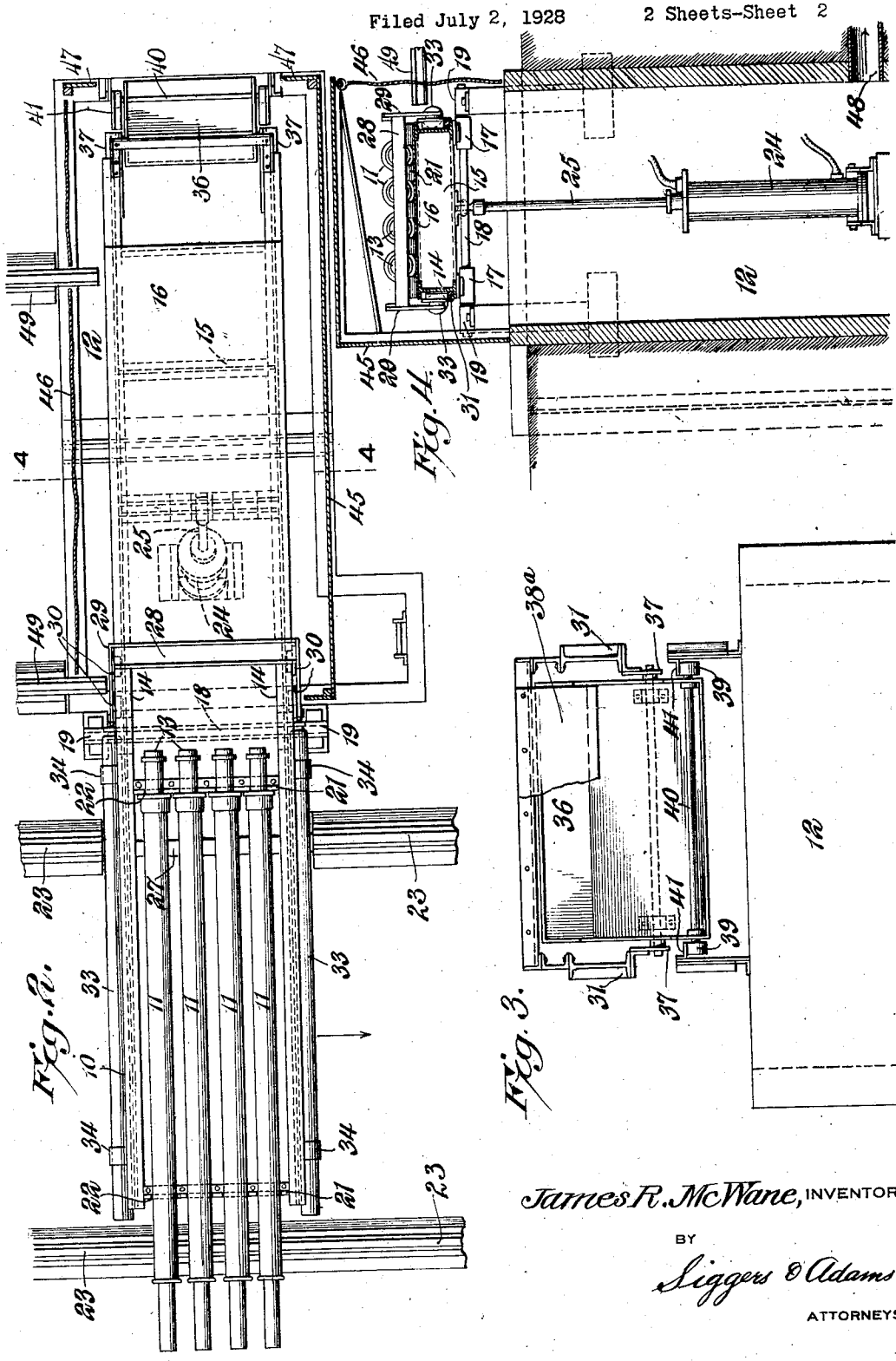


Fig. 1.

Fig. 2.

Fig. 3.

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1,765,022

UNITED STATES PATENT OFFICE

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APPARATUS FOR REMOVING CORES FROM CAST-IRON PIPES AND THE LIKE

Application filed July 2, 1928. Serial No. 289,802.

This invention relates to apparatus for removing cores from cast iron pipes and, among other objects, aims to provide improved mechanical means having provision for separating cores from pipes by gravity without employing crane equipment or special core pullers and without creating objectionable dust in the plant. The apparatus is especially useful in plants of large capacity such as the one described and claimed in my co-pending application, Serial No. 220,731, filed Sept. 20, 1927.

In the accompanying drawings showing one embodiment of the invention:

Fig. 1 is a side elevation, partly in section, of the apparatus;

Fig. 2 is a top plan view, also partly in section, of the apparatus shown in Fig. 1;

Fig. 3 is a right end view of Fig. 2, a part being omitted;

Fig. 4 is a sectional view taken on the line 4—4 of Fig. 2;

Fig. 5 is a fragmentary longitudinal sectional view on an enlarged scale, through the right end of the platform shown in Fig. 1, parts being omitted;

Fig. 6 is a diagrammatic left end view of the apparatus shown in Fig. 1, the inclinations of the runway being exaggerated; and

Fig. 7 is a sectional view taken on line 7—7 of Fig. 1.

In the manufacture of cast iron pipe horizontally, the usual practice is to use a green sand mold and a green sand core. After the pipe has sufficiently cooled, it is removed from the flask with its core, and at a convenient time the core bar is shaken out of the pipe. This has been done by elevating one end of the pipe and rapping it to break the adhesion of the core sand so that the core bar and sand will fall out by gravity, thus stripping the pipe from the bar. The cores of short, light pipes are generally removed by hand; but to remove the cores from long heavy pipes, it is necessary to pick up the pipes mechanically by means of a crane or other lifting mechanism, elevating them at an angle, rap the pipes, as in the hand process, until the sand has run out, and then strip the pipes off the core bars.

The foregoing methods are objectionable for various reasons, one of which is the large volume of dust arising from the falling dry sand. This dust is not only disagreeable to the crane operator but damages the bearings of the crane and other machinery in the plant, and spreads over everything within a large area, creating undesirable working conditions, particularly in hot weather. Another objection is the difficulty of elevating the pipe to the proper angle and then stripping it off the bar. There must be a rest for the core (usually a trestle or "horse") after the pipe is stripped from it, but this rest interferes with the forward movement of the pipe in the process of stripping it.

The present invention provides novel means to separate the cores from the pipes very economically without raising objectionable dust and without employing an overhead crane and effecting a saving of labor. It contemplates the provision of novel means to control the falling movement of the cores to prevent injury to the core bars and the apparatus. Further it provides means to recover the core sand and dump it automatically where it can be conveyed to sand reconditioning apparatus. Also, the arrangement is such as to enable pipes and cores both before and after separation to be handled expeditiously in successive groups of any desired number; thus the invention may be used to excellent advantage in the plant described in the aforesaid application.

The selected embodiment of the invention includes a power-operated, tiltable table or platform 10 pivoted or hinged to rock see-saw fashion and adapted to support a group of pipes 11 on one side of its axis as shown in Fig. 1, so that when it is tilted with its other end projecting into a pit 12, the core bars 13 and core sand will fall out by gravity. Provision is made to prevent the pipes from sliding down the platform when tilted, and to permit the core bars to fall out and rest on the pit end of the platform so that, when the platform is restored to its normal or approximately horizontal position, the pipes and core bars may be rolled off to undergo subsequent operations.

The platform 10 is shown as having a rigid underframe consisting of I-beams 14 and channel-shaped cross braces 15 on the top flanges of which is secured a sheet metal floor 16 (Figs. 2, 4 and 5). To the lower flanges of the I-beams about midway of their length are secured a pair of hinge members 17 mounted on a shaft 18 which is journaled in bearings 19 on the pillars 20 (Figs. 1). The pillars are arranged adjacent to one end of the pit 12 so that one end of the platform can swing downwardly into it as shown in dotted lines in Fig. 1. It will be clear that if the platform is elevated high above the floor of the plant, no pit need be used. Usually it is more convenient to amount the platform as low as possible and employ a pit, as shown.

The means to support a group of pipes on the end of the platform so that they will not slide down when it is tilted is shown as comprising transverse angle members 21 secured to the plate 16 and each having four notches 22 of suitable size in its vertical flange in which the pipes are adapted to rest (Fig. 7). The notches shown in Fig. 7 are sufficiently wide to receive the core bars while the bell ends of the pipes being larger than the notches, abut the vertical flange and are restrained thereby. Thus, the sliding or falling movement of the core bars and sand is not interfered with. The pipes are adapted to be placed properly in their respective seats or notches for example with the aid of an overhead crane rig (not shown) after they are rolled down runway tracks 23 (Figs. 1, 2 and 6) from the casting zone. These tracks are shown in Fig. 6 as being inclined upwardly to the level of the platform so that the pipes may be rolled upon the platform before they are lifted or otherwise set in the notches. Moreover, the inclined portions of the tracks on the opposite side of the platform permit the separated pipes to be rolled away by gravity, thus reducing the manual labor required. As shown in Fig. 2, the track over which the bell ends of the pipes roll has a gap in which the platform works, while the end of the platform falls short of the other track.

To tilt the loaded platform to such an angular position that the gravitational component of the core bars will frequently be sufficient to break the adhesion of the core sand, there is shown a fluid pressure, (preferably pneumatic) cylinder 24 hinged at its lower end in the pit 12 and having a piston rod 25 pivotally connected to a cross brace of the platform. The operation of this piston may be controlled manually by means of valves (not shown) located at an easily accessible point above the floor level in suitable air conduits connected to the opposite ends of the cylinder (Fig. 4).

It is desirable to limit the extent of the tilting movement of the platform. In Figs. 1 and 2 there is shown a stop member in the form of an I-beam 26 extending across the pit so that the underframe beams of the platform will strike it. This will jar the pipes on the platform enough to insure breaking the adhesion of the core sand to all of the pipes; or the pipes may be struck with a hammer if jarring the platform is not effective. Also, there is shown a similar stop or support 27 for the other end of the platform to hold it level while it is being loaded and unloaded, thus relieving the pneumatic cylinder of this duty.

It is desirable to provide bumper or abutment means to break the fall of the core bars after they start down on the platform. To this end, there is shown a movable abutment in the form of a transverse bar 28, covenient-ly made of a piece of structural steel secured between standards 29 which are mounted on pairs of spaced rollers 30 on upper and lower tracks 31 in the outside channels of the I-beams, the arrangement being such as to prevent the abutment member from rocking under the weight of the core bars. To each of the pairs of rollers a piston rod 32 from a pneumatic cylinder 33 is connected. These cylinders are shown as being secured to the I-beams 14 in their outer channels, by straps 34, and their action may be controlled by suitable valves (not shown) in the conduits 35, located within easy reach of the operator. Thus by permitting compressed air to escape from the cylinders the operator may control the falling movement of the core bars and thereby prevent them from striking the bottom with such force as to damage some part or fall off the platform into the pit. The length of the piston rods is such as to prevent the abutment 28 from traveling beyond the end of the platform, but obviously, stops may be used for this purpose. After the stripped core bars are removed from the platform, the operator will again admit compressed air into the cylinders and retract the abutment so that it is ready for the next operation.

To prevent core sand from accumulating in the pit and to recover it for further use in re-sanding the core bars, there is shown a scoop-like sand box 36 (Figs. 1 and 5) pivoted below its bottom and forwardly of its center of gravity to brackets 37 secured to the lower flanges of the I-beams at their ends. The arrangement is such that the rear end of the box normally rests against a U-shaped strap 38, as shown in dotted lines in Fig. 1, so that the sand will be discharged into it from the platform floor plate 16 which is short of the end of the beams 14 (Fig. 5). To prevent the falling sand from spilling out of the box, due to its high velocity, a baffle 38^a (Figs. 3 and 5) is disposed at the end of the platform and at right angles to its upper surface. The baffle 38^a is so arranged that when

the sand is falling into the box, most of the sand strikes the baffle and is deflected into the box (Fig. 1); but when the box is dumping (Fig. 5), the baffle offers no obstruction to free flow of the sand.

To provide for dumping the sand box automatically when the platform is restored to its horizontal position, as shown in Fig. 1, so that the sand will fall outside the pit, the open end of the box is so located that it will just clear the inside wall of the pit and is shown as having rollers 39 (Figs. 3 and 5) projecting from opposite sides conveniently mounted on a fixed shaft or bar 40 extending through the box. These rollers are adapted to strike the lower flanges of a pair of track members in the form of horizontal structural angles 41 secured above the upper edge of the pit wall and, as this end of the platform continues to rise, the rollers will ride along the track causing the box to rock on its hinge and, consequently, shift its dumping end by reason of the pivotal connection below its bottom, and thus dump the sand down the outside inclined edge 42 of the pit wall, whereby it is prevented from falling back into the pit. If desired, the dumped sand may fall through a grating 43 just outside the pit wall onto a sand belt conveyor 44 (Fig. 5) by which it may be carried to the sand reconditioning zone of the plant for further use. However, the sand may be allowed to accumulate where dumped and may be removed from time to time by other means.

To prevent the dust arising from the pit from escaping into the plant, there is shown a pit cover 45 which is preferably made of sheet metal having one or more movable walls (Figs. 1, 2 and 4). Herein, the cover has a canvas side curtain wall 46 adapted to be opened to permit the core bars to be removed. The end of the cover adjacent to the platform hinges is, of course, left open so that the platform can tilt, as shown in dotted lines in Fig. 1, without striking the pipes against the top wall. The other end wall has a small opening 47 at the bottom through which the sand box is dumped (Fig. 2). Inasmuch as there is no substantial opening through which dust can escape, practically all of it will remain in the pit. Moreover, it is exhausted from the pit through a suction conduit 48 (Figs. 1 and 4) connected to an exhaust fan (not shown).

After the core bars have been stripped from the pipes and the platform has returned to its horizontal position, the pipes may be rolled down the inclined tracks 23 in the direction indicated by the arrow in Fig. 6 to the pipe rattlers (not shown). The core bars are removed manually or otherwise, and rolled also by gravity in the opposite direction along runway tracks 49 preferably parallel with and inclined like the tracks 23 where they rise to the platform level. Thence, the core bars are transferred to the reconditioning zone of the plant described in the aforesaid application.

The general operation has been described above. It will be understood that two or more attendants will operate the apparatus and load and unload the pipes and core bars. After the group of pipes is placed on the platform, one of the operators will open a valve to admit compressed air to the top of the cylinder 24 to force the piston downwardly, thereby tilting the platform until it strikes the stop member 26 slightly jarring the pipes so that the core bars and sand will fall out of the pipes through the notches 22 in the angle member 21. The core bars will fall freely until they strike the abutment member which resiliently checks their movement whereupon an operator will open another valve to exhaust the air from the cylinders 33 in front of the pistons and permit the abutment to descend as slowly as desired into the pit to the end of its limit of travel. The sand will fall in the sand box 36 and nearly all the dust will be exhausted through the conduit 48. Then an operator will admit compressed air below the piston in cylinder 24 to restore the platform to its level position, thereby dumping the sand box automatically. Then the attendants will roll off the pipes on the inclined runway tracks 23, move aside curtain 46, and roll the core bars down the tracks 49.

From the foregoing description, it will be seen that the apparatus is particularly advantageous in large capacity plants in which long lengths of pipe and pipe of large diameter are made. Moreover, it is capable of handling a group of pipes at one time, thereby speeding up the separating or stripping operation and increasing the plant capacity. Further, and perhaps most important, it eliminates the objectionable dust. Also there is a saving in labor and in floor space required for the operation, as compared with the old method.

Obviously the present invention is not restricted to the particular embodiment thereof herein shown and described. Moreover, it is not indispensable that all the features of the invention be used conjointly, since they may be employed advantageously in various combinations and sub-combinations.

What is claimed is:—

1. Apparatus for removing cores from cast iron pipes comprising, in combination, a tiltable platform; means on the platform to receive a pipe with a core bar therein; means to tilt the platform to an angular position in which the core bar will fall out of the pipe; means engaging the end of the pipe which is lowermost when the platform is tilted to prevent downward movement of the pipe; a movable abutment on the platform against which the core bar strikes upon falling; means permitting the abutment to descend to a point

where the core bar is free of the pipe; and means associated with the platform to recover the core sand.

2. Apparatus of the character described comprising, in combination, a support for the pipe; power actuated means for swinging the support so as to change the elevation of one end of the pipe with reference to the other and permit the core bar therein to move out of the pipe by gravity, and so as to restore the pipe and core bar to their original level; and a box at the end of the support which is lowered during the swinging for receiving the sand.

3. Apparatus of the character described comprising, in combination, a tiltable support for the pipe; power-actuated means for tilting the support so as to change the elevation of one end of the pipe with reference to the other and permit the core bar therein to move out of the pipe by gravity, and so as to restore the pipe and core bar to their original level; a tiltable box at the end of the support which is lowered during the swinging for receiving the sand; and means so constructed and arranged as to tilt the box to discharge its contents, when the support is restored to its initial position.

4. Apparatus of the character described comprising, in combination, a tiltable support for the pipe; and power-actuated means for tilting the support so as to change the elevation of one end of the pipe with reference to the other and permit the core bar therein to move out of the pipe by gravity, and so as to restore the pipe and core bar to their original level; and a tiltable open-ended, core-sand-receiving box pivoted off center upon the support so that, when tilted, its open end moves forwardly and downwardly to discharge the sand.

5. Apparatus of the character described comprising, in combination, a platform mounted see-saw fashion; a pit into which one end of the platform is adapted to be lowered; means on the other end of the platform to support a pipe so that, when the platform is tilted, the core bar may fall out by gravity; a tiltable core-sand-receiving box carried by the platform and having an open end out of which the sand is adapted to be dumped, said box normally resting in a substantially horizontal position, when the platform is fully tilted; and means above the upper edge of the pit to engage the box and tilt it so that its dumping side projects slightly over the edge of the pit when the platform is restored to substantially horizontal position.

6. Apparatus of the character described comprising, in combination, a tiltable platform mounted see-saw fashion; a pit into which one end of the platform is adapted to be lowered; means on the other end of the platform to support a pipe so that, when the platform is tilted, the core bar may fall out by gravity; a tiltable core-sand-receiving box carried by the platform and having an open end out of which the sand is adapted to be dumped, said box being pivoted to tilt on an axis below its bottom wall and being arranged normally to rest substantially horizontally and to be lifted by the platform above the upper edge of the pit wall; rollers on the opposite sides of the box; and track means with which the rollers engage to tilt the box and dump the sand outside of the pit wall.

7. A device for removing cores from cast iron pipes comprising, in combination, a tiltable platform; means on the platform to receive a plurality of pipes including spaced notched members; the notched member nearest the tilting axis of the platform receiving the core bars projecting from the pipes so as to permit longitudinal movement of the core bars and providing a stop by which the bell ends of the pipes are supported when the platform is tilted; means to tilt the platform to such an angle as to break the adhesion of the core sand and permit the core bars and sand to fall out by gravity; means to control the separating movement of the core bars; and means associated with the platform to recover the core sand.

8. Apparatus of the character described comprising, in combination, a tiltable platform having means at one side of its axis for receiving a cast iron pipe and core; means to tilt the platform to an angular position in which the core elements will fall out; and means carried upon the platform on the other side of the axis to recover the falling core sand.

9. Apparatus of the character described comprising, in combination, a tiltable platform, a scoop-like sand box pivotally connected to the platform to catch the falling core sand when the platform is tilted; and means engageable with said sand box to tilt it and dump it automatically when the platform is restored to its normal position.

10. Apparatus of the character described comprising, in combination, a hinged support for the pipe; power-actuated means for swinging the support on its hinges so as to lower one end of the pipe and permit the core bar therein to move out of the pipe by gravity, and so as to restore the pipe and core bar to their original level; and runways extending in opposite directions from the hinged support and in parallel lines so that after separation the pipe may move in one direction and the core bars in another without interference or laborious handling.

11. A device for removing cores from cast iron pipes comprising, in combination, a tiltable platform having a pipe support; pipe tracks leading to and from the platform; transverse notched flanges on the platform for receiving a group of pipes transferred

from the tracks; the notches in the flange nearest the center of the platform adapted to receive the projecting bell ends of the core bars but being too small to permit the bell ends of the pipes to slide through them, whereby to permit the core bars and sand to fall out by gravity when the platform is tilted; and a trackway leading from the platform at the other end over which the separated core bars may be rolled.

12. A device for removing cores from cast iron pipes comprising, in combination, a tiltable platform; means to hold the pipes against longitudinal movement on one end of the platform; pipe tracks leading to and from the sides of the platform; said platform adapted to be tilted to effect gravity separation of the core so that it will be transferred to the other end; and core bar tracks leading from one side of said end to which the core bar may be transferred for further operations.

13. In combination with a tilting platform of the class described, pipe tracks leading to and from the sides of the platform at one end and presenting a gap in which the platform works; and a core bar track leading from one side of the platform at the other end, said tracks being slightly inclined adjacent to the platform to provide for rolling the pipes and core bars by gravity.

14. A device for removing cores from cast iron pipes comprising, in combination, a platform pivoted near its center and having transverse notched flanges for receiving a group of pipes; the notches in the flange nearest the center of the platform adapted to receive the projecting bell ends of the core bars but being too small to permit the bell ends of the pipes to slide through them, whereby to hold the pipes immovable longitudinally and permit the core bars and sand to fall out by gravity when the platform is tilted.

15. Apparatus of the character described comprising, in combination, a tiltable support for the pipe; a movable core bar abutment carried by the support; and fluid-pressure cylinders for controlling the abutment.

16. Apparatus of the character described comprising, in combination, a hinged support for the pipe; a fluid-pressure cylinder for swinging the support on its hinges so as to change the elevation of one end of the pipe relative to the other; a movable abutment carried by the support; and fluid-pressure cylinders for controlling the abutment.

17. Apparatus of the character described comprising, in combination, a tiltable support for the pipe having side channels; a movable abutment extending crosswise of the support and movable longitudinally thereof; and rollers supporting the abutment and traveling in the side channels.

18. Apparatus of the character described comprising, in combination, a tiltable support for the pipe having side channels; a movable abutment extending crosswise of the support and movable longitudinally thereof; rollers supporting the abutment and traveling in the side channels; and a fluid-pressure cylinder for controlling the movement of the abutment along the support.

19. A device for removing core bars from pipes comprising, in combination, movable supporting means arranged to tilt a group of pipes to such angular position as to cause the weight of the cores to break the adhesion of the core sand so that the cores and sand will fall out by gravity; and a movable core bar abutment associated with the supporting means to break the fall of the core bars.

20. Apparatus of the character described comprising, in combination, a tiltable support for pipes and core bars; power means connected to tilt the support on an axis transverse to and beyond the inner ends of the pipes and core bars; means to hold the pipes against longitudinal movement when the support is tilted, said means permitting the core bars and sand to slide out of the pipes; and means to limit the extent to which they may tilt.

21. Apparatus for removing cores from pipes comprising, in combination, a tilting platform; means to hold a pipe on one end against longitudinal movement; power means connected to tilt the platform; and a limiting stop for the platform against which it is adapted to strike and thereby jar the supported pipe so as to break the adhesion of the core sand and permit the core bar to fall out by gravity.

22. Apparatus of the character described comprising, in combination, a tiltable platform having provision on one end for receiving and supporting a cast iron pipe; and means to tilt the platform to an angular position in which the core elements will fall out.

23. Apparatus of the character described comprising, in combination, a movable support for the pipe; and power-actuated means for moving the support so as to change the elevation of one end of the pipe relative to the other and permit the core bar therein to move out of the pipe by gravity, and so as to restore the pipe and core bar to their original level.

24. Apparatus of the character described comprising, in combination, a hinged support for the pipe; and power means for swinging the support on its hinges so as to change the elevation of one end of the pipe relative to the other and permit the core bar therein to move out of the pipe by gravity, and so as to restore the pipe and core bar to their original level.

25. Apparatus of the character described comprising, in combination, a hinged support for the pipe; and power means for swinging the support on its hinges so as to

change the elevation of one end of the pipe relative to the other and permit the core bar therein to move out of the pipe by gravity, and so as to restore the pipe and core bar to their original level; said power means comprising a cylinder pivotally mounted at one end and a piston rod projecting therefrom and pivotally connected to the platform; and a source of fluid under pressure for actuating the piston.

26. Apparatus of the character described comprising, in combination, a hinged support for the pipe; and a fluid-pressure cylinder for swinging the support on its hinges so as to change the elevation of one end of the pipe relative to the other.

27. Apparatus of the character described comprising, in combination, a platform movable to effect gravity separation of cores and pipes; a pit for receiving one end of the platform; and a dust-cover for closing the mouth of the pit.

28. Apparatus of the character described comprising, in combination, a platform movable to effect gravity separation of cores and pipes; a pit for receiving one end of the platform; a dust cover substantially closing the mouth of the pit; and a suction conduit for exhausting the dust from the pit.

29. Apparatus of the character described comprising, in combination, a tiltable platform; a scoop-like sand box pivotally mounted on the platform to catch the falling core sand when the platform is tilted; and a baffle secured to the platform and extending into the sand box so as to deflect the falling sand into said box.

30. Apparatus of the character described comprising, in combination, a tiltable platform; a scoop-like sand box pivotally mounted on the platform to catch the falling core sand when the platform is tilted; means engageable with said sand box to tilt it and dump it automatically when the platform is restored to its normal position; and a baffle secured to the platform and extending into the sand box so as to deflect the falling sand into said box; said baffle being so disposed that when the box tilts to dump the sand, the lower edge of the baffle clears the bottom of the box to permit the sand to flow out freely.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature.

JAMES R. McWANE.