June 7, 1960 J. P. WAITE 2,939,595

DIPPER CLEANING APPARATUS FOR A BACK HOE

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FIG. 1.

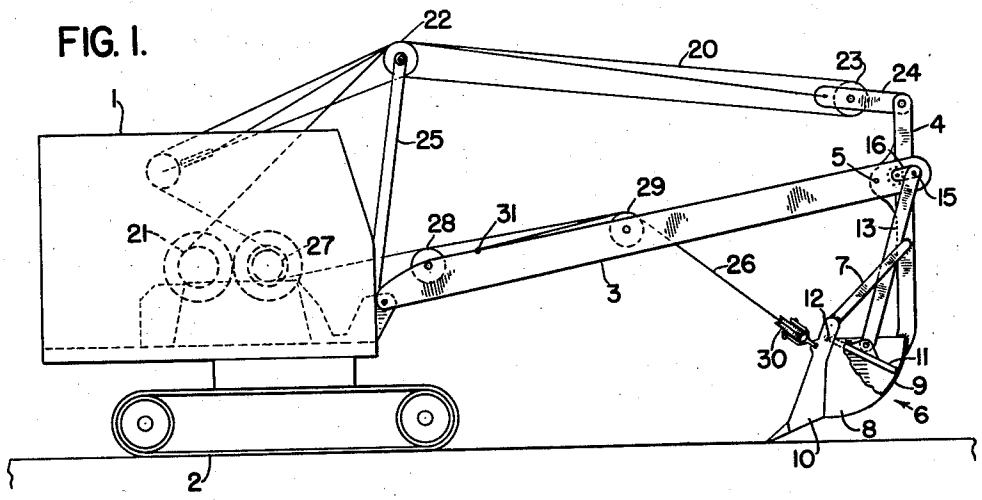


FIG. 2.

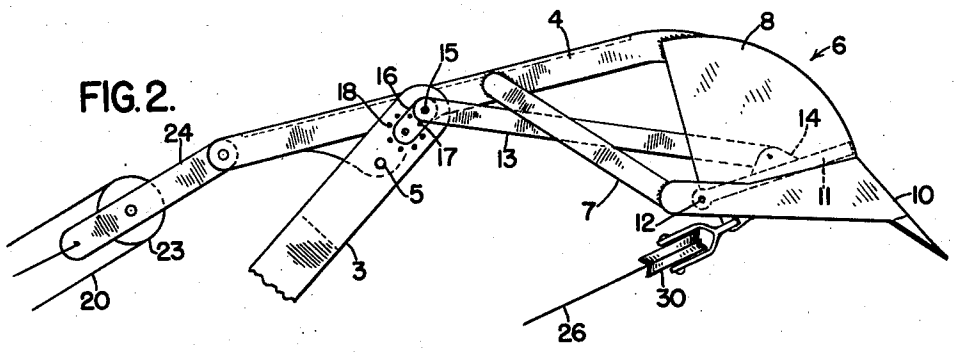
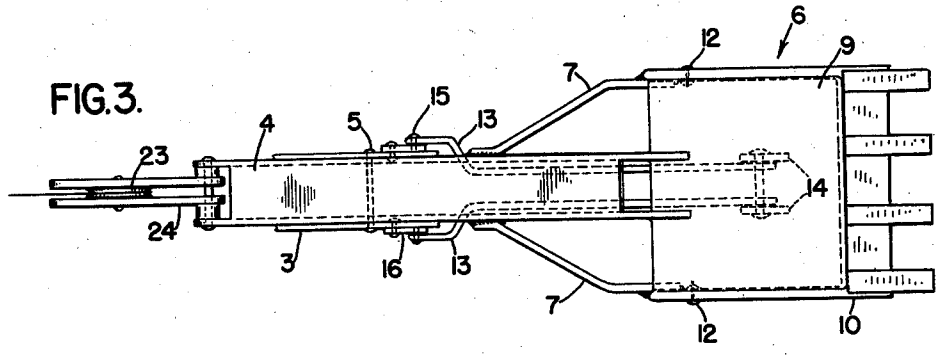


FIG. 3.



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FIG. 4.

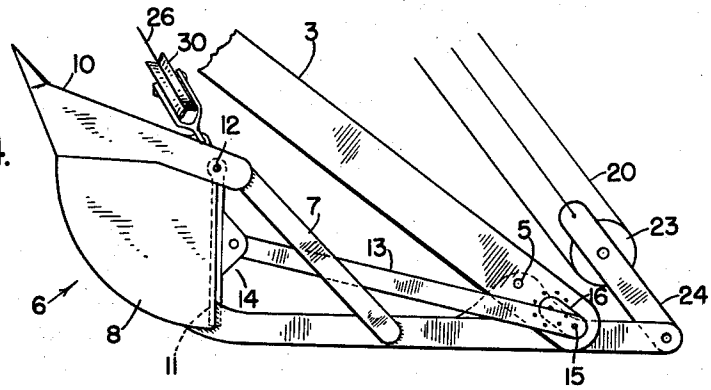


FIG. 5.

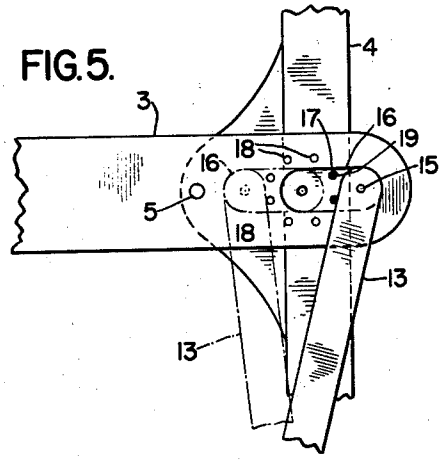
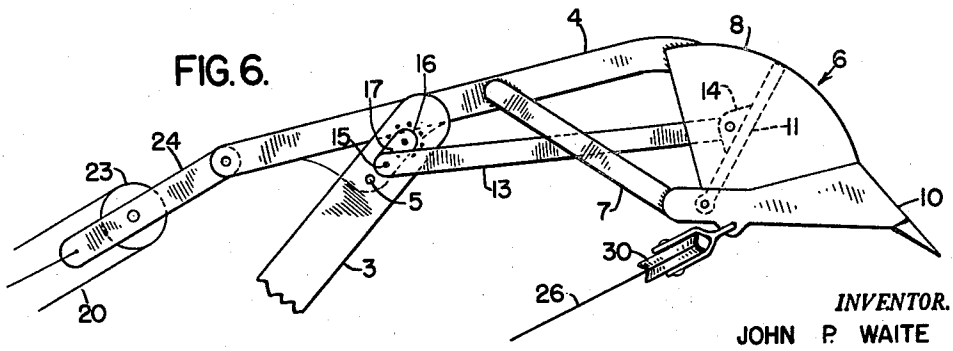


FIG. 6.



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FIG. 7.

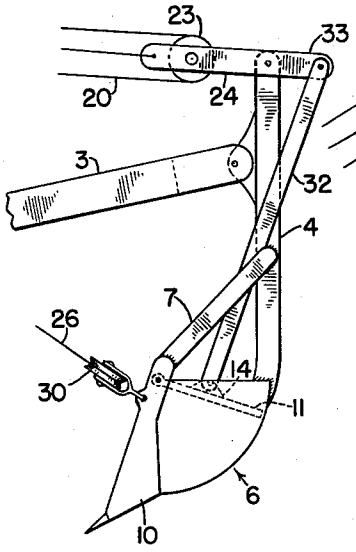
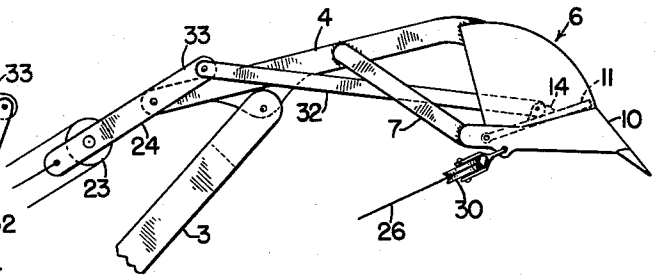


FIG. 8.



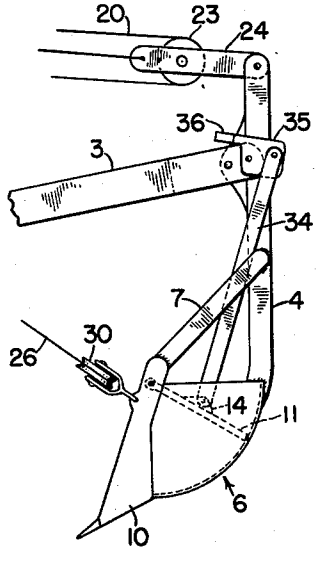
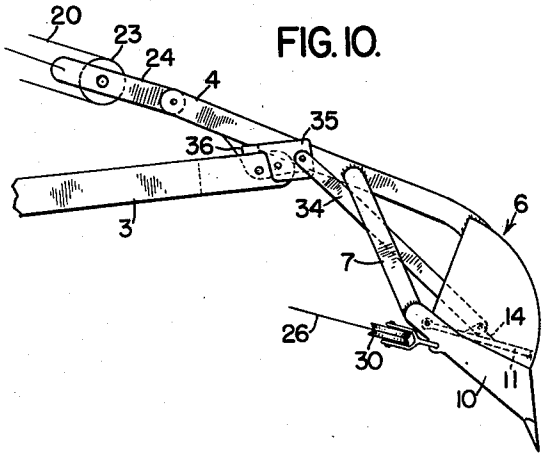


FIG. 9.

FIG. 10.



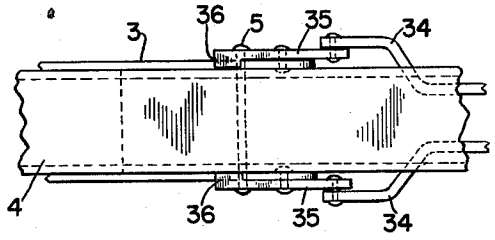


FIG. 11.

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DIPPER CLEANING APPARATUS FOR A BACK HOE

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3 Claims. (Cl. 214—510)

This invention relates to a back hoe and more particularly to a cleaning apparatus for automatically ejecting excavated material from the dipper of the hoe.

Difficulty sometimes arises during excavating in ejecting or cleaning the excavated material from the dipper. The excavated material occasionally sticks in the dipper and as the dipper of the back hoe cannot be shaken to any great extent to eject this material, the removal of the material is frequently a manual task.

It has been proposed in the past to clean the dipper of excavated material by a positively operated cleaner which is actuated by the operator of a machine. However, a cleaning device of this type is not only costly and a source of maintenance troubles and repair, but it increases the excavating time due to the additional operation which is required to be performed by the operator.

The present invention is directed to a simple and inexpensive apparatus for automatically ejecting the excavated material from the dipper of a back hoe as the dipper is raised to a dumping position.

More specifically, the dipper is fixedly connected to the dipper stick which is pivoted to the boom at a position spaced inwardly from the end of the boom. A cleaning plate is hinged to the upper forward portion of the dipper and is adapted to pivot through the dipper to eject material therefrom. To actuate the cleaning plate, means is provided for pivotally interconnecting the cleaning plate and a pivot member, such as the boom, which is adapted to pivot with respect to the dipper stick. With this construction the cleaning plate is pivoted through the dipper by relative pivotal movement between the dipper stick and the pivot member to eject excavated material from the dipper as the dipper is raised to the dumping position.

The present cleaning device for the dipper is automatically actuated by relative pivotal movement between the pivot member and dipper stick so that the cleaner is in the rear portion of the dipper during the digging operation and pivots through the dipper to the forward portion thereof as the dipper is moved to a dumping position. No separate controls are required to set the cleaner in operation.

The cleaning device of the present invention is of a simple construction that can be readily adapted to standard back hoes without alteration of the construction of the hoe.

The present invention also provides a positive dipper action and the cleaning device is readily adjustable so that the pivotal movement of the cleaning plate can be conveniently varied for different digging conditions.

The drawings illustrate the best mode presently contemplated of carrying out the present invention.

Figure 1 is a diagrammatic side elevation of a back hoe embodying the present invention;

Fig. 2 is an enlarged fragmentary side elevation of the digging apparatus with the dipper shown in the dumping position;

Fig. 3 is a top plan view of the apparatus of Fig. 2;

Fig. 4 is a view similar to that of Fig. 2 with the dipper shown in the forward digging position;

Fig. 5 is an enlarged fragmentary side elevation of the position of attachment of the dipper stick and the boom and showing the means for adjusting the pivotal movement of the cleaning member;

Fig. 6 is a view similar to Fig. 2 with the cleaning member making a limited pivotal movement within the dipper;

Fig. 7 is an enlarged fragmentary side elevation of a modified form of the invention with the dipper in a digging position;

Fig. 8 is a view similar to Fig. 7 with the dipper in a dumping position;

Fig. 9 is an enlarged fragmentary side elevation of a second modified form of the invention with the dipper in a digging position;

Fig. 10 is a view similar to Fig. 9 with the dipper in a dumping position; and

Fig. 11 is a top plan view of the structure of Fig.10.

The drawings illustrate a back hoe or drag shovel comprising a cab 1 which houses the drive mechanism and is rotatable on crawlers or treads 2.

A boom 3 is pivotally connected to the forward portion of the cab 1 and a dipper stick 4 is pivoted to the boom adjacent the outer end thereof. The position of pivotal attachment of dipper stick 4 to boom 3 is spaced from the outer end of the boom and is indicated by 5.

The lower end of the dipper stick 4 is secured to the upper rear edge of a dipper 6 and a pair of pitch braces 7 interconnect the forward upper edge of the dipper and the central portion of dipper stick 4. The dipper stick 4, dipper 6 and pitch braces 7 are secured together in a fixed relation to positively position the dipper with respect to the dipper stick.

The dipper 6 is of conventional construction and includes a pair of side plates 8 which are connected together by the generally curved bottom 9. The lower edge of the forward open end of the dipper is provided with a lip 10 which carries a plurality of teeth which are adapted to penetrate the material to be excavated.

To automatically eject the excavated material from the dipper as the dipper is raised to a dumping position, a cleaning plate 11 is pivotally attached to pins 12 which extend inwardly from the side plates 8 adjacent the upper forward edge of the dipper. The cleaning plate 11 is adapted to pivot within the dipper during relative pivotal movement between the dipper stick and the boom to automatically eject the excavated material from the dipper.

The cleaning plate 11 is pivoted within the dipper by means of a pair of rods 13. The lower ends of the rods 13 are pivotally connected to lugs 14 which are secured to the cleaning plate 11. The upper end of each rod 13 is pivotally secured, as at 15, to a cam plate 16 which is rotatably secured to the outer end portion of the boom. The position of pivotal attachment of cam plate 16 to rod 13, indicated by 15, is located outwardly of the position of pivotal attachment 5 of dipper stick 4 to boom 3.

The degree of pivotal movement of the cleaning plate 11 within the dipper 5 is varied by changing the distance between the pivotal connections 5 and 15. This is accomplished by providing a pair of openings 17 in cam plate 16 which are adapted to register with two of a circular series of openings 18 formed in boom 3. By bringing openings 17 into registry with any two adjacent openings 18 the effective position of pivotal attachment of rods 13 to boom 3 can be conveniently varied and this in turn will control the degree of pivotal movement of the cleaning plate 11 within the dipper. The cam plates 16 are locked in position with respect to boom 3 by pins 19 which are inserted within the aligned openings 17 and

18. If the openings 17 are secured in registry with a pair of openings 18 located toward the outer end of boom 3, as shown in Figs. 1–5, the distance between pivotal connections 5 and 15 will be at a maximum and the pivotal movement of the cleaning plate will also be at a maximum. However, if the openings 17 are secured in registry with a pair of openings 18 disposed toward the inner end of the boom, the degree of pivotal movement of cleaning plate 11 will be at a minimum. This is shown in Fig. 6. With this construction the action of the cleaning plate can be readily controlled depending on the digging conditions that are encountered and the need for cleaning action for that particular operation.

The boom 3 is raised and lowered by a conventional sheaving arrangement in which a cable 20, which is secured to cable drum 21, passes over sheaves 22 and 23 and is dead-ended on arms 24 which are pivotally attached to the upper end of dipper stick 4 and support sheave 23. Sheave 22 is rotatably secured to braces 25 which extend upwardly from cab 1. By retrieving cable 20, sheave 23 is moved toward sheave 22 thereby pivoting boom 3 upwardly about the forward portion of the cab, while letting out cable 20 will serve to pivot boom 3 downwardly.

The dipper 6 is pivoted about the boom by a cable 26 which is secured to cable drum 27. Cable 26 passes over sheaves 28 and 29, which are secured to boom 3, and sheave 30 which is secured to the forward edge of the dipper. The cable 26 is dead-ended on the boom as indicated by 31. With this sheaving arrangement the dipper is drawn inwardly toward the boom as the cable 26 is retrieved and moves away from the boom as the cable 26 is let out.

In operation of the present invention, the cleaner plate 11 is disposed in the upper portion of the dipper when the dipper is in the excavating position, as shown in Figs. 1 and 4. In this position the cleaning plate 11 will not interfere with the excavating and serves the added purpose of providing a back plate for the dipper which prevents the excavated material from passing through the dipper. As the boom is raised and the dipper is pivoted outwardly to a dumping position, the dipper cleaner pivots through the dipper to the forward portion of the same, as shown in Fig. 2. This action of the cleaner plate 11 forces the excavated material from the dipper and insures that the dipper is clean when the dipper and boom are again lowered for a second digging operation.

The present invention provides a simple and inexpensive method of cleaning the dipper of excavated material. The dipper plate 11 and connecting rods 13 can be readily adapted to conventional back hoe constructions without alteration of the braces or other parts of the apparatus.

The cleaning plate 11 is actuated automatically by the relative pivotal movement between the boom and the dipper stick. No outside or separate controls are necessary in order to actuate the cleaning plate. This automatic operation of the cleaner results in an overall time-saving in the digging operation for the operator is not required to perform the additional operation of separately actuating a cleaning mechanism.

The dipper 6 is fixedly connected to the dipper stick 4 so that a positive and controlled dipper action can be had during the digging operation.

The present dipper cleaner is provided with an adjustable stroke so that the degree of pivotal movement of the cleaner within the dipper can be readily varied to meet different digging conditions. This feature enables the operator to minimize the cleaning action of the plate 11 by the proper adjustment of the rods 13 to the boom 3 and thereby maintain the cleaner 11 toward the rear portion of the dipper at the dumping position if desired.

Figs. 7 and 8 illustrate a modified form of the invention in which a pair of rods 32, corresponding generally to rods 13 of the first embodiment, are connected between lugs 14 on cleaning plate 11 and a pair of extension members 33 which extend outwardly from arms 24. This construction functions similarly to that shown in the first embodiment with the cleaning plate 11 being adapted to pivot through the dipper in accordance with relative pivotal movement between the arms 24 and dipper stick 4. As shown in Fig. 7 the cleaning plate 11 is located toward the rear portion of the dipper during the digging stroke, and as the dipper is swung upwardly to the dumping position, as shown in Fig. 8, the arms 24 are pivoted relative to dipper stick 4 and this pivotal movement actuates rods 32 to pivot the cleaning member through the dipper to eject the excavated material therefrom.

A second modified form of the invention is shown in Figs. 9, 10 and 11. In this embodiment a pair of connecting rods 34, corresponding generally to rods 13 of the first embodiment, pivotally interconnect the lugs 14 on cleaning plate 11 and the ends of a pair of arms 35. The arms 35 are fulcrumed to the outer end portions of the boom 3 and the inner end of each of the arms is provided with a pad 36 which extends laterally of the respective arms and is adapted to engage the upper surface of the boom. With this construction, the cleaning plate 11 is freely movable within the dipper when the dipper is in the digging position and as the dipper digs into the material to be excavated, the cleaning plate is forced toward the rear of the dipper. However, as the dipper is swung upwardly and outwardly arms 35 will be pivoted and the pads 36 will engage the boom 3.

As shown in Fig. 9, the pads 36 are approaching engagement with the upper edges of boom 3 and farther upward and outward movement of the dipper will result in the engagement of the pads and the boom. Once the pads 36 are in contact with the boom, the cleaning plate 11 will then be pivoted within the dipper as the dipper is swung to the dumping position, as shown in Fig. 10, to eject the excavated material.

The structure shown in Figs. 9, 10 and 11 provides a means of ejecting the excavated material from the dipper in which the cleaning plate is not actuated until the dipper has been swung to a predetermined position. When the dipper reaches this position, the cleaning plate is then pivoted within the dipper to eject the material.

Various modes of carrying out the invention are contemplated as within the scope of the following claims particularly pointing out and distinctly claiming the subject matter which is regarded as the invention.

I claim:

1. In a power operated back hoe, a boom, a dipper having side walls and a bottom and an open forward end to receive the material to be excavated, a dipper stick fixedly secured to the dipper and pivotally connected to the boom at a position spaced from the outer end of the boom, a brace member secured between the forward portion of the dipper and the dipper stick to positively position the dipper with respect to the dipper stick, a cleaning member disposed within the dipper and hingedly connected between the upper portion of the side walls of the dipper adjacent the open forward end of the dipper, a cam plate rotatably secured to the outer end portion of the boom at a position disposed outwardly of the position of pivotal attachment of the dipper stick and the boom, a connecting member having one end thereof pivotally secured to the central portion of said cleaning member and having the other end thereof pivotally secured to said cam plate, means to lock said cam plate to the boom at selective positions on the boom to change the position of pivotal attachment of said connecting member and said cam plate with respect to the pivotal connection of said boom and said dipper stick, and means for pivoting the dipper stick with respect to the boom to thereby pivot

said cleaning member through the dipper as the dipper is raised to a dumping position to eject the excavated material from the dipper.

2. In a power operated back hoe, a boom member, a dipper having side walls and a bottom and an open forward end to receive the material to be excavated, a dipper stick fixedly secured to the dipper and pivotally connected to the outer end of the boom member, a dipper cleaner disposed within the dipper and pivotally connected between the upper portion of the side walls of the dipper, a connecting member having one end thereof pivotally secured to the dipper cleaner, a cam plate pivotally secured to the boom member and pivotally secured to said connecting member at a location spaced from the pivotal connection to said boom member, means to lock said cam plate against pivotal movement with respect to one of said members whereby the position of pivotal attachment of said cam plate to said boom member can be varied with respect to the pivotal attachment of said cam member to said connecting member to thereby adjust the pivotal movement of said dipper cleaner within the dipper, and means for pivoting the dipper stick with respect to the boom member to thereby pivot said dipper cleaner through the dipper as the dipper is raised to a dumping position to eject the excavated material from the dipper.

3. In a power operated back hoe, a boom member, a dipper having side walls and a bottom and an open forward end to receive the material to be excavated, a dipper

stick fixedly connected to the dipper and pivotally connected to the outer end portion of the boom, a cleaning member disposed within the dipper and pivotally connected between the upper portion of the side walls, connecting means having one end pivotally connected to one of said members, a cam plate pivotally secured to the other end of the connecting means and said cam plate rotatably secured to the other of said members, means to lock said cam plate to said other of said members at selected positions thereon to thereby change the position of pivotal attachment of said connecting means to the other of said members to thereby adjust the degree of pivotal movement of the cleaning member within said dipper, and means for pivoting the dipper stick with respect to the boom member to thereby pivot said cleaning members through the dipper as the dipper is raised to a dumping position to eject the excavated material from the dipper.

References Cited in the file of this patent

UNITED STATES PATENTS

2,106,402	Carlesimo	Jan. 25, 1938

FOREIGN PATENTS

145,157	Australia	Feb. 13, 1952
442,961	Great Britain	Feb. 19, 1936
482,341	Great Britain	Mar. 24, 1938
999,016	France	Jan. 25, 1952