

Jan. 25, 1938.

A. CARLESIMO
PULL SHOVEL EXCAVATOR
Filed March 10, 1937

2,106,402

3 Sheets-Sheet 1

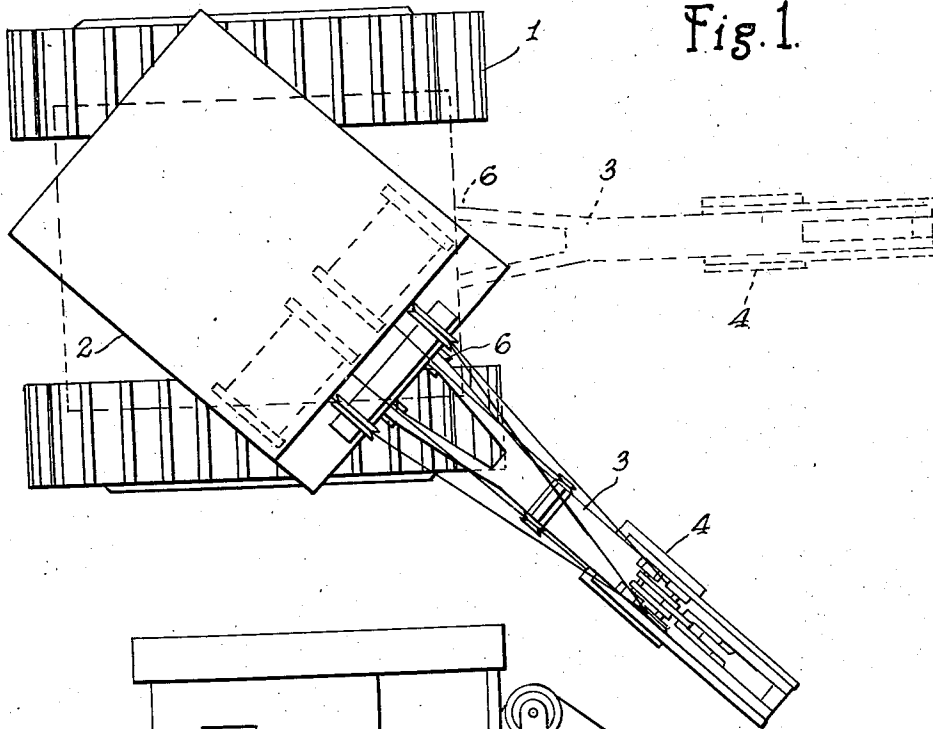


Fig. 1.

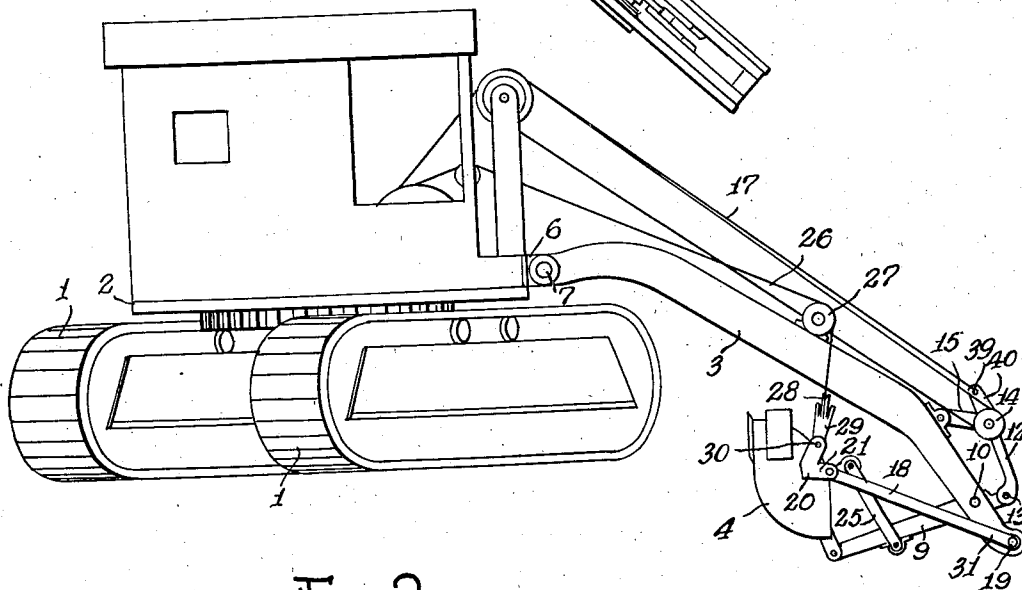


Fig. 2.

BY

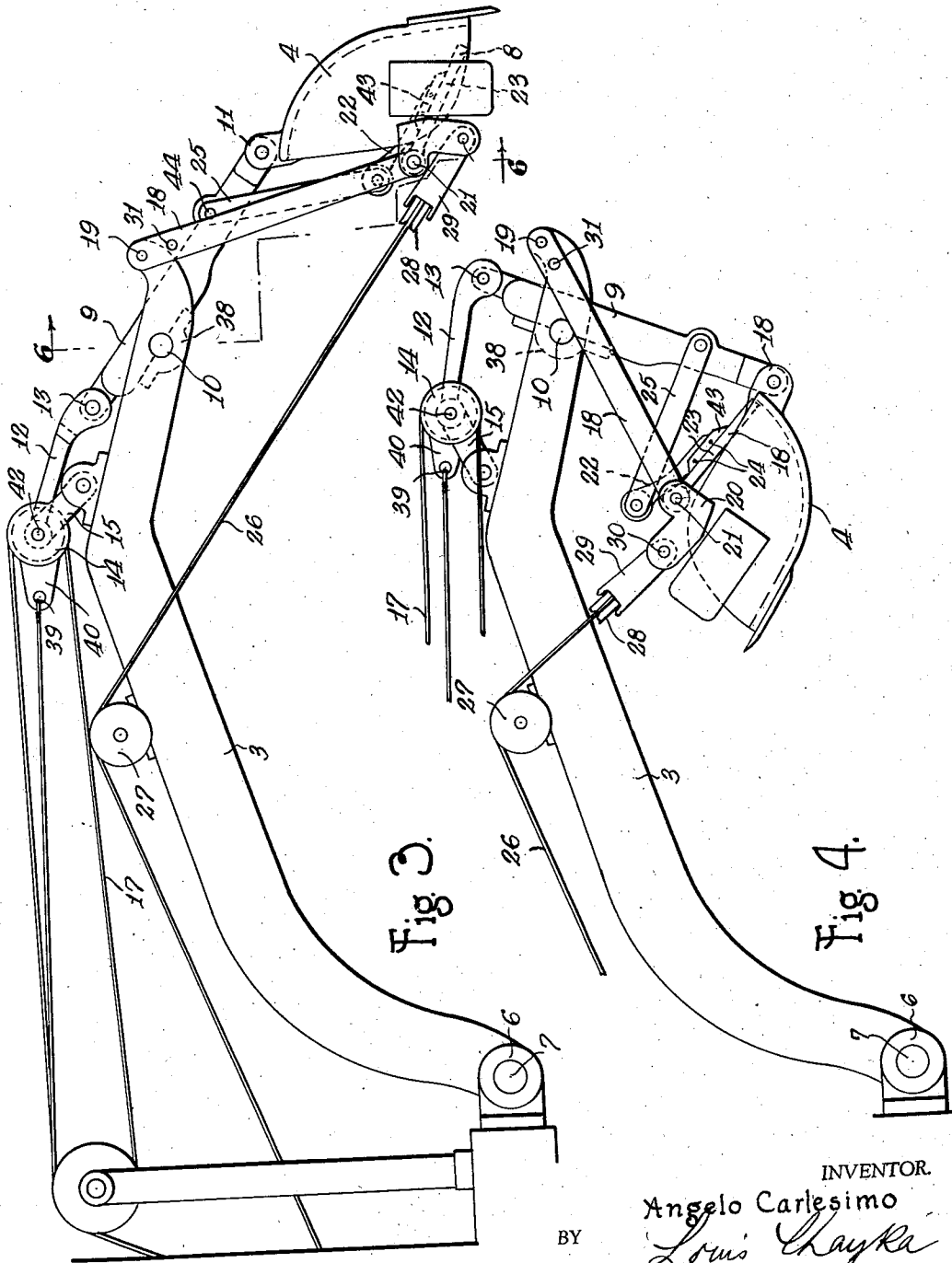
INVENTOR.
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3 Sheets-Sheet 3

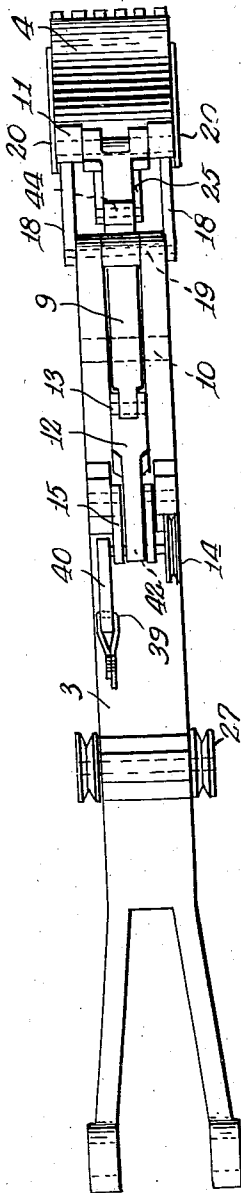


Fig. 5.

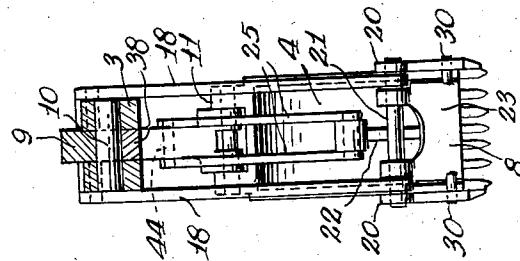


Fig. 6.

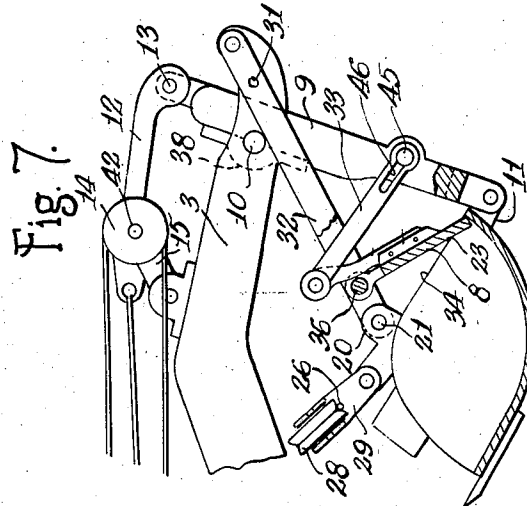


Fig. 7.

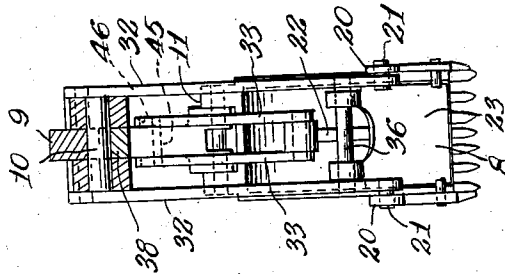


Fig. 8.

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2,106,402

PULL SHOVEL EXCAVATOR

Angelo Carlesimo, Detroit, Mich.

Application March 10, 1937, Serial No. 130,044

4 Claims. (Cl. 214-138)

The improvements in pull shovel excavators invented by me refer to the construction and design of the boom used in such shovels, to the design and construction of the dipper by means of which the material is excavated and transferred, to means of bringing the bucket into a quick dumping position and to novel means incorporated into the bucket of aiding in dumping the material excavated by the bucket.

The advantages of the construction arising out of my innovations are obvious and many and they will be clearly apparent from the detailed description of my improvements, which are illustrated in the accompanying drawings, in which:

Fig. 1 shows a diagrammatic plan view of a shovel consisting of a crawler and rotating base assembly, supporting a boom and a dipper.

Fig. 2 shows the side elevation of the shovel disclosing the design of my boom and the construction of the dipper.

Fig. 3 shows a detailed side elevation of the boom and the dipper, the latter being shown in the dumping position.

Fig. 4 shows the side elevation of the same boom and dipper in a scooping position.

Fig. 5 shows the plan view of the boom, the dipper stick and the dipper.

Fig. 6 is a sectional elevational view taken on line 6-6 of Figure 3 and looking in the direction of the arrows.

Fig. 7 is a side elevation, partly in section, of a modified form of dipper.

Fig. 8 is a view similar to Figure 6 but featuring the disclosure of Fig. 7.

Similar numerals refer to similar parts throughout the several views.

The view shown in Fig. 1 presents a diagrammatic arrangement of the elements of which the pullshovel is built, namely, the crawlers 1, or other means of locomotion, the rotating base 2, the boom 3 and the dipper 4, and the purpose of illustration is to point out the adaptability of the boom to extend over the crawlers into a position where the shovel is capable of digging sideways from the direction of the crawlers. This, the shovel designed by me is enabled to accomplish by reason of the novel design of the boom employed by me. This boom, as will be seen in Fig. 2, does not extend in a straight line from its hinged mounting, as is the conventional practice, but is provided with two inward curves, one at the base, the other at the end, so that the main portion of the body of the boom rises above a straight imaginary line connecting the base hinge of said boom with the end of said boom. Specifically,

boom 3, attached by hinge 6 to its base plate pivotally mounted on the rotating base 2, curves upward beginning at the said hinge from said imaginary line connecting the center pin 7 of the base hinge 6, with the pin 10 located at the other end of the boom, describing an arc substantially of 90 degrees. The main portion of the body of the boom proceeds from the end of the curve in a tangent thereto, so that the lower line of the main body portion of the boom is raised above the aforesaid imaginary line by substantially its own width or more, at its widest point. The mounting of the boom on the rotating base 2 is accomplished in the conventional manner so that the boom is capable of being swung radially from its base in a horizontal or vertical plane, the movement of the boom in its vertical plane being controlled by cable means operated by the power plant on the control platform of the shovel.

The illustration in Fig. 1 shows the boom operatively extending sideways over the end of the crawler, in which position the shovel is adapted to extend its digging operation as far downward as if the boom were extending normally in the position shown in dotted outline in Fig. 1. The boom otherwise is made in a conventional manner out of steel plates or girding, or possibly partly of metal and partly of other suitable material. Its base may be forked, as shown in Fig. 1, and attached by hinges 6 to its base plate on platform 2.

Now I wish to describe the construction and operation of my novel dipper 4. The innovation in my said dipper consists in the manner in which the dipper is supported from the boom, in the manner in which said dipper is operated and also in my having incorporated therein an ejector serving to eject any material contained in said dipper, when the latter has been brought into a dumping position. The dipper, as shown in Fig. 3, is suspended from the boom 3 by means of the dipper stick 9, mounted pivotally in the forked end portion of the boom 3, some distance away from the end of the boom, upon a lateral pin 10. A clamp over said pin 10. At its lower end, the stick 9 is pivotally connected to a hinge 11, mounted on the back plate of the dipper 4. At the upper end, the dipper stick 9 is pivotally joined at 13 to an elongated link 12, said link being pivotally connected at its other end to a member 15, which is hinged to a projection on the top of the boom 3. The pin 42, serving to connect the journalled ends of the link 12 and member 15, serves also as the supporting axle for

the sheave 14. A cable 17, which is dead-ended at 39 by being secured to member 40, the latter in turn being attached to the axle of the sheave 14, loops over the sheave and is actuated and controlled by means of the cable drum on the operating platform of the shovel. A pull exerted from the drum upon the cable 17, is transferred by means of the sheave 14 to link 12, to the upper end of the boom stick 9 above the pin 10, swinging said upper part in the direction of the pull and imparting an outward swing to the lower end of said stick and to the dipper connected thereto. A pair of beams 18, disposed crosswise of the dipper stick 9, is pivotally attached to the forked end of the boom, at a point somewhat forward of the pivoted connection of the boom stick 9, the manner of connection being such that each beam is pivotally suspended from each forked end of the boom 3. At their lower ends, the beams are pivotally attached to hinges 20, one such hinge being formed on each side plate of the dipper substantially as shown. Shaft 21 of the hinge 20 extends transversely across the width of the dipper, connecting both its sidewalls and serves as the axle for the pivotal support of the ejector or scraper 8, serving to remove from the interior of the dipper any material that may be therein, when the dipper has been brought into a dumping position as above stated. The ejector is composed of two parts, one being the handle 22 and the other being a broad plate body 23, provided with two parallel ribs 43 at the back, forming thus a recess into which the lower part of the handle is fitted and in which it is retained by lateral pins 24. The pins 24 are of the variety known as the shearing pins and are intended to break in case of an excessive stress upon the ejector 8. The handle of the ejector is actuated by bar 25, pivotally connected substantially to the middle part of the boom stick 9 at 44. The ejector 8 has the form of a shovel extending transversely in the dipper, substantially across the whole width of said dipper. In operation, it is adapted to swing within the dipper in an arc from the back of the dipper to its front, the lower end of the ejector moving closely to the bottom of said dipper 4.

The digging operation of the shovel, particularly the digging operation of the dipper, is controlled by the cable 26 rolling over sheave 27 mounted on said boom 3 and looping over sheave 28, said sheave being rotatably mounted in member 29, hingedly attached to the front section of the dipper to journaled connections 30. The position of the ejector 8, when the dipper is in a digging and loading operation, is at the back of the dipper, forming the back wall therein so that it in no way interferes with said loading or digging. When the dipper is in such a position, a pull exerted by means of cable 26, through its intervening connecting means upon the body of the dipper, brings the teeth-equipped lip of the dipper into a digging and loading engagement with the material to be worked upon. As a result thereof, the dipper becomes filled with said material. When it is intended that the dipper be brought into a dumping position, this is accomplished by means of cable 17 acting upon sheave 14, link 12 and the dipper stick 9. Under the pull of the cable, the dipper stick 9, which up to this time has assumed a position substantially at right angle to the boom 3, assumes a new position substantially in continuation of the longitudinal axis of the boom. All during the change from the loading position into a dumping position,

while the angle between the boom and the dipper stick widens, beams 18 act upon the front end of the dipper, serving to accelerate the tilt of the dipper into a dumping position when the mouth of said dipper is turned downward, as shown in Fig. 3. It will be noted that the swing of the ejector 8, actuated by bar 25, is relatively small. While the bottom of the dipper, which is actuated by the compound action of the dipper stick 9 and the beams 18, describes an arc, the ejector retains relatively more or less the same position so that with relation to the bottom of the dipper, it is brought to the front part thereof, as shown in Fig. 3, and is made to push out any material that may be therein.

It is possible to accelerate or retard the rate of the swing of the dipper by adjusting the length of the beams 18. This may be done by employing a shorter length of said beams and for that purpose additional bearings 31 or more may be provided. When the load of the dipper has been dumped by having the dipper brought into a dumping position, as shown in Fig. 3, the front of the dipper is again brought into a digging position by means of cable 26 when the ejector 8 recedes towards the back of the dipper actuated by beams 18.

A modification of the dipper is shown in Fig. 7. While the construction is substantially the same, it will be noted that the axle upon which the handle of the ejector is pivoted, is carried in bearings located not on the top of the bucket, as shown in Fig. 4, but on beams 32 corresponding to beams 18 in Fig. 4, and that the ejector is actuated by arm 33. Otherwise the arrangement of parts is similar.

It will be seen that the modification has certain advantages. Since the ejector is pivoted on the movable beams 32, and the angle between the top 34 of the dipper and the beams 32 varies, the blade of the ejector will be able to reach deeper into the bucket when said angle decreases and the bearing 35 is brought closer to said top 34 of the bucket. As a result thereof, the bucket may be built deeper, providing a larger capacity for material.

The swing of the ejector with respect to the dipper in which it is mounted, is gradual. The ejector, positioned first at the back of the dipper, is gradually and steadily changing its relative position with respect to the bottom of the dipper, while the latter is being swung in an arc with respect to the boom into a dumping position. As soon as this swing starts, the ejector begins its pushing and ejecting action. When the material is soft, this may serve to compress such material as is contained in said bucket before it is ejected. Sometimes, however, should it be desired that the ejecting action of the ejector be delayed, it may be accomplished by construction shown in Fig. 7, wherein arm 33 is provided with a slot 46, sliding on pin 45. The arrangement or an equivalent construction will allow some play between the parts, delaying the movement of the ejector with respect to the interior of the dipper. In other words, the arrangement will allow the ejector to remain idle at the beginning of the dumping action but will begin its ejecting movement sometime after the initial swing of the dipper stick and the bucket into a dumping position has started.

In operating the boom, a provision is made that the dipper stick be relieved from the stresses of the cable operating upon the boom, and this is effected by having the sheave 14 attached to the

dipper stick by member 15 hinged at 16 to the boom itself.

Having thus described my invention embracing the aforesaid improvements, what I wish to claim is new and what I wish to protect by Letters Patent is:

1. In a steam shovel employing a boom as a part thereof, in combination a tiltable dipper, a dipper stick provided with a plurality of selective bearings pivotally mounted in said boom, approximately at the end thereof, one end of said stick being pivotally attached to the back end of the dipper, the other end above its pivotal mounting on the boom being connected to means responsive to the pull of a cable, beam means pivotally mounted on said boom forward of the pivotal connection of the stick, the body of said beam means crossing the stick and being pivotally attached at the other end of the upper middle section of the dipper, and cable means to actuate the said dipper and said dipper stick.

2. In a power operated pullshovel of the class described, in combination a boom, the main body portion of said boom being raised above the line connecting the base hinge and the point of said boom, a dipper stick adapted to swing in an arc from the end of said boom, a dipper adapted for digging and loading purposes hingedly suspended on said dipper stick, beam means pivoted on said boom cooperating with said dipper stick to impart to the dipper a tilting motion from a loading into a dumping position, cable means actuating said dipper stick, an ejector within the dipper comprising a pivotally mounted handle portion, and a plate body portion secured to the handle by safety pins adapted to break under excess stress, means connected to said handle and co-acting with said dipper stick to change the position of the ejector in an arc from the back of the dipper when same is in a loading position to the front of the dipper when same is in a dumping position, and cable means to move the dipper from the loading into a dumping position.

3. In a power operated pullshovel of the class

described, in combination a boom, the main body portion of said boom being raised above the line connecting the base hinge and the point of said boom, a dipper stick adapted to swing in an arc from the end of said boom, a dipper adapted for digging and loading purposes hingedly suspended on said dipper stick, beam means pivoted on said boom, cooperating with said dipper stick to impart to the dipper a tilting motion from a loading into a dumping position, cable means actuating said dipper stick, an ejector pivotally mounted comprising transversely disposed means within the interior of said dipper and extending substantially the whole width thereof, bar means to actuate said ejector, said means being slotted at one end and slidably fitting over a pin on the dipper stick, said bar means co-acting with said dipper stick to change the position of the ejector in an arc from the back of the dipper when same is in a loading position to the front of the dipper when same is in a dumping position, and cable means to move the dipper from the loading into a dumping position.

4. In a power operated pullshovel employing a boom as an operative part thereof, in combination a dipper stick adapted to swing in an arc from the end of said boom, a dipper adapted for digging and loading purposes, beam means pivoted on said boom, cooperating with said dipper stick to impart to the dipper a tilting motion from a loading into a dumping position, an ejector comprising a movable plate body transversely disposed in said dipper and a handle to which said plate body is attached by means yielding under excess stress, means pivotally and slottedly mounted on the dipper stick and adapted to impart to the ejector a retarded initial action in its movement from the back of the dipper when same is in a loading position to the front of the dipper when same is in a dumping position, and cable means to move the dipper from the loading into the dumping position.

ANGELO CARLESIMO.