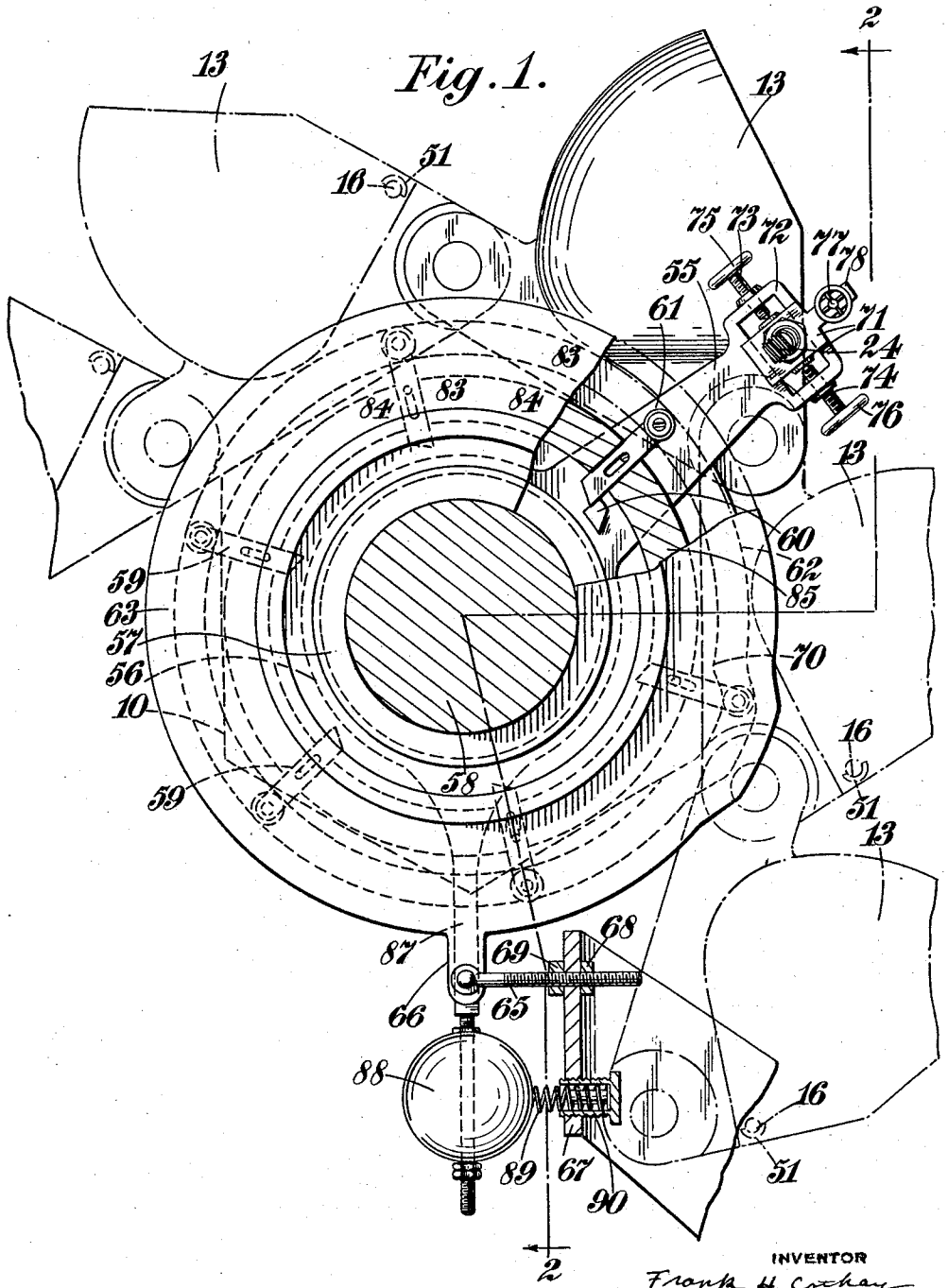
March 24, 1931. F. H. COTHAY 1,797,330

BUCKET AND BUCKET ELEVATOR AND DREDGE

Filed Dec. 3, 1928 2 Sheets-Sheet 1

Fig. 1.



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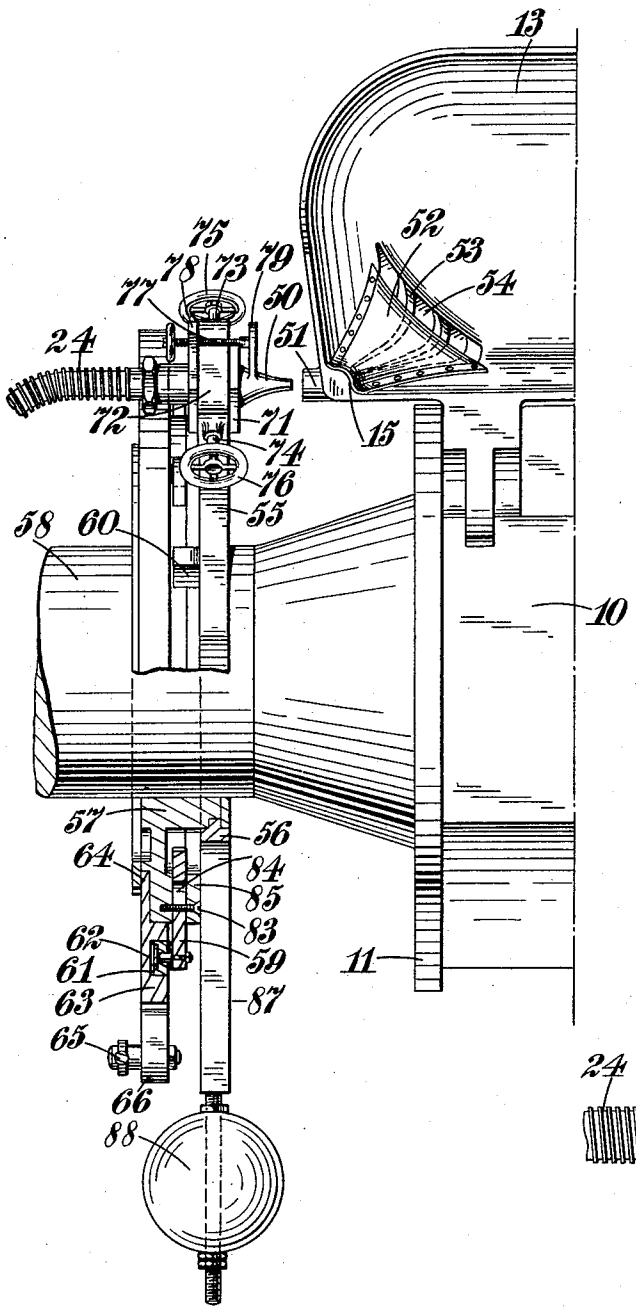


Fig. 2.

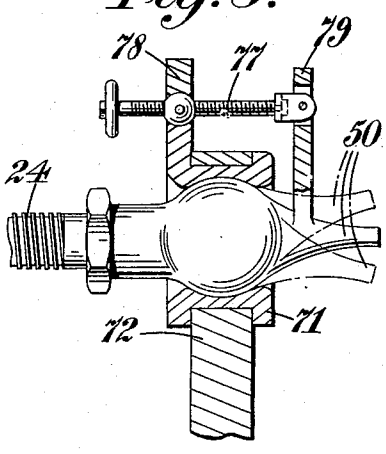


Fig. 3.

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UNITED STATES PATENT OFFICE

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BUCKET AND BUCKET ELEVATOR AND DREDGE

Original application filed June 8, 1927, Serial No. 197,438, and in Germany May 31, 1927. Divided and this application filed December 3, 1928. Serial No. 323,523.

This invention relates to elevators and dredges, one form of which has been described and claimed in our co-pending application Serial No. 197,438, from which the present application has been divided.

It is well known that a bucket which is filled with stiff plastic material which is impervious to air, such as wet clay or like sticky plastic material cannot be easily emptied. For example, in the use of bucket elevators for dredging operations where these have to be employed on clayey material, the buckets of the elevator frequently become filled with clay which refuses to fall out of the buckets when these reach the discharging point of the elevator, with the consequence that as soon as a substantial proportion of the buckets are thus choked, the elevator has to be stopped and all the buckets cleared by hand, which is not only laborious but a serious waste of time. It has been attempted to remove clay from the buckets by means of water-jets at high pressure directed upon the material therein with the object of sluicing them out while they are in motion, but this plan is not wholly successful, as the water-jets tend to merely cut holes in the clay and not to remove the clay from the bucket bodily in the limited time available during the passage of each bucket. In consequence, the usual practice when digging clay is to fill the bucket partially only. It is an object of the invention to provide a construction of bucket elevator or dredge in which the buckets may be filled full and readily discharged by automatic means.

The invention comprises in a bucket elevator or dredge the combination of a chain of buckets, channels in the buckets which are provided with mouths outside the buckets and which channels extend from the mouths to the interior of the buckets near the bottoms thereof, and a nozzle for a water-jet situated at the approach to the point of discharge of the bucket and mounted to move about the axis of the upper tumbler as centre, means to connect the said nozzle operatively with the bucket chain to move in company with each bucket through an arc as the bucket rides over the upper tumbler and thereafter to disconnect the nozzle and return it to its initial position for moving in company with a following bucket in the chain, so that as each bucket arrives at the point of discharge and is inverted, a water jet may be directed from the nozzle into the mouth of the channel of each bucket in the manner hereinafter to be described.

The accompanying drawing illustrates an example of a construction of bucket elevator in accordance with the invention.

In the drawing:—

Figure 1 is a side elevation of the upper tumbler and associated parts of a bucket elevator or dredge; and

Figure 2 is in the upper part a front elevation of the same and in the lower part a cross-section on the line 2—2 of Figure 1.

Figure 3 is a detail of the nozzle and the circumferentially adjustable mounting.

The general parts of an elevator or dredge constructed in accordance with the present invention are of the usual construction, the buckets being mounted upon an endless chain which travels over a tumbler at the upper end. The buckets come up filled; in passing over the tumbler they are inverted and discharged of the material which they contain into a chute, in the usual way.

Referring to Figures 1 and 2, the upper tumbler is marked 10, the sides 11, the buckets 13, and the water-supply 24.

In the present construction the nozzle 50 is, in its normal position, located close to the side of the bucket so that it almost comes into contact with the mouth 16 of the channel 15 in each bucket. The mouth 16 is turned outwardly at the sides of the bucket and is shielded by a cowl 51 to prevent the entrance of dirt or stones when the bucket is moving through the earth. The channel 15 within the bucket is shown in this instance as being formed by a recess cast in the bucket wall which is covered by an iron plate 52 riveted over it. The recess has longitudinal ribs 53 which support the centre of the plate and extend beyond its edge across the opening 54 through which the water enters the bottom of the bucket.

In this construction the nozzle 50 is car-

ried upon the upper end of an arm 55 and the arm 55 projects from a ring 56 which is mounted on a carrier 57 fitting upon the shaft 58 of the upper tumbler so that the bearing for the ring 56 is concentric with the shaft. The ring 56 carries also a counterbalance arm 87 having an adjustable counterweight 88 which serves to return the arm 55 normally to its uppermost position. In order to cushion the parts against shock a stiff coiled spring 89 is located in a casing 90 supported in a fixed bracket 67 which projects from the framework of the dredge. The casing 90 is screw-threaded where it passes through the bracket so that the position of the spring 89 may be adjusted and the position to which the arm 55 is returned may be set according to the requirements of the mechanism.

The carrier 57 has a rim 85 which is slotted at a number of intervals in a radial direction to receive sliding pawls 59. The pawls 59 are movable in the slots towards and from the tumbler-axis and extend beyond the rim 85 both inwardly and outwardly. At their inner ends they form abutments to cooperate with an abutment 60 on the side of the arm 55 which carries the nozzle. At their outer ends they carry operating portions in the form of rollers 61 which work in a cam-groove 62 in a circumferential disengaging cam 63. To facilitate assembly the pawls are held in place in the slots in the rim 85 by means of pins 83 which pass through slots 84 and the pawls.

The disengaging cam 63 is supported in a bearing in the carrier 57 as shown at 64 and it is held from rotation with the carrier by a screw 65 which projects tangentially from a lug 66 on the cam and engages the fixed bracket 67. The screw 65 is adjustable relatively to the bracket 67 by means of nuts 68, 69, and this permits the circumferential position of the cam to be adjusted. The disengaging cam 63 is so shaped that over the greater part of their movement around the tumbler the pawls 59 are held close to the ring 56. In this position, as soon as one of the pawls hits the abutment 60, the arm 55 begins to move with the tumbler and this movement is continued until the pawl is withdrawn by the disengaging cam, which is accomplished when the pawl reaches the raised portion 70 of the cam. Thereupon the abutment 60 being no longer engaged by the pawl, the counterweight 58 returns the arm 55 to its initial position. The number of the pawls 59 is equal to the number of the sides of the upper tumbler, and the relative position of the pawls 59 and the abutments 60 are so chosen that the nozzle 50 will lie opposite to the mouth 16 of the channel 15 in the bucket when the pawl and the abutment are engaged with one another.

In order to ensure accurate centering of the nozzle upon the mouth 16 the nozzle is made adjustable circumferentially by mounting it in a slide 71, which works in a circumferential slot 72 in the end of the arm 55. The position of the slide 71 is determined by two adjustable locating screws 73, 74 provided with hand-wheels 75, 76.

To allow for wear and to facilitate fitting the nozzle 50 is also made adjustable in a radial direction by mounting it in a ball-and socket joint in the slide 71 and providing an adjusting-screw 77 which works in a lug 78 projecting from the slide 71 and engages an arm 79 extending laterally from the nozzle.

It is contemplated that a high pressure water-jet should be used, pressure being of the order of 25 pounds or more per square inch, and that the pressure caused by the introduction of this high pressure water to the underside of the clay in the bucket will be sufficient to dislodge the same and to prevent any tendency to retain the clay matter by suction in the bucket.

While the invention has been described with reference to a bucket dredge it will be evident that the application of the invention is not limited to such dredges but that it may be employed for freeing any buckets which are liable to become clogged from any materials which they may contain. For example, the skips of mechanical shovels, skips mounted upon a crane, or smaller buckets, in whatever connection employed, may all be constructed with water channels and emptied in accordance with the present invention.

I claim:—

1. In a bucket elevator or dredge, the combination of a chain of buckets, a channel in each bucket extending from a mouth which opens in one side wall of the bucket and faces laterally of the bucket chain to the interior of the bucket near the bottom thereof, a nozzle for a water-jet normally situated at the approach to the point of discharge of the bucket and mounted to move in line with the lateral mouth therein about the axis of the upper tumbler as centre, and coupling means to engage the said nozzle with the upper tumbler when in register with a lateral mouth and move it in company with each bucket as the bucket rides over the upper tumbler, and thereafter to disengage the nozzle allowing it to return to its initial position for moving in company with a following bucket.

2. The combination claimed in claim 1 wherein the nozzle is directed toward and located close to the sides of the series of buckets and the mouths of the water-channels lie opposite and close to the nozzles when the latter are in movement in company with the buckets.

3. In a bucket elevator or dredge the combination of a chain of buckets, a channel in each bucket extending from a mouth which opens in one side wall of the bucket and

faces laterally of the bucket chain to the interior of the bucket near the bottom thereof, a nozzle for a water-jet normally situated at the approach, to the point of discharge of the bucket and mounted to move in line with the lateral mouth therein about the axis of the upper tumbler as centre, and coupling means to engage the nozzle with the upper tumbler when the nozzle is in register with a lateral mouth, the said coupling means comprising an abutment connected to the nozzle, a co-acting abutment carried by the upper tumbler, one of the said abutments being movable radially of the tumbler, a disengaging cam for tripping the movable abutment after a predetermined arc of movement and yielding means to return the nozzle to its normal position.

4. The combination claimed in claim 3 wherein the upper tumbler is provided with a rotatable carrier on which a pawl forming the movable abutment is so mounted as to move radially of the upper tumbler, and the said pawl is provided with an engaging portion to co-act with the disengaging cam.

5. The combination claimed in claim 3 wherein the upper tumbler is provided with a rotatable carrier on which a pawl forming the movable abutment is so mounted as to move radially of the upper tumbler, and the said pawl is provided with an engaging portion to co-act with the disengaging cam, which cam is supported loosely on a bearing formed upon the carrier so that the latter is rotatable independently of the cam and the cam is maintained concentric with the carrier.

6. The combination claimed in claim 3 wherein means is provided for adjusting the disengaging cam circumferentially in relation to the upper tumbler.

7. The combination claimed in claim 3, wherein the nozzle is mounted so as to be adjustable circumferentially in relation to the abutments.

8. The combination claimed in claim 3 wherein the nozzle is mounted so as to be adjustable radially relatively to the tumbler.

In testimony whereof I affix my signature.

F. H. COTHAY.