

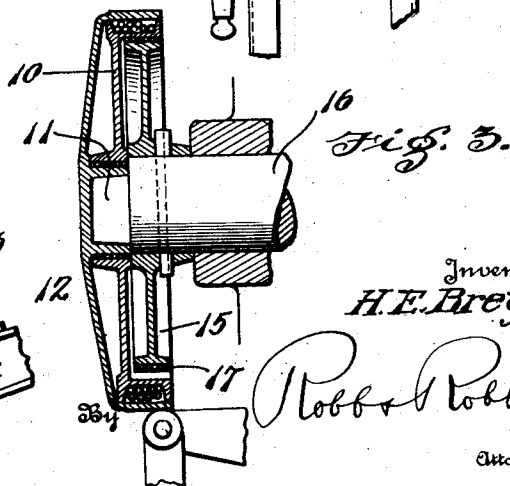
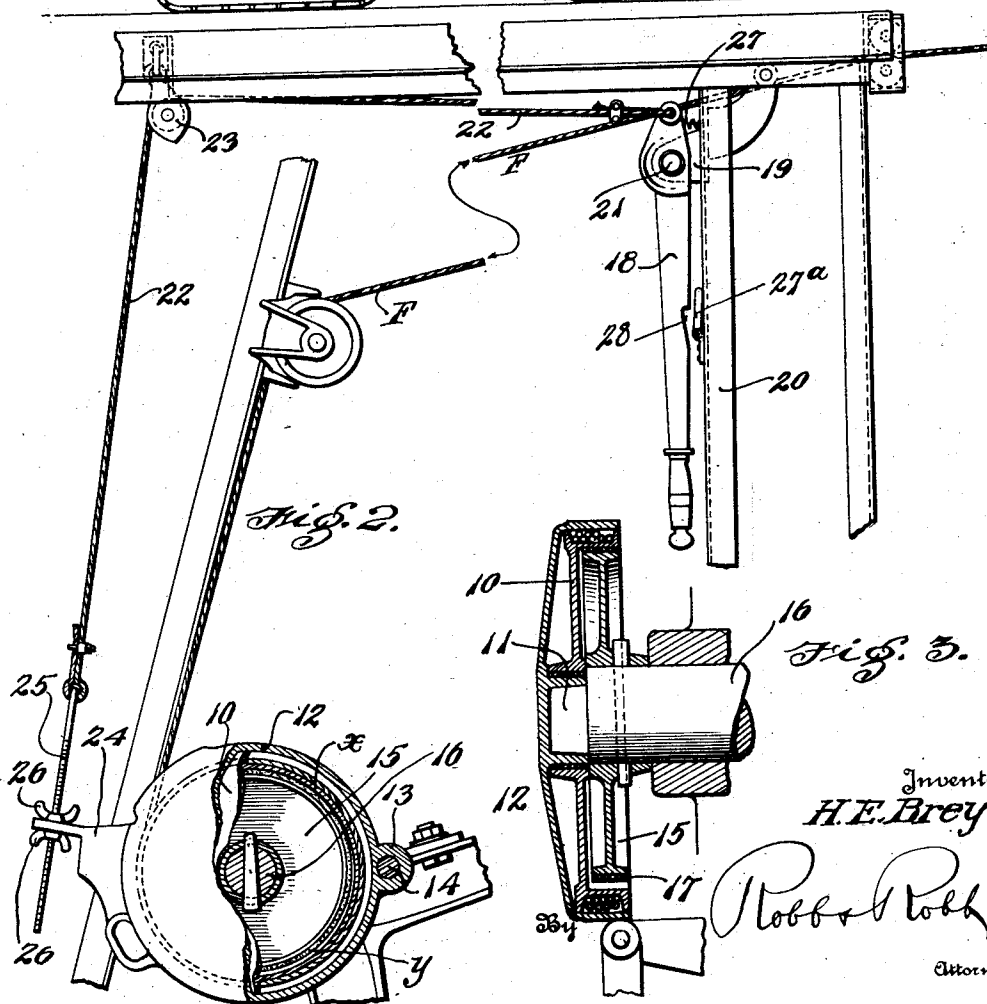
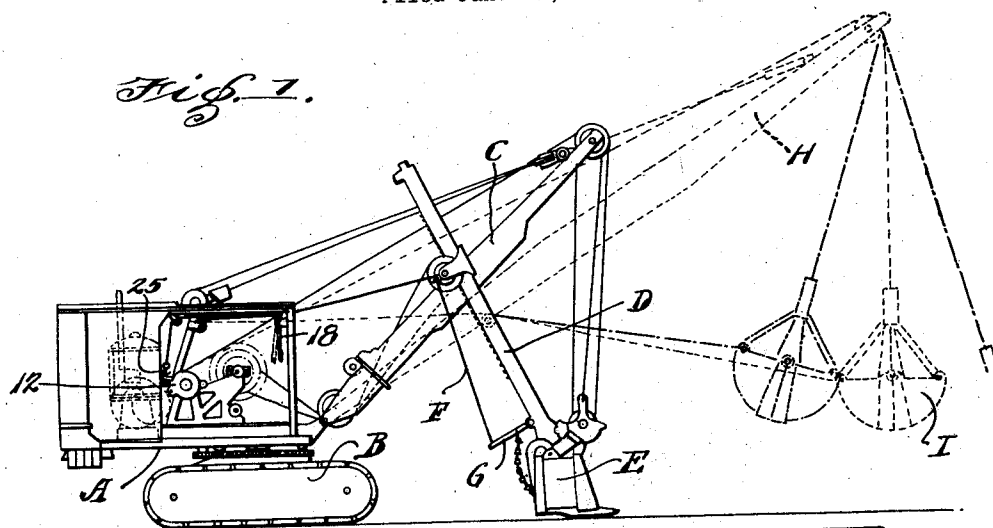
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COMBINED POWER OPERATED DIPPER TRIP AND TAG LINE

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## UNITED STATES PATENT OFFICE

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## COMBINED POWER OPERATED DIPPER TRIP AND TAG LINE

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Convertible apparatus for excavating and handling materials is now commonly in use and capable of performing entirely different lines of work by a simple interchange of attachment units whereby the machine as a whole may function in one instance as an excavator for digging and grading, and in another instance as a crane for materials handling. Such an apparatus, known as Koehring shovel-crane-drag-line, requires only the displacement of the shovel boom, dipper and dipper stick unit, and the application of the crane boom and bucket unit. In connection with the first named unit there is employed a power operated trip line connected to the dipper door, the mechanism cooperating with said line acting to maintain slack take-up tension on the line normally until by manual control positive actuation of the line is produced for tripping the dipper door. Such power dipper trip mechanism is disclosed in my co-pending application Serial Number 128,578, filed August 11, 1926, wherein provision is made for the swing of the trip line drum in one direction for normal slack take-up action, and in the opposite direction for positive tripping operation.

With regard to the second named unit there is required a tag line which is connected to the bucket to prevent twisting and slack take-up action is also normally necessary. The tension which must be exerted on the tag line to take-up slack in this type of apparatus is much in excess of the tension for slack take-up in the dipper trip because of the great weight of the crane bucket and contents. Recognizing this common requirement, however, it is the object of this invention to provide a convertible arrangement whereby the dipper trip line may be caused to function as a tag line, and vice versa.

In carrying out this invention I provide adjusting means for maintaining the required tension on the line in either of the uses to which the machine is adapted, preferably incorporating said means in the connection between the take-up drum and the manual means for effecting dipper trip operation.

Other objects and advantages of the in-

vention will be hereinafter set forth and the novel features thereof defined by the appended claims.

In the accompanying drawings:—

Figure 1 is a side elevation of a convertible apparatus to which this invention is applied, the full lines of the drawing representing the shovel attached unit and the dotted lines representing the crane attachment unit interchangeable with said shovel unit;

Figure 2 is a fragmentary side elevation showing a portion of the frame of the excavating apparatus and the dipper trip line mechanism forming the special subject matter of this invention; and

Figure 3 is a transverse sectional view through the trip line drum, its casing and the driver with which the drum coacts.

Like reference characters designate corresponding parts throughout the several figures of the drawings.

Referring to the drawings, A designates the swing-body of the excavating apparatus which is turnably mounted upon the traction unit B by means of which the apparatus is rendered portable. When this apparatus is to be used as a shovel, a boom C is attached thereto, said boom carrying the dipper stick D and dipper E. This is of conventional construction and needs no further specific description.

In conjunction with this dipper there is employed the conventional trip line F which is connected at one end to the dipper trip lever G by means of which the door latch of the dipper is disengaged for dumping the contents of the dipper. The other end of the line is wound upon the take-up or retrieving drum 10 which is mounted upon the internal hollow boss 11 of the surrounding casing 12. This casing is provided at one side with an apertured lug 13 by means of which it is mounted upon the pivot pin 14 at one side of a constantly rotating disk or driver 15 fixedly secured to the shaft 16 which is suitably driven from the prime mover of the excavating apparatus.

It will be observed by reference to Figure 2 that in this manner the take-up drum 10 is arranged eccentrically with respect to the

driver which latter is provided with friction material 17 on its periphery with which the drum coacts in the operation of the mechanism as hereinafter more specifically set forth.

Normally the drum 10 and its casing 12 have a gravitative action which causes the drum to drop into frictional contact with the driver at a point in the periphery about at  $\alpha$ . Owing to the frictional contact thus produced, slack in the trip line F is rapidly taken up until the casing and the drum are lifted slightly by the winding-in of the trip line. This relieves the frictional contact to a certain degree but maintains a sufficient amount of frictional contact to continuously take up the slack in the line as the dipper is operated in the excavating work.

For the purpose of tripping the dipper latch a manual actuating means is provided in the form of a hand lever 18 which is suspended from the bracket 19 mounted upon the frame 20 at a point convenient to the position of the operator of the apparatus. This lever is pivoted at 21 and has connected thereto above the pivot a flexible cable or line 22 which passes over the sheave 23 and connects with an offstanding aperture extension 24 on the casing 12 which carries the winding drum.

The connection between the line 22 and the extension 24 is preferably in the form of a threaded rod 25 carrying the wing nuts 26—26 which engage at opposite sides of the extension eye. This provides an adjustment means, the purpose of which will be explained hereinafter.

An expansion or cushioning spring 27 is interposed between the upper end of the lever 18 and the adjacent frame piece tending to assist in restoring the lever 18 to its vertical position shown in Figure 2 and to maintain a taut condition of the connecting line 22. The lever 18 by virtue of its arrangement will naturally gravitate to the vertical position and tends to counter-balance the weight of the casing 12 and the drum 10.

In the operation of this device, when it is desired to trip the door latch, the lever 18 is shifted laterally, which as in my previous case initiates winding action of the line on the drum and this winding action itself tends to increase the frictional contact of the drum with the driver about the point  $\gamma$ . Thus the line is self-energized and is rendered effective to produce its latch tripping movement which is positive and quick following the initial manual movement and requires very little exertion on the part of the operator.

When the apparatus is to be used as a crane for materials handling, the boom C with its dipper stick and dipper is displaced and in its stead the crane boom H is attached. The clamshell or orange-peel bucket I is suspended from this boom by the proper threading

of the cables and it only remains to provide the tag line for this bucket to complete the conversion of the machine from one type of apparatus to the other. The line F which formerly acted as the dipper trip line is merely passed through the usual fairlead on the crane boom and connected to the bucket I in the customary manner. In order to provide for the greater tension on the tag line, adjustment is made on the connection between the cable 22 and the casing 12. That is to say, the wing nuts are run upwardly on the rod 25 until the necessary frictional contact of the drum 10 with the driver is produced. Thus the normal action in the use of the apparatus as a crane is produced by contact of the drum with the driver at the point marked  $\gamma$  whereas the normal slack take-up action when the apparatus is used as a shovel is produced by contact at the point  $\alpha$  hereinbefore mentioned. It will be apparent, therefore, that a varying degree of frictional contact may be produced by the adjustment of the connection parts 25 and 26 so that the apparatus as a whole may be readily converted from one type of excavating machines to another type in both of which the line F functions in the dual capacity hereinbefore described.

Instead of making the foregoing adjustment, the lever may be held in its shiftable position by engaging a spring latch 27a with the notch 28 of the lever. A slight movement of the lever only is necessary to effect disengagement of the latch and the change to light slack take-up tension.

The hand lever 18 may be employed to manipulate or swing the bucket, as shown in dotted line position in Figure 1. For example, if it is desired to trip the load at a point near the machine without peaking up the boom, the handle is swung laterally affecting positive actuation of the line to draw the bucket inwardly the desired amount. It will be obvious, furthermore, that by a slighter movement of the handle the drum 12 may be raised just sufficiently to free it entirely of contact with the driver taking all tension off of the winding drum which addition is desirable for certain operations of the excavating apparatus. Manipulating the bucket and swinging the boom simultaneously either with the slight take-up tension or with no tension on the drum will also permit the bucket to be swung outwardly beyond the vertical plane passing through the boom extremity.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:—

1. In means of the class described, the combination of a retrieving drum adapted to receive a dipper trip or tag line, means for actuating said drum so as to normally take up slack in a dipper trip line attached there-

to and for tripping the line for dipper trip action, and supplemental means for adjusting the drum in relation to the actuating means to produce a greater degree of slack take-up action when a tag line is connected to the drum, than when the drum is acting to operate a dipper trip line.

5 2. In convertible apparatus of the type described, a dipper trip line, power means for normally maintaining slack take-up action on said line, manual means for effecting trip action of said line, and means operable through said manual means for rendering the slack take-up action sufficient to permit  
10 the line to act as a tag line.

15 3. In convertible shovel-crane apparatus, a drum operated line, a power operated driver, a drum for said line supported in such relation to the driver as to have frictional contact therewith, and means for varying the  
20 degree of contact to produce slack take-up action and trip action when acting as a dipper trip line, and separate means to effect frictional contact sufficient for tag line work.

25 4. In convertible shovel-crane apparatus, a drum operated line, a power operated driver, a winding drum to which said line is connected and swingingly mounted at one side of the driver, means for supporting said  
30 drum for such frictional contact with the driver as will produce slack take-up and dipper trip actions, and means operable through the last named means for producing tag line action.

35 5. In convertible shovel-crane apparatus, a combined dipper trip and tag line, a power operated driver, a winding drum to which said line is connected and eccentrically mounted in relation to the driver, an actuating connection to said drum including a hand  
40 lever normally sustaining the drum in frictional contact with the driver to effect slack take-up action, and means for adjusting the drum through said actuating connection relative to the driver to produce greater frictional contact of the drum with said driver.

45 In testimony whereof I affix my signature.

HAROLD E. BREY.

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