April 23, 1929. F. ARCHIBALD 1,710,564

MECHANICAL SHOVEL

Original Filed Nov. 22, 1926 2 Sheets-Sheet 1

FIG. 1.

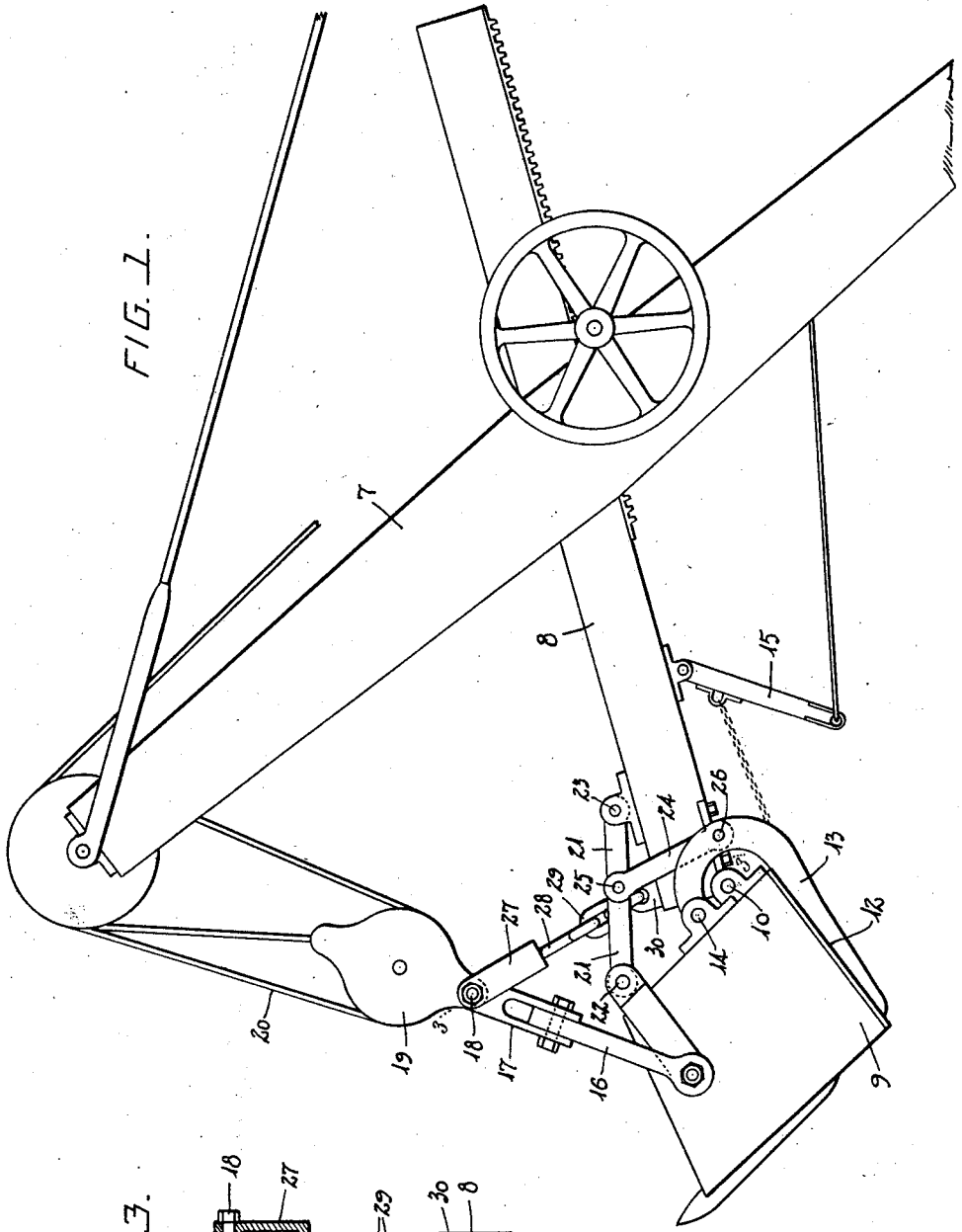
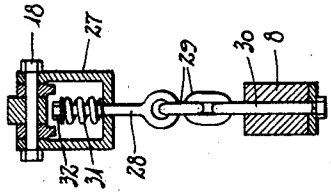


FIG. 3.



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Original Filed Nov. 22, 1926 2 Sheets-Sheet 2

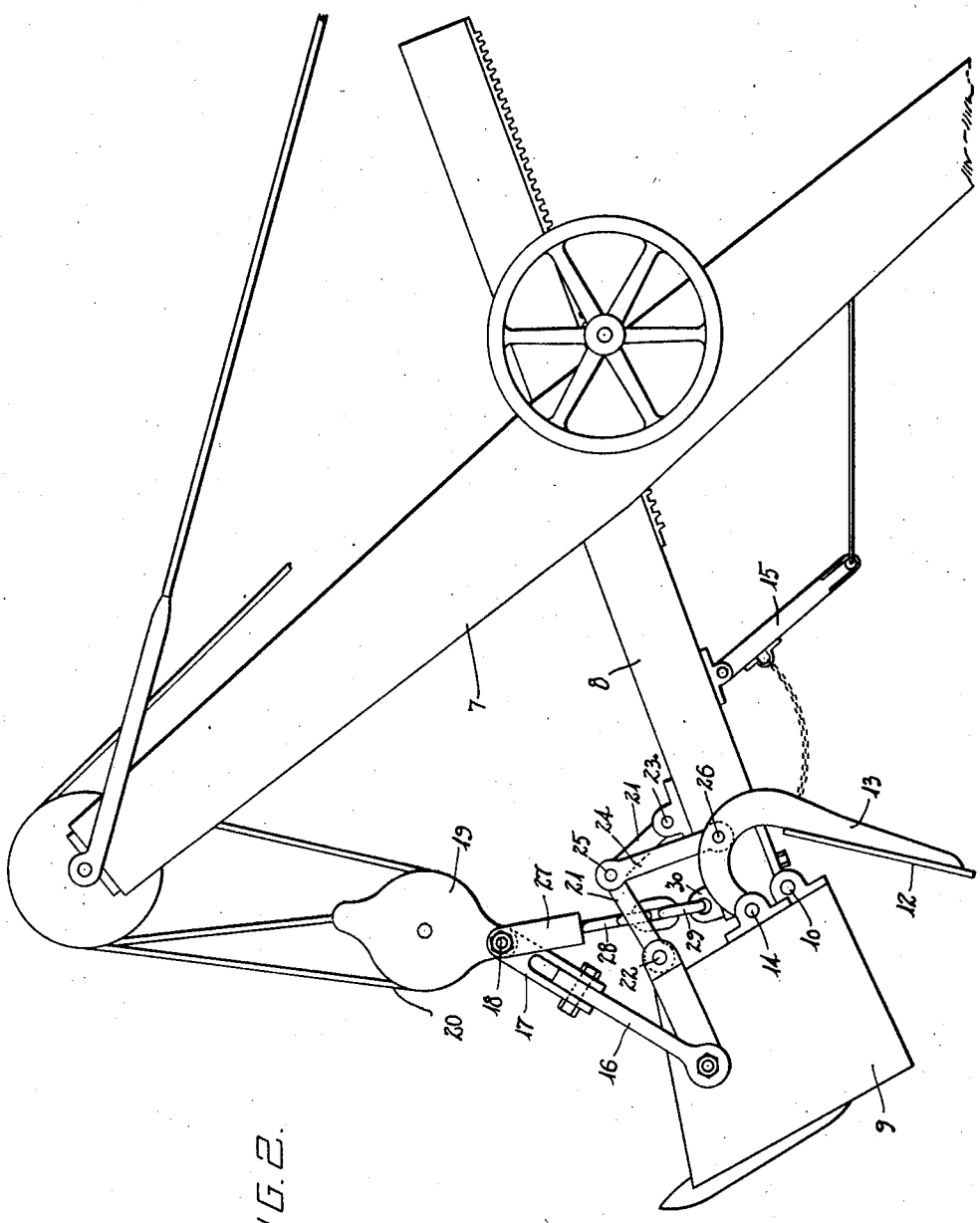


FIG. 2.

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UNITED STATES PATENT OFFICE.

FREDERICK ARCHIBALD, OF WILMINGTON, ILLINOIS.

MECHANICAL SHOVEL.

Application filed November 22, 1926, Serial No. 150,113. Renewed March 14, 1929.

The present invention relates to steam and electric shovels, such as include a dipper on the end of a dipper stick operated mechanically for scooping up the dirt, said dipper having a rear door adapted to be opened for dumping the material into a car or other receptacle.

One object of the invention is to provide novel bracing means between the dipper and dipper stick for maintaining the dipper in a predetermined position relatively to the stick during the scooping operation, and for tilting the dipper relatively to the stick during the dumping operations, so as to facilitate the scooping and dumping operations.

Another object is to provide means for limiting the tilting movement of the dipper relatively to the stick during the dumping operation.

With the foregoing and other objects in view, which will be apparent as the description proceeds, the invention resides in the construction and arrangement of parts, as hereinafter described and claimed, it being understood that changes can be made within the scope of what is claimed, without departing from the spirit of the invention.

The invention is illustrated in the accompanying drawings, wherein—

Figure 1 is a side elevation of the improved shovel construction showing the dipper door closed.

Fig. 2 is a corresponding side elevation showing the dipper door swung open.

Fig. 3 is a sectional detail on the line 3—3 of Fig. 1.

The improvements are illustrated as being applied to a steam or electric shovel of conventional form, and including the boom 7 through which the dipper stick 8 is movable, being projected downwardly and retracted by suitable means (not shown), and the dipper 9 is hingedly connected, as at 10, to the forward or lower end of the stick 8. The dipper 8 has a rear door 12 carried by arms 13 hingedly connected to the dipper 9, as at 14, near the hinge 10, so that the door may swing downwardly and rearwardly when released, the usual latch (not shown) being provided for holding said door closed, and the door being unlatched as usual by the unlatching device 15, as well known. A bail 16 connected with the sides of the dipper is connected by a clevis 17 with a pivot bolt 18 engaging a pulley block 19 suspended by the cable 20, in order that the dipper may be pulled forwardly and upwardly as usual during the scooping operation. The foregoing structure is well known, being generally used in steam and electric shovels.

In carrying out the invention a bracing device is provided between the dipper 9 and stick 8, and includes the toggle links 21 pivoted at their opposite ends, as at 22 and 23, respectively, with the dipper 9 and stick 8 and adapted to straighten out, as seen in Fig. 1, for holding the dipper 9 in scooping position relatively to the stick 8. A link 24 is connected to the joint 25 of the links 21, and is pivoted, as at 26, to one of the door arms 13, in order that when the door 12 is closed, the link 24 will pull the links 21 downwardly to straight line position, thereby holding the links 21 in bracing position while the door 12 is latched. This will maintain the dipper 9 in its most effective position for scooping up the dirt, and when the dipper is raised over a car or other receptacle for receiving the material, and the door 12 is unlatched so as to swing open, as seen in Fig. 2, the link 24 being moved upwardly will break the toggle device upwardly, as seen in Fig. 2, thereby tilting the dipper 9 toward the stick 8. Thus, the bracing or toggle device is operated automatically by the closing and opening movements of the door 12.

In order to limit the tilting movement of the dipper 9 during the dumping operation, a U-shaped stirrup 27 has its terminals pivotally engaging the pivot bolt 18 of the pulley block 19, from which the dipper is suspended and a rod 28 is slidable through the intermediate portion of said stirrup and is connected by chain links 29 with an eye bolt 30 engaging through the dipper stick 8. A coiled spring 31 surrounds the rod 28 within the stirrup 27 and is confined between said stirrup and a nut 32 adjustable on the rod. This spring provides a cushion to absorb shocks and jolts. The connection thus provided between the pivot bolt 18 and the dipper stick 8 will serve to limit the tilting movement of the dipper 9 during the dumping operation, inasmuch as the weight of the dipper and its contents is divided between the bail 16 and the connection between the bolt 18 and stick. This will prevent the dipper from swinging too far toward a vertical position, in order that the dipper may be discharged conveniently into a car on the same

level as the shovel, without spilling the dirt from the car or raising the dipper to an excessive height above the car. The present improvements are especially desirable when using the shovel for filling cars on the same level as that of the shovel. It will be apparent that when the door 12 is unlatched and swings open so that the toggle device is broken to permit the dipper 9 to tilt backwardly, part of the weight normally carried by the bail 16 is transmitted to the connection between the bolt 12 and stick 8 constituting the stirrup 27, rod 28 and chain 29, which will limit the backward tilting movement of the dipper, and the spring 31 yielding will prevent a sudden jar or jolt such as might be injurious to the mechanism.

The arrangement of the toggle links 21 and connecting link 24 may be such that when the door 12 is opened with the dipper in discharging position, said dipper may be substantially vertical, it being noted that the breaking of the toggle from the position shown in Fig. 1 to the position shown in Fig. 2 causes the dipper to swing upwardly toward a vertical position to facilitate the discharge of the contents of the dipper.

Having thus described the invention, what is claimed as new is:—

1. A device of the character described comprising a dipper stick, a dipper hinged thereto, a hinged door for the dipper, a toggle connection between the dipper and stick, and a connection between said toggle connection and door for moving said toggle connection to straightened out position when the door is closed, for bracing the dipper, and for breaking the toggle connection and tilting the dipper relatively to the stick when the door is opened.

2. A device of the character described comprising a dipper stick, a dipper hinged thereto, a hinged door for the dipper, toggle links connected to the dipper and stick, and a link connecting said toggle links and door, said links being so arranged that the toggle links are moved to straightened out position when the door is closed.

3. A device of the character described comprising a dipper stick, a dipper hinged thereto, a hinged door for the dipper, bracing means between the dipper and stick operably connected to the door to tilt the dipper relatively to the stick when the door is opened, means connected to the dipper to draw same forwardly and upwardly, and a connection between said last named means and stick to assist in supporting the dipper when it is tilted relatively to said stick and to limit said tilting movement thereof.

4. A device of the character described comprising a dipper stick, a dipper hinged thereto, a hinged door for the dipper, bracing means between the dipper and stick operably connected to the door to tilt the dipper relatively to the stick when the door is opened, means connected to the dipper to draw same forwardly and upwardly, and a yieldable connection between said means and stick to assist in supporting the dipper when it is tilted relatively to the stick and to limit the tilting movement thereof.

In testimony whereof I hereunto affix my signature.

FREDERICK ARCHIBALD.