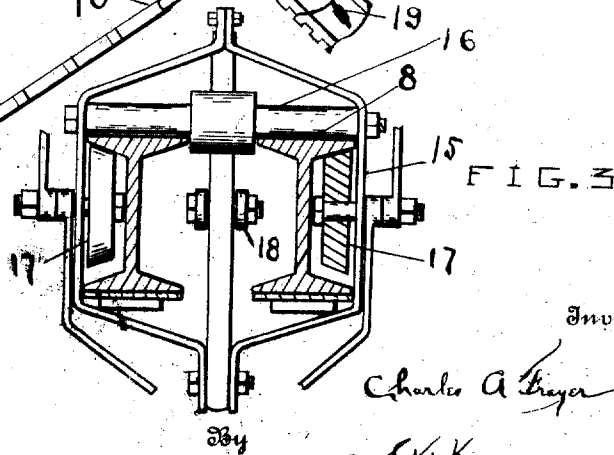
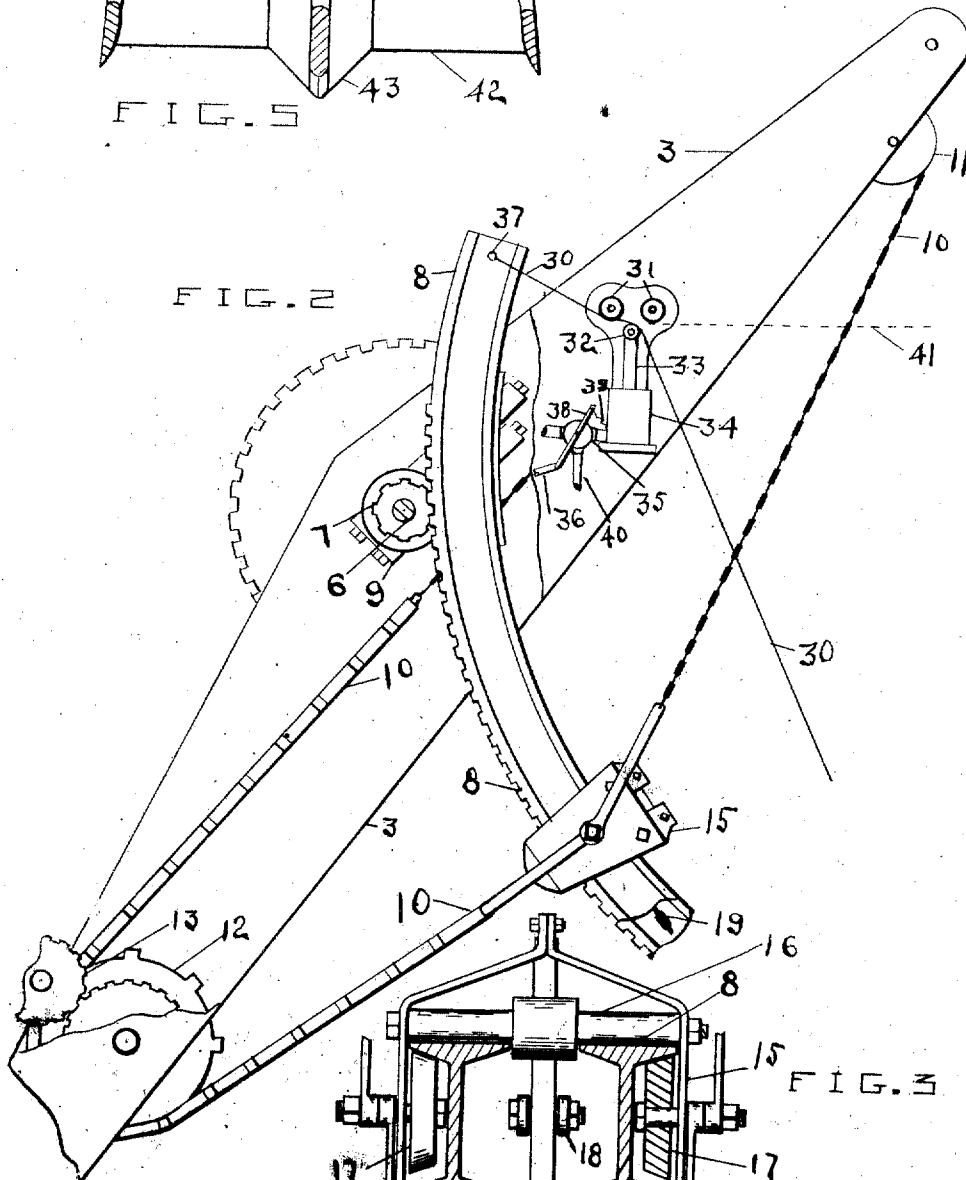
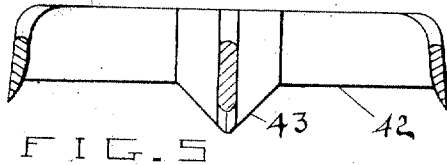


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MATERIAL HANDLING APPARATUS.
APPLICATION FILED JAN. 20, 1910.

1,000,166.

Patented Aug. 8, 1911.

3 SHEETS—SHEET 2.



Witnesses

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FIG. 6

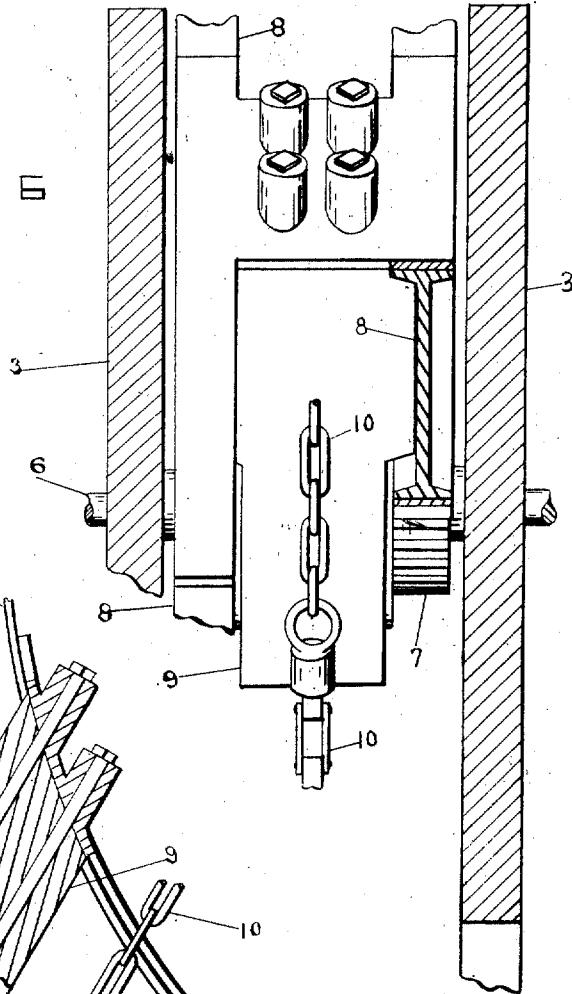
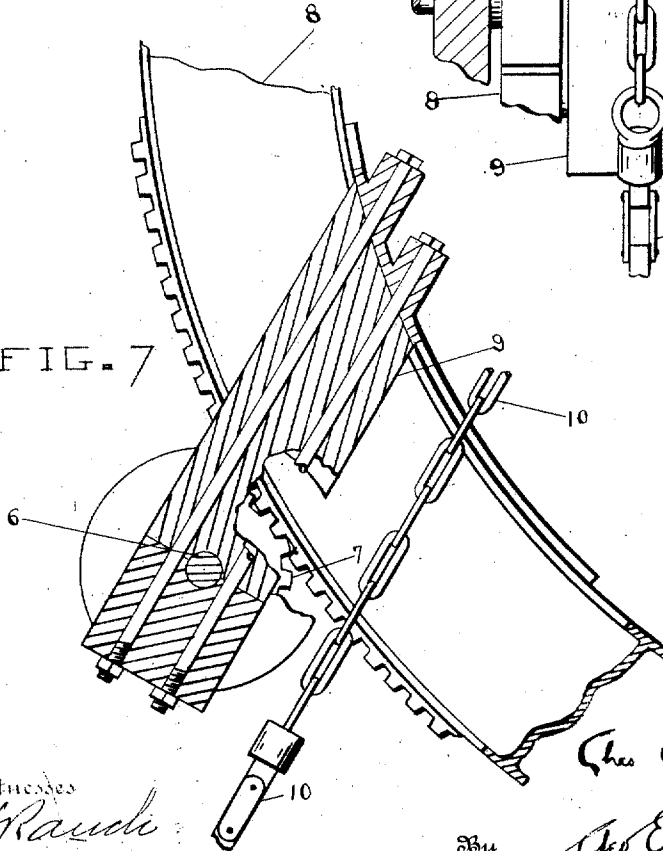


FIG. 7



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MATERIAL-HANDLING APPARATUS.

1,000,166.

Specification of Letters Patent.

Patented Aug. 8, 1911.

Application filed January 20, 1910. Serial No. 539,045.

To all whom it may concern:

Be it known that I, CHARLES A. FRAYER, a citizen of the United States, residing at Toledo, Lucas county, Ohio, have invented new and useful Material-Handling Apparatus, of which the following is a specification.

This invention relates to features of operation and control in material handling apparatus.

This invention has utility when adapted to bucket handling machinery, and possesses many features of exceptional value when embodied in excavators.

Referring to the drawings: Figure 1 is a fragmentary view in side elevation of an excavator of the power shovel type in which have been incorporated features of the invention for back-action operation, or digging toward the machine; Fig. 2 is an enlarged detail view, with parts broken away, of the forwardly overhanging frame or boom, showing certain of the features of mounting and control; Fig. 3 is a transverse sectional view of the directing member or bucket stick, showing the auxiliary guide mounted thereon; Fig. 4 is a transverse sectional view of the directing member, showing the fixed mounting of the cutter or plow thereon; Fig. 5 is a section of the cutter on the line V—V, Fig. 4, looking in the direction of the arrow. Fig. 6 is a front view of the diagonal block mounting the directing member in the boom; and Fig. 7 is a section of said block.

Mounted on the vehicle or car deck 1 is the turn table or platform 2 carrying the forwardly overhanging frame or boom 3, from the outer free end of which extend the guys 4 to the A-frame 5 mounted on the deck adjacent the platform 2.

Mounted centrally of the boom 3 to be actuated by a prime mover, in this instance shown as engines on the boom, is the shaft 6 carrying pinions 7 to coact with the directing member 8, which is provided with racks to be held in mesh with the pinions by the pivoted block 9 loosely mounted on shaft 6 and disposed diagonally as to the general line of direction of the curved or crooked directing member 8. The bosses about the bolts in Fig. 2, determine the extent of the block 9 between the parallel I-beam portions of the directing member, notwithstanding the plate portions have a greater extent on said members. This arrangement of the

block 9, which holds the member 8 in position to be primarily guided as well as reciprocated, permits clearance between the parallel portions of the member 8 for the controlling connection 10, passing about guide 11 near the outer end of the boom, and about sprocket wheel 12 near the base of the boom 3. This sprocket wheel 12, through gear 13 is controlled by prime mover 14, so that the auxiliary guide 15 on the directing member 8, to which the connections 10 lead from guide 11 and wheel 12, may be held, permitted to move freely, or actuated. Actuation of guide 15 will serve to oscillate or raise and lower the directing member 8, while when held, it limits the travel of the directing member to reciprocation in its general line of direction, shown as the arc of a circle.

The guide 15, while having bail connections to the lines 10 pivoted centrally to avoid binding, is additionally anti-frictionally mounted on the member 8, by centrally ribbed rollers 16 to effectively avoid lateral shifting, which action is supplemented by the rollers 17, one of which is shown in section in Fig. 3.

Extending from the guide 15 at a central point and between the longitudinally extending elements of the directing member 8, is the bail 18 connecting to the hoisting line 19, which extends over the guide 20 (Fig. 4), from which guide 20 is pivoted the link 21 carrying the movable guide 22. The line 19 extends over this guide 22, about the guide 23 near the outer end of the boom 3, thence over guide 24 and through the platform 2 to the source of power.

Connected to the movable or free end of the link 21 is the flexible connection 25 extending to the after portion of bucket 26, the forward end of which has pivotal connection 27 with the directing member or dipper handle 8.

The outwardly swingable pivoted back of the digging or working member 26 has its tripping latch 29 engaged by line 30 extending past the guides 31, 32. These comprise relatively reciprocable means, the latter of which, guide 32, is carried by plunger 33 reciprocable in cylinder 34, shown in Fig. 2 as connected to three-way valve 35 controlled by manually operable connections 36 for power tripping of the bucket, the other end of the line being connected to the di-

recting member 8 at end 37 remote from the bucket 26. The lever 38 of the valve 35, is normally so held by spring 39 that the motive fluid from the cylinder 34 is exhausted through exhaust pipe 40. Actuation of the connection 36 against the resistance of spring 39, closes exhaust 40 and allows motive fluid to enter cylinder 34, force plunger 33 upward and thus laterally engage by means 32, the line 30, normally freely extending from the bucket 26 to attachment 37. This travel of guide 32, carrying the line 30 between the guides 31, not only interferes with the free running of the line 30, but so takes up the line as to trip the latch to the bucket back and to bring about dumping of the bucket. The positioning of this tripping device is such that the least possible resistance will be given line 30 during the reciprocations of the member 8. The intermediate position between the high and low directions of the bucket 26 from the after terminus 37 of the member 8 is shown by the dotted line 41. It is to be noted when the line 30 assumes this direction it runs practically free between the guides 31, 32.

The shovel 26 may work effectively in certain kinds of material. It is especially designed to cut away, according to conditions, layers of material, two, three, or more inches in thickness, and to add to its effectiveness in this duty under severe conditions, the material may be prepared for ready gathering in to fill the shovel or bucket 26, by the cutter 42, shown as a working or digging member rigidly mounted on the member 8. Centrally of the cutter is the rib or plow 43 (Fig. 4).

In operation, an excavator vehicle or mounting frame of a usual type, by slight alteration may be equipped with the features herein to permit of back action handling; that is, have the machinery travel over the line where the material is to be taken out, as a sewer or trench. The directing member 8 may be quite extended as to length, thereby permitting of excavating to a depth considerably below the machinery. Thus drawn into position for filling of the bucket 26, the extension of the member 8 past the pivot mounting 27 effectively braces the bucket, which is firmly held in position by the connection 25, drawn taut by the hoisting line 19, which simultaneously hauls guide 15 toward link 21 to tighten connections 10, thereby firmly holding the guide 15 at a maximum spacing from the guide block 9. This results in a rigid holding of the member 8 at two points and effectively determines its direction of reciprocation as the hoisting line 19 actuates the bucket toward the platform 2. During this digging or filling operation, the wheel 12 may be held, or the prime mover 14 may even

force gradually the working members into the material. With the bucket filled, freeing of wheel 12, will permit swinging of the member 8 about shaft 6, through operation of the hoisting line 19. This swinging may be effected by prime mover 14. This swinging of the member 8 is upward, and notwithstanding the long back or rearward extension of member 8, owing to its crooked line or direction, it in no wise interferes with the A-frame, and due to its curvature permits of considerable increase in height of dumping over a straight member. With the hoist line freed, after swinging of the member 8 upward, shaft 6 may be actuated to thrust the bucket upward still farther while guide 15 is held or actuated higher. Upon slacking of the hoisting line 19, link 21 is pulled toward the dipper by the connection 25 as the heavily loaded dipper swings into a downwardly hanging position about its pivot mounting 27, as shown in dotted line position Fig. 1. In this position, the dipper back is at the bottom permitting free discharge as the latch is tripped. The cutter 42 may be so disposed as to limit the swing of the bucket. The turn table 2 permits of swinging the overhanging frame or boom 3 to such point as desired for the dumping.

To repeat the filling operation, the boom is swung over the trench, wheel 12 is freed or actuated to cause guide 15 to lower, with the member 8 properly extended. As the hoisting line 19 is drawn taut, the bucket swings up against the member 8, in which position its back 28 readily latches, and all is in readiness for proceeding.

With the connections to the bucket as herein shown, within the bucket-width, there is no necessary roughening of side walls to trenches and where straight smooth walls are desired, no subsequent trimming is required. This means quite a considerable saving in many instances in practice.

What is claimed and it is desired to secure by Letters Patent is:

1. A material handling apparatus comprising a frame, a digging member, a directing member for the digging member, said directing member reciprocably mounted on the frame, an auxiliary guide for the directing member spaced laterally from and movable toward and from the frame, a pair of flexible lines divergently extending from the auxiliary guide to different points on the frame to position said guide, and actuating means extending from the digging member to the frame.

2. A material handling apparatus comprising a frame, a bucket, a directing member for the bucket, said directing member movably mounted in the frame, an auxiliary guide for the directing member spaced laterally from and movable toward and from the

frame, a pair of lines divergingly extending from the auxiliary guide to the frame, controlling means for oppositely operating said lines, and actuating means extending from the digging member to the frame.

3. A material handling apparatus comprising a frame, a digging member, a directing member for the digging member, said directing member movably mounted in the frame, an auxiliary guide for the directing member spaced laterally from and movable toward and from the frame, a pair of lines divergingly extending from the auxiliary guide to the frame, guide actuating means for oppositely operating said lines, and actuating means for the digging member extending from the frame.

4. A material handling apparatus comprising a frame, a working member, a directing member for the working member, said frame having a primary guide for the directing member, an auxiliary guide for the directing member spaced laterally from and movable toward and from the frame, one of said guides having means to reciprocate the directing member, and the other having adjustable means divergingly extending therefrom to direct such reciprocation, and actuating means extending from the working member to the frame to effect movement of the working member relatively to the frame.

5. A material handling apparatus comprising a frame, a bucket, a directing member to which the bucket is positively connected against relative travel, said directing member mounted on the frame, a cutter mounted on the directing member and spaced from the bucket, and actuating means diverging from the directing means in its extensions from the bucket, said means effective to operate the bucket, cutter, and directing member in normal bucket filling operation.

6. A material handling apparatus comprising a frame, a directing member mounted on the frame, a bucket engaged by the directing member, a rigidly mounted cutter spaced from the bucket, and actuating means diverging from the directing means in its extensions from the bucket, said means effective to operate the bucket, cutter, and directing member in normal bucket filling operation.

7. The combination with a boom, of a directing member longitudinally reciprocable therein, a bucket having a receiving end, and a cutter rigidly mounted on the directing member forward of the bucket receiving end, said cutter having a medial plow section.

8. A material handling apparatus comprising a frame, a directing member mounted thereon, a working member pivotally carried by the directing member, ac-

tuating means for the directing member, a link carried by the directing member and with which said means coacts, and a flexible connection from said link to the working member to oscillate the working member.

9. A material handling apparatus comprising a boom, a reciprocable directing member mounted thereon, a bucket, a pivotal mounting connecting the forward end of the bucket to the directing member at a point spaced from the forward end of the member, and a hoist line coacting with the bucket slackable to permit swinging of the rear end of the bucket downward away from filling position against the forward end of the directing member to material retaining position.

10. A material handling apparatus comprising a frame, a directing member mounted thereon, a working member carried by the directing member, an auxiliary guide for the directing member, and actuating means for hoisting the directing member, said means extending from the frame to the guide by way of the directing member.

11. A material handling apparatus comprising a frame, a directing member mounted thereon, a guide for the directing member, actuating means extending from the guide to the directing member and thence to the frame, and additional guide control means extending directly from the guide to the frame.

12. A material handling apparatus comprising an overhanging frame, a directing member mounted thereon, a guide for the directing member movably spaced relatively to the frame, controlling means from the guide to the directing member, and over the frame to guide the directing member, and additional controlling means extending to the guide for determining the position of the guide as to the frame.

13. A material handling apparatus comprising an overhanging frame, a pivotally mounted working member, a longitudinally reciprocable directing member pivotally sustained by the overhanging frame and carrying the working member, said directing member extending past the pivotal mounting of the working member to provide a brace toward and from which the working member is free to swing in operation, and working member actuating means extending from the frame to the working member.

14. A material handling apparatus comprising a frame, a directing member, a block diagonally disposed as to the member for mounting the member in the frame, and operating connections for the member extending through the member and approximately parallel to the block.

15. A material handling apparatus comprising a frame, a curved directing member, a block disposed at an angle to the curvature

of the member for mounting the member in the frame, and flexible operating means for the member extending through the member and approximately parallel to the block.

16. A material handling apparatus comprising a frame, a directing member, a block pivotally mounted in the frame and diagonally disposed as to the directing member, and operating connections for the member extending through the member and approximately parallel to the block.

17. A material handling apparatus comprising a curved directing member, a frame in which said member is longitudinally reciprocally mounted, a guide in said frame through which the curved portion of the member is reciprocable, and a digging member connected against travel along the directing member.

18. A material handling apparatus comprising a frame, a crooked directing member longitudinally reciprocally mounted in the frame, a guide in said frame through which the crooked portion of the member is reciprocable, and a working member connected against travel along the directing member, said working member pivotally carried by the directing member.

19. The combination with a boom, an A-frame for supporting the boom, a crooked directing member, a mounting for the directing member in the boom through which the crooked portion of the directing member may reciprocate, and a working member carried by the directing member.

20. The combination with a boom, a curved directing member, and a mounting for the directing member in the boom through which the curved portion of the directing member may reciprocate, of a movable guide for the directing member, said guide spaced from the boom.

21. The combination with a frame, provided with an overhanging boom, of a curved directing member mounted therein, a back-action digging member connected against travel along the directing member in normal digging operation, and operating means to the boom extending from the digging member in a direction diverging from the directing member.

22. The combination with a frame, a directing member reciprocally mounted thereon, a bucket carried by the directing member, and a trip device for dumping the bucket, said device comprising a flexible connection normally freely extending from the bucket to a remote point on the directing

member, and means mounted on the frame intermediate the length of the flexible connection, said means embodying a pair of spaced guides disposed in a line approximating an intermediate position of the directing member, and a third guide reciprocable between the pair of guides to actuate the connection laterally of its normal direction to effect tripping of the bucket.

23. The combination with a frame provided with a boom, of a curved directing member, a mounting for the member in the boom and through which the curved portion of the member is reciprocable, a cutting member rigidly connected to the directing member, a guide for the directing member, flexible connections from said guide, and a prime mover operable to control said guide through the connections and thereby determine the direction of reciprocation of the directing member.

24. A material handling apparatus comprising a boom, a crooked directing member, a mounting for the member in the boom and through which the crooked portion of the member is reciprocable, and a cutting member rigidly connected to the directing member.

25. The combination with a boom, and a boom supporting platform on which the boom is directly mounted, of a directing member reciprocally mounted in the boom, a hoist line guide in the boom more remote from the platform than the directing member, a digging member carried by the directing member, and a hoist line coacting with the guide, said line effective to actuate the digging member toward the platform in normal digging.

26. The combination with a boom, and a boom supporting platform on which the boom is directly mounted, of a directing member reciprocally mounted in the boom, a hoist line guide in the boom more remote from the platform than the directing member, a working member carried by the directing member, and a hoist line coacting with the guide, said line provided with connections coacting with the directing member to actuate the working member toward the platform in normal digging.

In testimony whereof I affix my signature in the presence of two witnesses.

CHARLES A. FRAYER.

Witnesses:

GEO. E. KIRK,
GLADYS JAMESON.