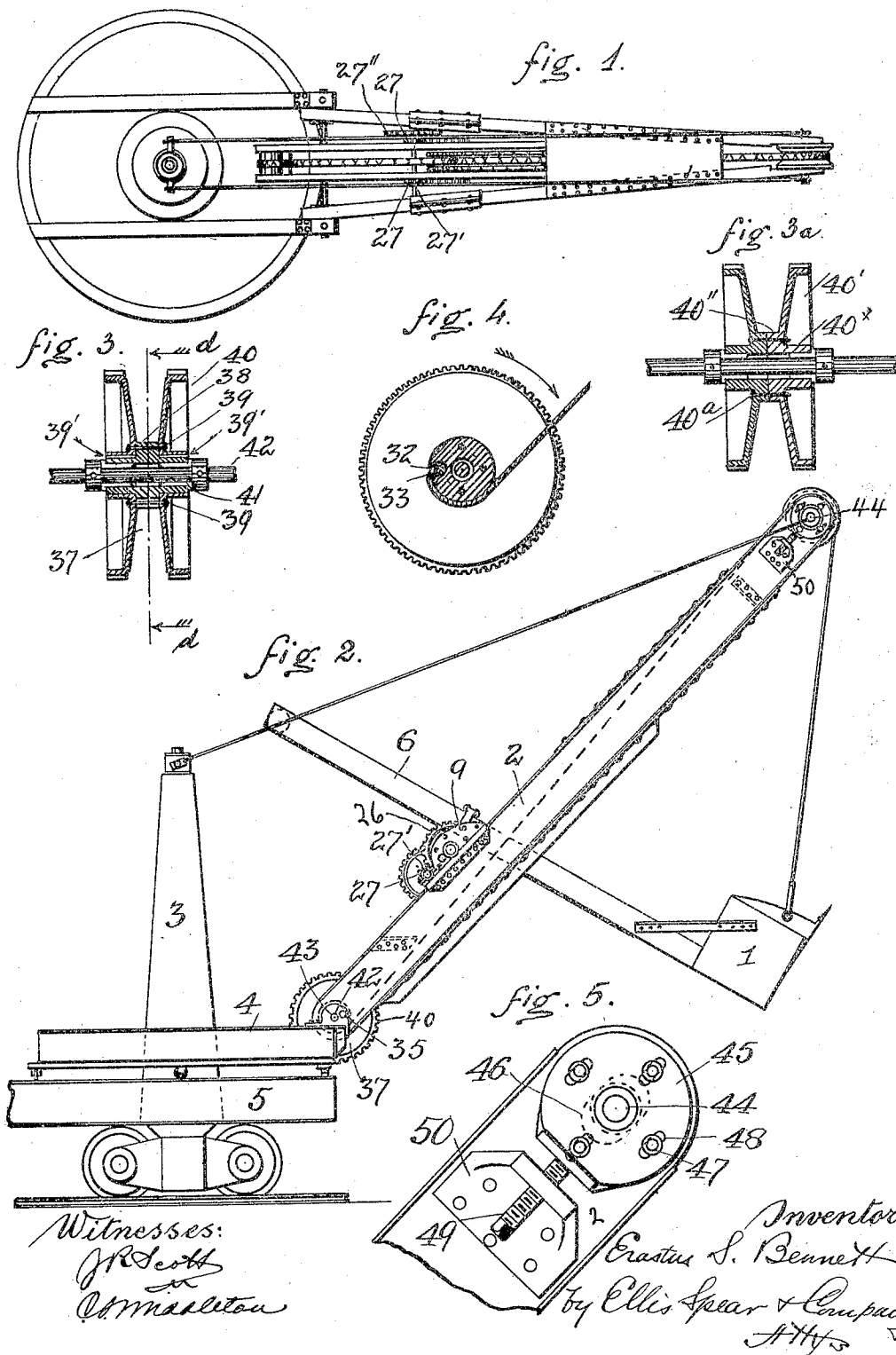


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APPLICATION FILED JAN. 9, 1904.

2 SHEETS—SHEET 1.

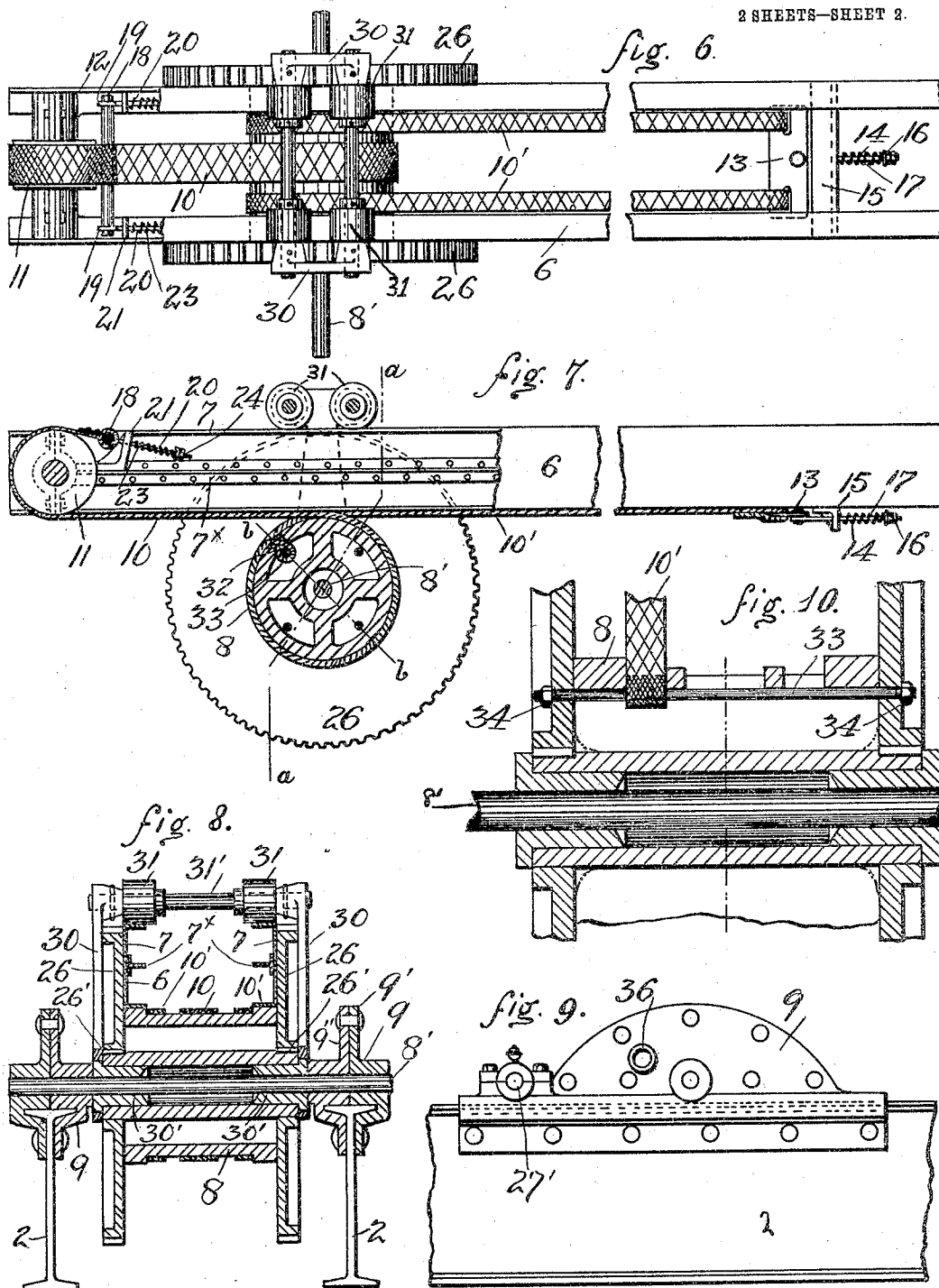


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2 SHEETS—SHEET 2.



Witnesses:
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UNITED STATES PATENT OFFICE.

ERASTUS S. BENNETT, OF NEW YORK, N. Y.

MEANS FOR OPERATING DIPPER-HANDLES FOR SHOVELS OR DREDGES.

SPECIFICATION forming part of Letters Patent No. 778,840, dated January 3, 1905.

Application filed January 9, 1904. Serial No. 188,317.

To all whom it may concern:

Be it known that I, ERASTUS S. BENNETT, a citizen of the United States, residing at New York city, New York, have invented certain new and useful Improvements in Means for Operating Dipper-Handles for Shovels or Dredges, of which the following is a specification.

My invention relates to mining or excavating apparatus, and particularly to the mechanism associated with the dipper-handle for supporting and operating the same.

The object of my invention is to provide a simple construction, avoiding the use of a chain formed of links, which, as is well known, is as strong only as its weakest link. I aim also to provide a light and practically noiseless operating connection, and for this purpose I prefer to use a flat wire rope connected with the ends of the dipper-handle and passing around a drum arranged intermediate of the length of the dipper-handle and operated through suitable gearing.

Other features of my invention will be described, and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is a plan view of the invention. Fig. 2 is a side elevation. Fig. 3 is an enlarged sectional view of the hoisting-drum. Fig. 3^a is a similar view of a modified form of hoisting-drum. Fig. 4 is a sectional view of Fig. 3 on line *d d* thereof. Fig. 5 is a side view of the means for adjusting the upper boom-sheave. Fig. 6 is a plan view of the dipper-handle and mechanism associated therewith. Fig. 7 is a side view, partly in section, of part of the handle and devices associated therewith. Fig. 8 is a transverse sectional view on line *a a* of Fig. 7. Fig. 9 is a detail side elevation of part of the main boom, and the special supports attached thereto for the stationary shaft of the drum controlling the dipper-handle. Fig. 10 is an enlarged sectional view through the drum on line *b b* of Fig. 7.

In the drawings the dipper is shown at 1, the boom of the apparatus at 2, the mast at 3, and the turn-table and car-body at 4 and 5, respectively. The dipper is carried by a han-

dle or beam 6, made up of channel-irons 7, the cross-sectional shape of which is indicated at Fig. 8. These channel-irons are arranged parallel with each other at a suitable distance apart to receive between them the operating mechanism now to be described.

A drum 8 is supported to turn on a stationary shaft 8', held in suitable bearings 9 on the upper edge of the boom 2, and this drum is provided with a peripheral face of the width substantially equal to the space between the outer sides of the channel-irons 7 7, comprising the dipper-handle. Secured to the periphery of this drum in a manner hereinafter described and centrally thereof is a band or rope 10, formed of wire, the said rope being of flat formation and extending longitudinally of the dipper-handle to the inner end thereof, where it passes between the channel-irons 7 7 and over a pulley 11, journaled in bearings 12, carried by and extending transversely between the channel-irons 7. In addition to this flat band or rope I provide two additional bands or ropes 10', one on each side of the band 10 and secured to the periphery of the drum near the opposite margins thereof. These two bands 10' extend to the front part of the handle, where they are secured to a cross-bar 13, to which a stem 14 is connected centrally, the said stem passing through an angle-iron cross-piece 15, extending between and secured to the channel-iron 7, the said stem having on its end nuts 16, between which and the outer face of the channel-iron 15 a coil-spring 17 is located to constantly draw the cross-bar 13 toward the front end of the dipper, and thus keep the bands or flat ropes 10' taut under all conditions. A like take-up or tension arrangement is provided for the central band or rope 10, before described, and for this purpose its end is connected with a cross-bar 18, and the ends of this cross-bar are engaged by eyes 19 on rods 20, which rods pass through angle-irons 21. The rods 20 have springs 23 surrounding them and bearing at one end on the angle-iron brackets 21 and at the opposite end upon nuts 24. The tendency of the springs 23 is to constantly draw the band 10 around and over the roll or

pulley 11, and thus keep the same taut. It will be seen from Figs. 6 and 7 that the bands or flat ropes 10 and 10' pass around the drum in opposite directions, and by operating the said drum in either one direction or the other one of the connections will be paid out while the other connection is wound up, and thus the dipper-handle may be moved inwardly or outwardly while maintaining a constant and perfect connection with its operating means. If in winding in either direction either of the connections begins to wind upon itself, the spring holding the opposite end of said connection to the handle will give to allow such action to take place.

For operating the drum I show gears 26, which, as shown in Fig. 8, are attached to the drum by keys 26'. These gears are operated by pinions 27 on a cross-shaft 27', carried by the boom. These gears 26 are located close along each side of the channel-irons 7 of the dipper-handle 6, so as to form a guiding means therefor, as shown in Figs. 6 and 8. I prefer to hold the dipper-handle closely against the drum by arms 30, journaled on the bushings 30' of the drum and extending up alongside the gears 26 and having rollers 31, journaled on a cross rod or shaft 31', supported in the ends of the arms, the said rollers bearing on the upper sides of the channel-irons. These rollers and tie-bars or arms 30 hold the dipper-handle close against the periphery of the drum in all positions to which the dipper-handle may be adjusted. The shaft 27' is driven by the gear-wheel 27" thereon.

Referring now to the manner of securing the wire ropes to the drums, it will be seen from Figs. 4 and 7 that the means employed consists in doubling the ends of the wire rope within recesses 32 and holding them therein by bolts 33. The bolts are held in place by nuts 34, Fig. 10, and they may be removed in order to disconnect the ropes from the drum. For this purpose I provide an opening 35, Fig. 2, in the bearing of the hoisting-drum and also an opening 36, Fig. 9, for the bolt which holds the end of the wire rope to the drum of the dipper-handle.

The hoisting-drum 37, Figs. 2 and 3, is made up of a body portion or sleeve 38, which has bolted thereto at 39 the two gears 40, to which the power is applied from the hoisting-engine. These gears are also secured to the sleeve by the keys 39'. The body portion 38 has within its ends two split bushings 41, and these, together with the body portion and the gears, revolve as one body about the shaft or rod 42, which is fixed in bearings 43, Fig. 2, on the turn-table, said shaft or rod serving as the pivot-pin for the boom. The gears 40, together with the drum, form a sheave for the hoisting-rope.

Instead of the construction shown in Fig. 3 the hoisting-drum may be formed as shown

in Fig. 3^a, in which each gear 40' is provided with a hub-section 40^x, projecting outwardly, and a boss 40'', projecting inwardly, the latter abutting against each other and forming the periphery of the drum. The two gears are secured together by the bolts 40^a.

Fig. 5 shows means for adjusting the upper sheave of the boom into proper alinement with the hoisting-drum. For this purpose the shaft 44 of the upper sheave bears in blocks 45 on the outer sides of the beams or angle-irons composing the boom, the said beams having elongated openings 46 through them for the passage and adjustment of the sheave-shaft. The block is held in place by bolts 47, passing through elongated openings 48 into the beams. The block is adjusted by first loosening the bolts 47 and then turning the screw 49, which passes through an angle-iron bracket 50, secured to the side of the boom and bears against the block, and after the block has reached the desired position it is set rigidly in position by tightening the bolts 47.

The means for operating the dipper-handle already described is supported, as before stated, in the bearings 9. Each of these bearings is formed in sections 9' 9'', Fig. 8, fitted to the upper flange of the channel-iron beam of the boom and riveted in place. The bearings extend some distance along the I-beam, so that a long bearing is afforded and the strain is distributed over a considerable extent of the I-beam. It will be noted that no holes are formed or cut in the flanges of the I-beam, and the same is not weakened in any way; but the bearing serves as a reinforce at this point. This bearing 9, besides supporting the drum-shaft 8', may also support the shaft carrying the driving-pinions, as shown in Fig. 9.

It will be seen from Figs. 1, 2, and 8 that all the operating mechanism is included within the side beams of the main boom, and there are no overhanging parts which are liable to become deranged or damaged. It will be observed also that the handle will be guided perfectly and will be prevented from having lost motion, the gears serving as lateral guides and the rollers 31 as top guides. There will also be an absence of torsion in the means for driving the dipper-handle, as the drum 8 will be driven on both its ends.

As shown in Figs. 7 and 8, the angle-iron beams comprising the handle are provided with reinforcing angle-irons 7^x, which sustain the longitudinal thrust of the operating connection 10, said irons extending up to the bearings 12 of the drum 11 and serving also as a support for the bracket 21.

I claim as my invention—

1. In combination with a dipper-handle, a drum and flat bands wound around the drum in opposite directions, and connected one on one side of the drum to the dipper-handle and the other being connected to said handle on

the other side of the drum, and means for operating the drum, substantially as described.

2. In combination with the dipper-handle, a drum, a central band of flat material wound in one direction on the drum and connected with the dipper-handle and a pair of bands wound in the other direction on the drum near its margin and connected with the dipper-handle, substantially as described.

3. In combination with the dipper-handle, a drum, flat bands wound in different directions around the drum and connected with the dipper-handle, and springs for keeping the bands taut, said springs forming part of the connections between the bands and the dipper-handle, substantially as described.

4. In combination with the dipper-handle formed of channeled irons arranged parallel with each other, reinforcing angle-irons secured thereto, a drum, bands secured to the said drum and extending in different directions and means for connecting the said bands with the dipper-handle, substantially as described.

5. In combination with the dipper-handle made of two bars parallel with each other, a drum located in line with a space between the two bars and a band connecting the drum with the dipper-handle, said band passing over a pulley arranged between the two bars and a spring connection between the band and the dipper-handle, substantially as described.

6. In combination with the dipper-handle, a drum, means wound in opposite directions around the drum, and connected with the dipper-handle, and means for tying the dipper-handle to the drum-shaft, substantially as described.

7. In combination with the dipper-handle, a drum, means wound in opposite directions around the drum, and connected with the dipper-handle, and means for tying the dipper-handle to the drum-shaft, said means including a part to bear on the dipper-handle and a tie bar or bars connecting the same with the shaft of the drum, substantially as described.

8. In combination with a dipper-handle, a drum and a flat band of wire rope connecting the drum with the handle, substantially as described.

9. In combination with a drum for a dredge or shovel having a recess therein, a rope having its end doubled in the recess and a bolt for holding the doubled portion in the recess substantially as described.

10. In combination with a dipper-handle, a drum having a recess therein, ropes having doubled portions in the said recess and extending from the drum in opposite directions and a single bolt for holding the plurality of rope ends in the recess, substantially as described.

11. In combination a dipper-handle, a drum, connections between the handle and drum and gears for operating the drum, one on each side

of the handle, said gears serving to guide the same, substantially as described.

12. In combination, a dipper-handle, a drum, gears for operating the drum extending up on each side of the handle, and means resting on top of the dipper-handle, said means being supported from the axial line of the drum, substantially as described.

13. In combination, a drum, a dipper-handle resting thereon, the flexible connections between the handle and the drum, gears for operating the drum extending up on each side of the handle, and rollers resting on top of the handle and supported from the axis of the drum, substantially as described.

14. In combination with a boom, composed of beams with a space between them, a dipper-handle and operating means therefor arranged wholly within the vertical planes of the said beams composing the boom, substantially as described.

15. In combination, a boom composed of side beams spaced apart, a dipper-handle passing between the said beams, a drum arranged between the beams with connections therefrom to the dipper-handle, and gearing for operating the drum also located wholly within the vertical planes of the sides of the boom, substantially as described.

16. In combination with the beams composing the boom, a dipper-handle, means for operating the same and bearings for said means serving to reinforce the boom-beams at the point where the dipper is supported thereon, said bearings extending along the beams to distribute the strain, substantially as described.

17. In combination with the beams composing the boom, a dipper-handle, means for operating the same, and bearings for said means serving to reinforce the boom-beams at the point where the dipper is supported thereon, said bearings extending along the beams to distribute the strain and each consisting of a pair of castings secured to the flanges of the beams, substantially as described.

18. In combination, the two-part boom, a dipper-handle, a drum having connections with the dipper-handle, bearings on the boom for the said drum and a shaft having pinions for driving the drum, the said bearing having an extension with bearings therein for the pinion-shaft, substantially as described.

19. In combination with a boom, a drum composed of a body portion and gears forming the end guides therefor, with means for operating the said gears, substantially as described.

20. In combination with the boom, a hoisting-drum, a sheave at the end of the boom and adjustable bearings for the same to line said sheave up in relation to the hoisting-drum, substantially as described.

21. In combination with the boom, a hoisting-drum, a sheave at the end of the boom and

adjustable bearings for the same to line said sheave up in relation to the hoisting-drum, said means consisting of the adjustable blocks having slots with clamp-bolts passing through
5 the same and an adjusting-screw 49, substantially as described.

22. In combination, the boom, the dipper-handle, a drum with connections to the dipper-handle, and gearing at each end of the

drum for driving the same to avoid torsion, 10 substantially as described.

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

ERASTUS S. BENNETT.

Witnesses:

J. R. SCOTT,

M. L. JUSTIN.