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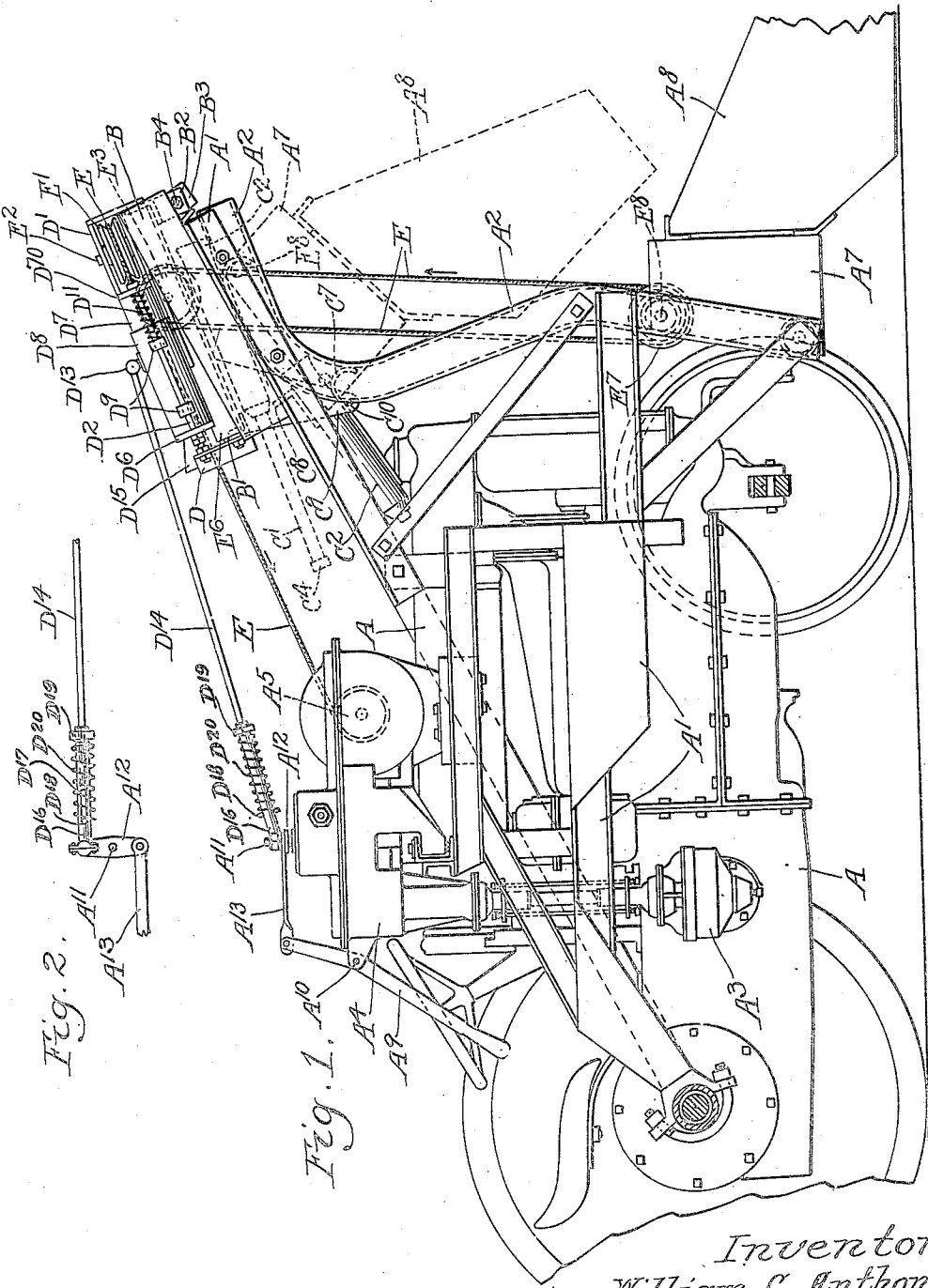
W. C. ANTHONY ET AL

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SHOVEL HEAD

Filed Nov. 6, 1926

3 Sheets-Sheet 1



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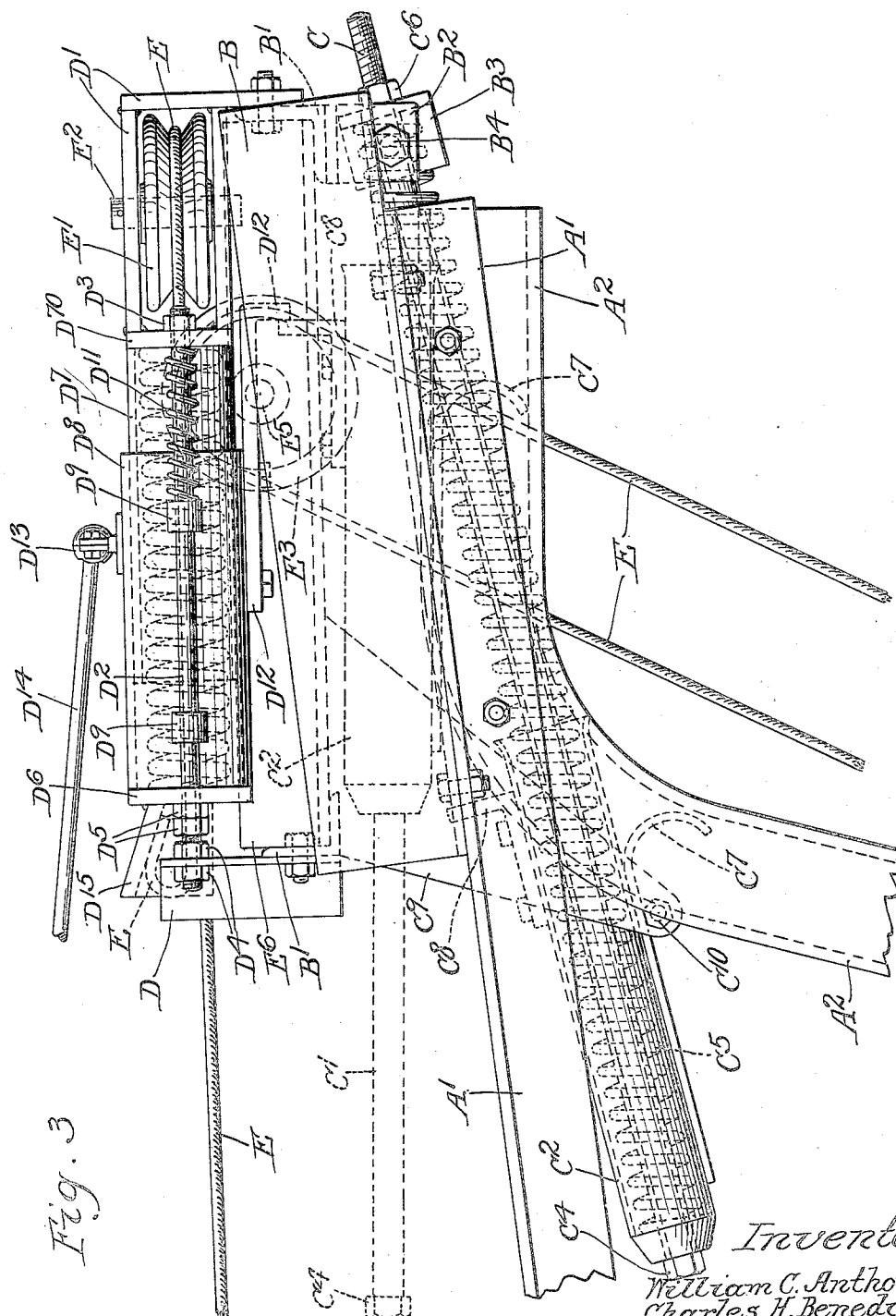
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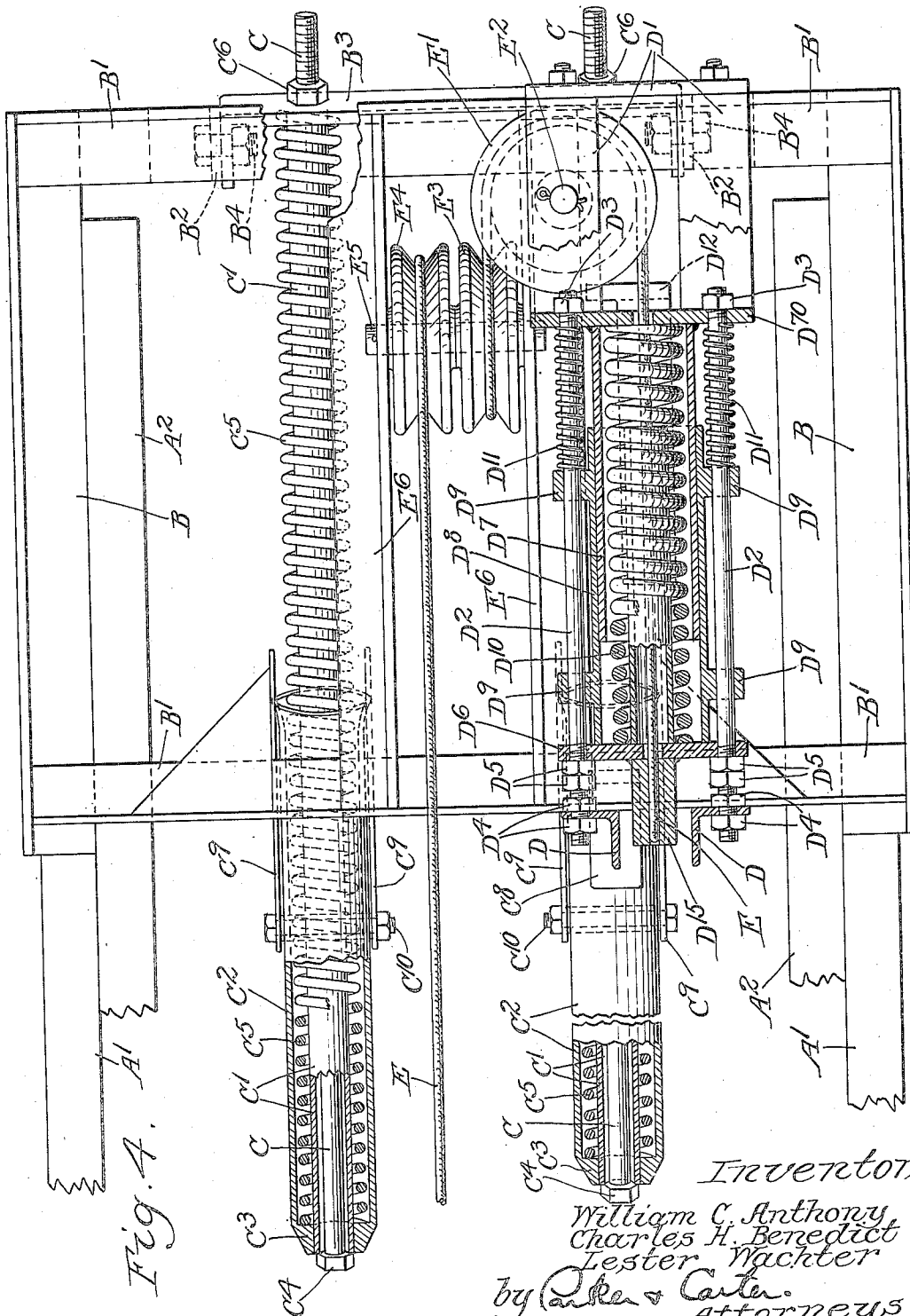
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3 Sheets-Sheet 3



UNITED STATES PATENT OFFICE

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SHOVEL HEAD

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This invention relates to an elevating shovel mechanism and particularly to a head assembly for such shovel. It has for one object to provide means for stopping and cushioning the movement of the bucket as it approaches its upper limit. Another object is to provide positive and simple means for initiating the return movement of the bucket. Another object is to provide means for automatically stopping the bucket as it approaches its upper limit. Another object is to provide automatic means whereby the mechanism is prevented from operation if loaded to excess. Other objects will appear from time to time throughout the specification and claims.

Our invention is illustrated more or less diagrammatically in the accompanying drawings, wherein:

Figure 1 is a side elevation with parts removed and parts in section;

Figure 2 is a detailed plan showing a portion of the operating mechanism;

Figure 3 is a side elevation on an enlarged scale showing the operating head;

Figure 4 is a plan view of Figure 3 with parts in section.

Like parts are indicated by like characters throughout.

The device is mounted on a tractor A upon which is positioned a composite built-up frame A¹. A² is a track carried by the frame A¹. A³ is a power take off whereby power is taken from the tractor. A⁴ is a driving mechanism adapted to drive a winch A⁵ about which a cable E may be wound. This cable operates on a dolly A⁷ which carries a bucket A⁸. A⁹ is a controlling lever adapted to control the driving mechanism. It is pivoted at A¹⁰. A¹¹ is a controlling shaft having mounted on it a lever A¹² and a connecting rod A¹³ is attached to it at one end. This rod is attached at its other end to one end of the member A⁹. The frame and track mechanism and the driving gear may be of many different types. Their particular details form no part of the present invention and are not illustrated in the specification. It is sufficient for the purpose of the present invention that a structure em-

bodying a track along which a bucket is to be moved and driving means for the bucket be provided. In this case the driving means is the power take-off from the engine of the tractor.

B B are side frame members attached one each to the sides of the frames A¹. Attached to these members B and extending laterally across between them are cross brace members B¹ B¹. Extending downwardly from the uppermost member B¹ are ears B² B². Pivottally mounted between these ears is a member B³ provided with a pair of perforations intermediate its ends. It is pivottally supported in the ears B² by means of bolts B⁴.

Within each of the perforations in the member B³ is a bolt C. Surrounding each of such bolts and extending substantially from end to end of it is a sleeve C¹. A tubular housing C² surrounds the bolt and the sleeve, at one end it is provided with an inwardly extending flange or shoulder C³ which normally contacts the sleeve C¹. The parts are held against longitudinal displacement by the member C⁴ of the bolt C. Lying within the tubular member C² and bearing at one end against the flange C³ and at the other against the member B³ are helical springs C⁵. C⁶ is a nut on the bolt C by means of which it may be tightened to increase the compression of the spring. This nut also of course serves to hold the parts against longitudinal separation. Each of the tubular members C² is provided on its under surface with a hook C⁷, and one of them is provided on its upper surface with a contact member C⁸. As here shown such a contact member is provided only on the top of one of the tubular members. It might, however, be provided on both of them. C⁹ C⁹ are pairs of reinforcing plates extending downwardly from the lowermost member B¹. Each pair is joined adjacent its lower end by means of a bolt C¹⁰. These bolts serve to limit the downward movement of the spring and bolt assembly above described.

D D are short upright members fastened to the rearmost member B¹. D¹ is a sheave

housing or enclosing member fastened to the forward member B¹. D² D² are rods or bolts fastened each at one end to the member D¹ and at the other to one of the members D. At their forward ends the rods D² are held in place by nuts D³ D³. At their rearward ends they are held in place by pairs of nuts D⁴ D⁴. Additionally mounted upon them are pairs of locking nuts D⁵ D⁵. D⁶ is a compression plate slidably mounted on the rods D² and held in place by the nuts D⁵. D⁷ is a tubular member lying between the shafts D² and fixed at one end to the generally vertical plate D⁷⁰ of the member D¹. D⁸ is a second tubular member provided with perforated ears D⁹ through which the rods D² pass. This member D⁸ is thus slidably mounted on the shafts D². It is of larger diameter than the tubular member D⁶ and may be axially moved with relation to it. D¹⁰ is a helical spring mounted within the tubular members D⁷ D⁸. D¹¹ D¹¹ are helical springs mounted one each about each of the shafts D² and each of them bears at one end against the plate D⁷⁰ and at the other on one of the ears D⁹. These springs tend normally to hold the tubular member D⁸ in the position shown in full lines in Figure 4. D¹² is a contact member mounted preferably on the bottom of the tubular member D⁸ and it is adapted to be contacted by the contact member C³ as shown in dotted lines in Figure 1 and on a larger scale in Figure 3. D¹³ is an attaching member mounted on the upper part of the tubular member D⁸, and D¹⁴ is a connecting rod fastened at one end to it and at the other end to the member A¹². D¹⁵ is a cable end member to which the end of the cable E is removably attached. The cable E passes through a perforation in the plate D⁶, through the center of the helical spring D¹⁰, through a perforation in the member D⁷⁰ and about the sheave E¹ which is carried on a shaft E² mounted in the member D¹. E³ E⁴ are sheaves mounted upon the shaft E⁵ which is carried between the brace members E⁶ E⁶ about a generally horizontal axis. The cable E having passed about the sheave E¹, passes about the sheave E³, thence downward about the sheave E⁷ which is mounted on the shaft E⁸ in the dolly A⁷, thence backward about the sheave E⁴, and thence backward where it is wound upon the winch A⁵.

Although we have shown an operative device, still it will be obvious that many changes might be made in size, shape and arrangement of parts without departing materially from the spirit of our invention; and we wish, therefore, that our showing be taken as in a sense diagrammatic.

The use and operation of our invention are as follows:

The driving mechanism includes a winch and track mechanism. When it is desired to raise the shovel, the clutch is operated so that the winch is caused to rotate and the cable is drawn in. When it is desired to stop the raising motion the controls are operated so as to disengage the clutch. The controlling parts of the mechanism may be operated either to disengage the brake or to disengage the clutch and permit the bucket to return to position. Automatic means are provided for throwing out the clutch automatically when the bucket has been raised to approximately its upper limit, and additional automatic means are provided for throwing out the hoisting mechanism whenever too great a weight is taken into the bucket. This will now be described.

When the parts are originally assembled, the spring D¹⁰ is given an initial compression, for example, a compression of one thousand pounds. If a weight less than this be carried in the bucket, it will not further compress the spring. If a weight greater than this be taken into the bucket and the hoisting mechanism be put into operation, the spring will be further compressed and will operate an automatic throw out which will be described below.

The automatic throw out mechanism operates as follows: When an excessive weight is taken into the bucket, and an attempt is made to raise it, the spring D¹⁰ as above mentioned will be compressed. This causes the cylindrical member D⁸ which surrounds it to be moved forward in opposition to the springs D¹¹. Since the rod D¹⁴ is fastened to the cylindrical member D⁸, it moves with this member and since its other end is fastened to the controlling mechanism this motion of the cylindrical member D⁸ operates the controlling mechanism and automatically disengages the clutch, and so long as the excessive weight remains in the bucket no manual operation of the control will serve to permit them to raise or attempt to raise the excessive load. The moment the hoisting mechanism is operated to raise this load, the spring D¹⁰ is compressed and the automatic throw out becomes operative.

In the normal operation of the shovel, when a normal load is taken, the spring D¹⁰ will be operated to set the hoisting mechanism into operation and to raise the shovel. As the shovel rises the axle, or some other suitable part of the dolly A⁷, comes into contact with the hooks C³ on the cylindrical members C². These members rotate upwardly about their axes B⁴ in response to further upward movement of the shovel. At this point as the shovel moves upward it also moves forward, carrying the cylindrical members C² with it, thus compressing the springs C⁵. Thus as the bucket approaches its upper limit a constantly greater com-

pression is put on the springs. Just before the bucket reaches its upper limit, the contact member C⁸ on one of the cylindrical members C² strikes the contact member D¹² on the cylindrical member D⁸ and moves it forward in opposition to the springs D¹¹. Since the cylindrical member D⁸ is not fastened to the plate D⁶, it can move forward as described, without in any way affecting or being affected by the spring D¹⁰. This forward movement of the cylindrical member D⁸ operates through the member D¹⁴ to operate the controlling mechanism and automatically to throw out the driving mechanism and to prevent further raising of the shovel. Thus the raising of the shovel is automatically stopped in one case when it has been raised to a sufficient degree, and in the other case when it is excessively loaded.

After the shovel has been raised to approximately the position shown in dotted lines in Figure 1 and has been dumped, it is allowed to return down along the track and this return movement is initiated, accelerated and made certain by the springs C⁵ which are under their greatest compression at the time that the bucket is at its greatest height, and when therefore as soon as they are free to do so, act powerfully to drive the bucket downward.

To permit hand movement of the controls without necessarily operating the automatic control mechanism, one end of the rod D¹⁴ is fitted into a tube D¹⁶ which is provided with slots D¹⁷ through which the ends of a pin D¹⁸ positioned into rod D¹⁴ projects. The tube D¹⁶ is fastened to the lever A¹² to move with it. It is provided at its opposite end with a nut D¹⁹. D²⁰ is a spring positioned about the tube D¹⁶, bearing at one end upon the pins D¹⁸ and at the other end upon the nut D¹⁹. By means of this construction the hand control may be operated in one direction to swing the lever A¹² and its only effect upon the automatic control mechanism will be to compress the spring D²⁰, but this movement will not move the rod D¹⁴.

We claim:

1. In combination with a shovel mechanism, a track, a bucket adapted to move along said track, means for moving the bucket, means for throwing out of operation such bucket moving means, such means including a compressible element mounted on the shovel positioned in the hoisting line and subject to the load such element adapted to operate said throw-out to stop further hoisting movement.
2. In combination with a shovel mechanism, a track, a bucket adapted to move along said track, means for moving the bucket, automatic means for throwing out of operation such bucket moving means, and means for cushioning the final movement of the

bucket and for initiating its return, such throw out means including a compressible element mounted on the shovel positioned in the hoisting line and subject to the load such element adapted to operate said throw-out to stop further hoisting movement.

3. In combination with a shovel mechanism, a track, a bucket adapted to move along said track, means for moving the bucket, automatic means for throwing out of operation such bucket moving means, such means including compressible elements, pivotally mounted on the shovel such elements carrying engaging parts adapted to engage a part of such bucket as it moves along the track whereby the bucket compresses them, such elements, adapted to operate said throw-out to stop further hoisting movement said throw out mechanism being positioned in the hoisting line and subject to the load hoisted.

4. In combination with a shovel mechanism, a track, a bucket adapted to move along said track, means for moving the bucket, automatic means for throwing out of operation such bucket moving means, pivotally mounted on the shovel including elements carrying engaging parts adapted to engage a part of such bucket as it moves along the track whereby the bucket compresses them, such elements adapted as they pivot, due to the movement of the bucket to operate said throw-out to stop further hoisting movement such compressible members adapted when they are free to expand to initiate the return movement of the bucket said throw out mechanism including an additional compressible element adapted yieldingly to resist the throw-out movement.

5. In combination with a material handling apparatus having a receptacle and means for moving such receptacle, a mechanical throw-out mechanism adapted to prevent movement of such moving means and two operating means each adapted to operate such throw-out mechanism one in response to any excessive load put upon such moving mechanism and the other adapted to act in response to movement of such receptacle the final throw out operating member being in each case the same.

6. In combination with a material handling apparatus having a receptacle and means for moving such receptacle, an automatic mechanical throw-out mechanism adapted to prevent movement of such moving means and two mechanical operating means each adapted to operate such throw-out mechanism one in response to any excessive load put upon such moving mechanism and the other adapted to act in response to movement of such receptacle the final throw out operating member being in each case the same.

7. In combination with a material handling

dling apparatus having a receptacle and means for moving such receptacle, a throw-out mechanism adapted to prevent movement of such moving means and two mechanical operating means each adapted to operate such throw-out mechanism one in response to any excessive load put upon such moving mechanism by being taken into such receptacle and the other adapted to act in response to movement of such receptacle the final throw out operating member being in each case the same.

8. In combination with a material handling apparatus having a receptacle and means for moving such receptacle, a single automatic throw-out mechanism adapted to prevent movement of such moving means and two mechanical operating means each adapted to operate such throw-out mechanism one in response to any excessive load put upon moving mechanism by being taken into such receptacle and the other adapted to act in response to the movement of such receptacle beyond a predetermined point the throw out mechanism including a main movable member adapted in each case of throw out operation to be operated similarly.

Signed at Streator, county of La Salle and State of Illinois, this 29th day of October, 1926.

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