April 25, 1933. J. S. FINLAY ET AL 1,906,001

SHOVELING MACHINE

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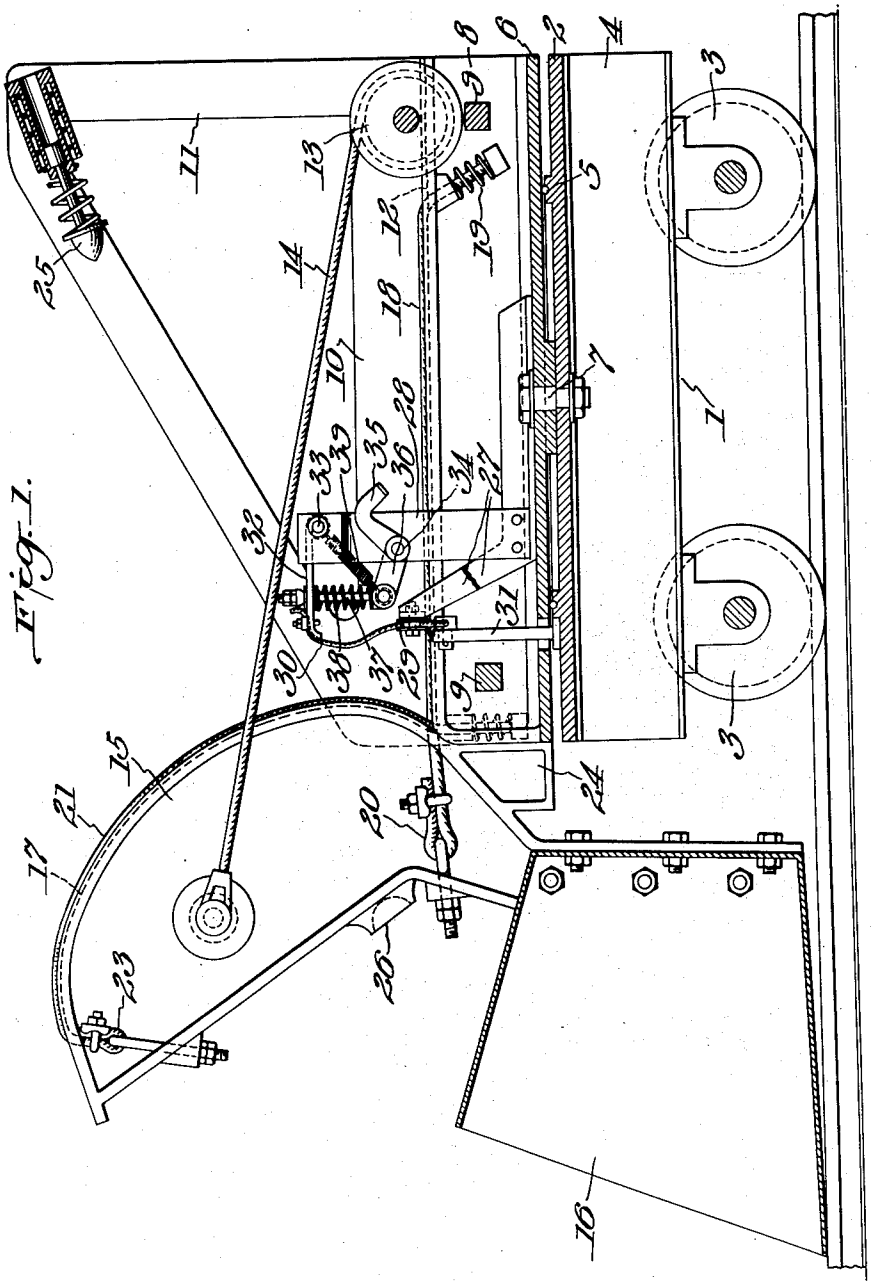


Fig. 1.

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Fig. 2.

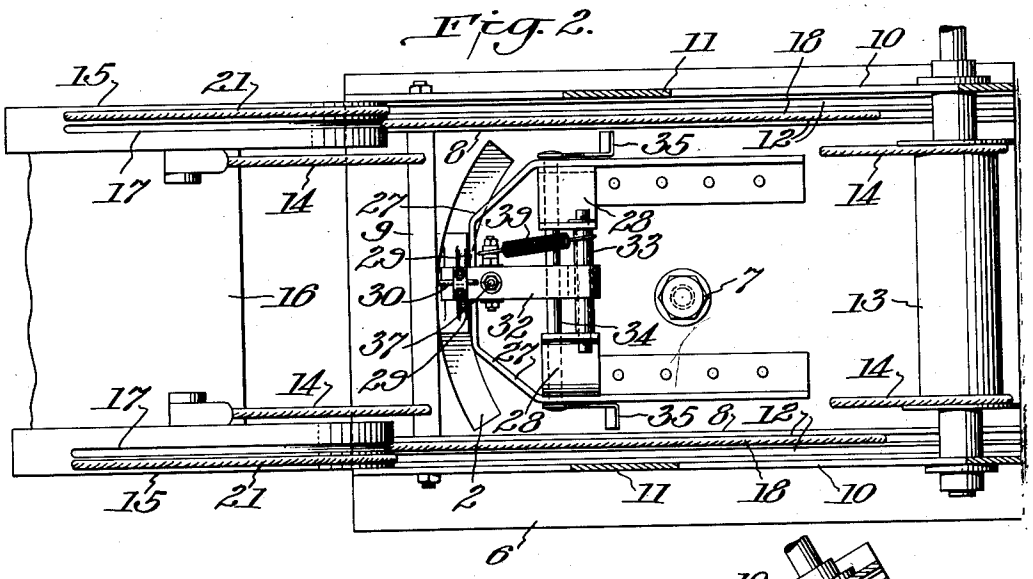
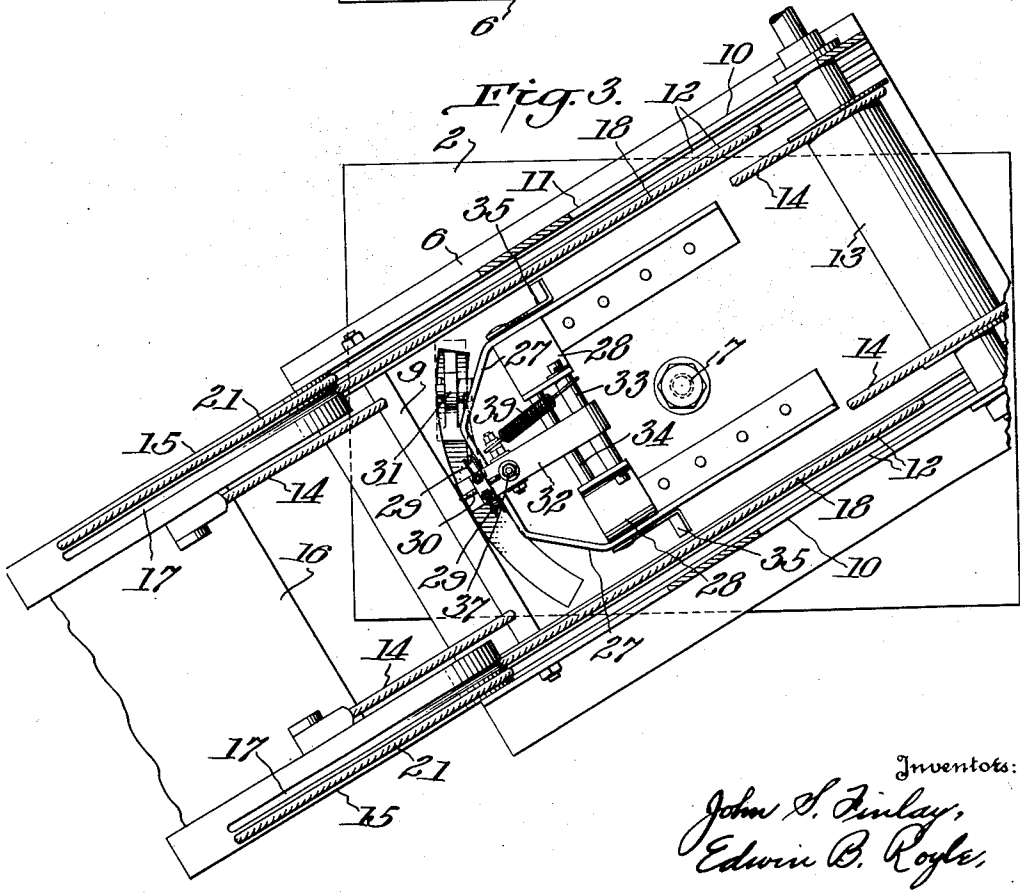


Fig. 3.



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Fig. 4.

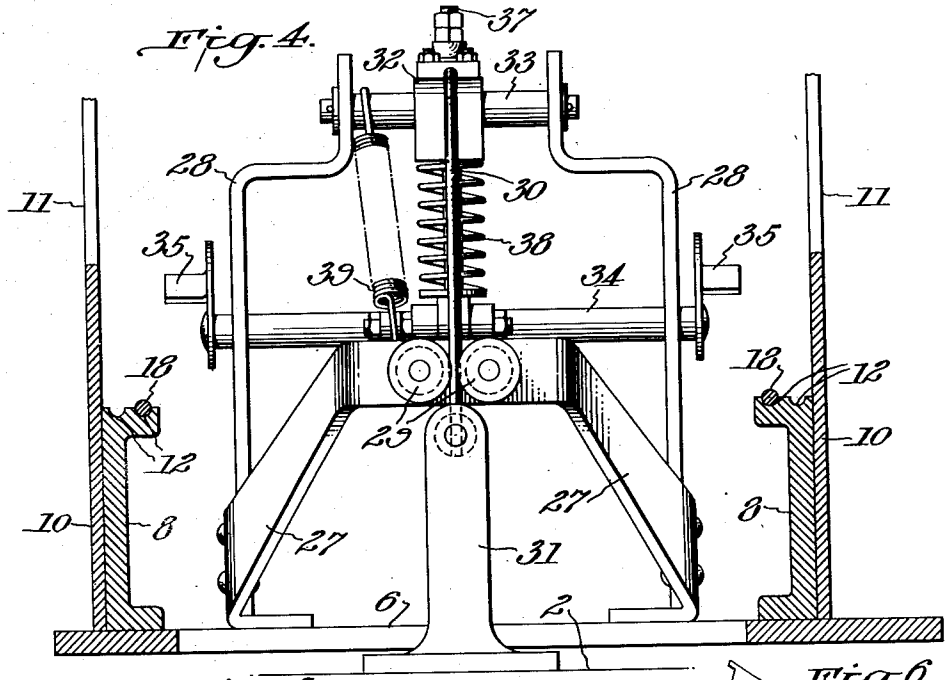


Fig. 5.

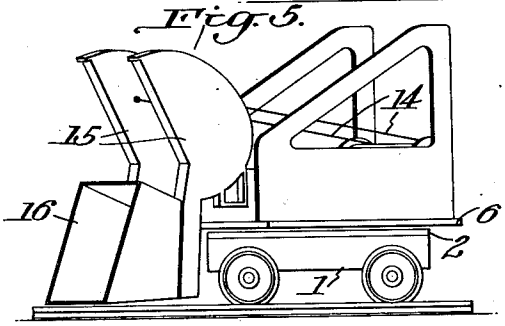


Fig. 6.

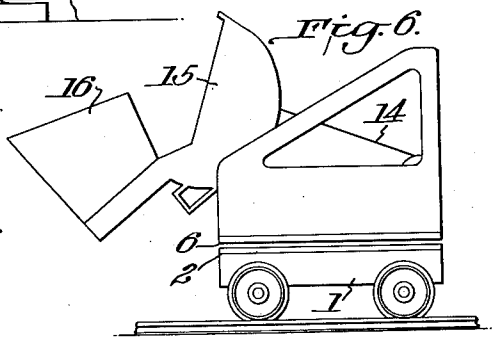


Fig. 7.

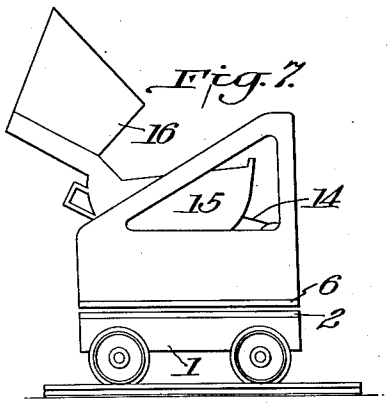
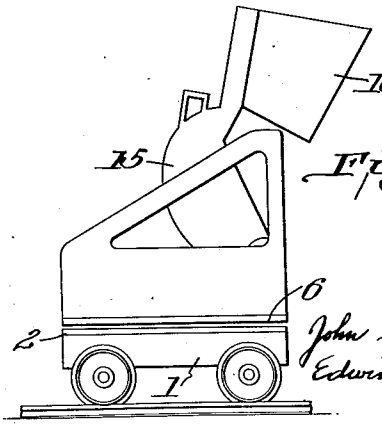


Fig. 8.



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UNITED STATES PATENT OFFICE

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SHOVELING MACHINE

Application filed February 23, 1932. Serial No. 594,655.

This invention relates to shoveling machines of the type employed for loading muck or other material in cars and particularly to shoveling machines or muckers adapted for work under ground and having an automatic centering device.

In muckers used in mines, it is the present practice to rotatably mount the dipper so that it may be turned partly to the side to handle material lying to one side of the path of the machine. The rotation of the dipper is usually effected by hand and when the dipper has been advanced into the muck pile and filled with material, it has been necessary to manually return the dipper to its central position for dumping.

An object of this invention is to provide a mechanical shoveler that is light in weight, efficient in operation and which can be made in sizes small enough to be placed in mine cages without dismantling.

Another object of this invention is to provide a device for a shoveling machine to automatically center the dipper from a lateral position during its dumping movement.

It is a further object of this invention to provide a device for a shoveling machine which is engaged by the dipper during its dumping movement, to return the dipper from a lateral to its central position.

These and other objects will be apparent from the following specification taken with the accompanying drawings, in which

Fig. 1 is a longitudinal section through the machine,

Fig. 2 is a plan view of the machine with the dipper in its central position,

Fig. 3 is a plan view of the machine with the dipper in a lateral position,

Fig. 4 is an end elevation showing details of the centering mechanism,

Fig. 5 shows the shoveling machine in mucking position with its car attached, and

Figs. 6, 7, and 8 show the dipper in different stages during the dumping movement.

The shoveling machine is mounted on a truck 1 comprising a bed plate 2 mounted on wheels 3 through the channel members 4. The bed plate 2 has its top grooved for ball bearings 5 which support the revolving table 6 pivoted at 7.

Upon the upper surface of the table 6, are fastened the lower flanges of two I-shaped supporting members 8 which are connected to one another by cross members 9. The upper flanges of these members 8 have side boards 10 and upwardly projecting guiding frames 11 formed integrally with them. In the top surface of each of the upper flanges of members 8, are formed two grooves 12 semicircular in cross section.

Connected to the table 6 is a reversing air or electric motor (not shown) which drives the rope drum 13 which through the rope 14 and the rocker unit 15, actuates the dipper 16, which is connected to the rocker unit 15.

The surface of the rocker unit has an increasing radius of curvature in a direction away from the end to which the dipper is connected and the rope 14 is attached to the rocker near the end having the greatest radius of curvature.

The rocker unit 15 has two contact surfaces that roll along the top flanges of the supporting members 8 and are guided by the side boards 10 and guiding frames 11. Each rocker unit contact surface is scored with two grooves 17 having a semicircular cross-section equal and corresponding to those in the top flanges of the members 8. Lying along the inner of the grooves on each side is a guiding cable 18 which has its rear end attached by a spring connection 19 to give a small amount of flexibility and its front end attached by an adjustable connection 20 to the rocker 15. In the outer of the two grooves on each side, guiding cables 21 are arranged to lie. One end of each is attached to the supporting members 8 by a spring connection 22 near the front and the other end of each is adjustably connected to the rocker 15 by the connection 23.

The rocker 15 is provided with a block 24 which, when the shoveling machine is in a position for mucking, as shown in Figs. 1 and 5, rests against the ends of the members 8 and with the aid of the limiting cables 18 and 21 supports the dipper 16 and rocker 15 against the resistance of a muck pile while it

is being crowded ahead, or to the side of the car, to load the dipper.

The upwardly projecting frames 11 have near their apexes two companion spring bumpers 25. The rocker 15 has two corresponding members 26 which coact with the spring bumpers 25 to stop the rearward dumping movement of the dipper 16 at its rearmost position.

The centering mechanism is mounted on the shoveling machine by the bracket 27 and supports 28 attached to the revolving table 6. The bracket carries two guiding sheaves 29 between which is passed a cable 30, one end of which is connected to an extended lug 31 attached to the bed plate 2 and the other end to a bar 32 which is secured to the rotatable shaft 33 mounted on the supports 28. The supports also carry a second rotatable shaft 34 to which are rigidly attached the centering levers 35 and the arm 36. A rod 37 pivotally connected to the outer end of the arm 36, surrounded by the compression spring 38 and slidably connected to the bar 32, yieldably joins the bar 32 and the arm 36. A spring 39 acts on the outer end of the arm 36 to maintain the device in neutral position.

The operation is as follows: For working on a muck pile directly in front of the machine, the machine is advanced as far as possible into the muck pile by means of any suitable driving device. Power is then momentarily supplied to the dipper actuating motor, causing the rope drums to revolve and the rockers to pivot on the forward ends of members 8, giving a digging movement to the dipper. This digging action is repeated until the dipper is full. The dipper is dumped into a car attached to the rear of the shoveling machine by winding the cable 14 on the drum 13. The rocker rolls on the tops of the supporting members 8, carrying the dipper upwardly and rearwardly, as shown in Figs. 6, 7, and 8, until the dipper reaches its rearmost position. At this position the bumpers 25 and 26 meet, and abruptly stop the movement of the dipper. The inertia of the load then causes it to continue its movement and it is thereby thrown into the car. By cutting off the power from the dipper actuating motor just before the bumpers 25 and 26 meet, advantage is taken of the recoil to start the return of the dipper, which movement is completed by gravity. The machine is then ready to repeat the cycle.

The rocker 15 is guided and maintained in its proper relative position with respect to the members 8, during its forward and rearward rolling movements by the cables 18 and 21 and the grooves 12 and 17. It will be evident that the cooperation between the cables 18 and 21 with the grooves 12 and 17 results in the rocker 15 rolling in a straight path and that the rocker 15 and the members 8 are maintained in proper relative position with respect to each other by the action of the cables in preventing the rocker 15 from slipping on the members 8. The rocker by being curved, as shown and described, with respect to the point of application of power, causes an accelerating movement to be given to the dipper and its load which prevents any of the load from being spilled. The curve of the rocker is also designed to require a minimum amount of head room for the dipper during its unloading movement.

Should the muck pile or material to be handled be on either side of the path of the shoveling machine, the dipper and its associated structure may be manually rotated to either side of the machine about the pivot 7, through a maximum angle of approximately 30° on each side. It is when the dipper has been rotated to one side of the machine and crowded into a muck pile that the centering mechanism is actuated by the dumping of the dipper to automatically rerotate the dipper to its central position so that the material in the dipper will be dumped into the car immediately behind it. As the dipper is rotated to one side or the other, one of the sheaves 29, depending upon the side to which the dipper is rotated, pushes against the cable 30. As the lower end of the cable 30 is attached to the fixed lug 31, the bar 32 is pulled down against the force of the compression spring 38 and at the same time the tension spring 39 is extended. As the rocker 15 rolls rearwardly on the tops of the supporting members 8, it engages the centering levers 35 which are depressed, ultimately to levels below the tops of the supporting members. As the centering levers 35 are depressed, the arm 36 is raised, acting on the spring 38 to raise the bar which in turn pulls the cable 30. The cable 30, tending to straighten, exerts a lateral force upon one of the sheaves 29, depending on the side to which the dipper has been rotated and thus draws the dipper and its associated structure into central dumping position. When the dipper has dumped its load and returned to its forward crowding position, the rocker and cable 21 release the centering lever 35, thereby releasing the compression spring 38 which in turn allows the cable 30 to become slack and the dipper is ready to be rotated at the will of the operator.

This invention is not intended to be limited by the specific construction shown and described but only by the scope of the following claims.

We claim:

1. In apparatus of the type described, the combination with a relatively fixed structure, a rotatable structure mounted thereon, a dipper supported by said rotatable structure and rockable thereon, and means for rocking said dipper on said structure to dump said dipper, of means actuated by the dipper during the rocking movement there-

of to center said rotatable structure on said fixed structure.

2. In a shoveling machine of the type described, the combination of a truck, a table rotatably mounted on the truck, a movable dipper support mounted on the table, a dipper carried on the movable dipper support, and a centering mechanism mounted on the rotatable table, said centering mechanism including means preliminarily engaged by the movement of said table out of its normal position on said truck and means engageable by the movable dipper support to center the table.

3. In a shoveling machine of the type described, the combination of a truck, a table rotatably mounted on the truck, a movable dipper support mounted on the table, a dipper carried by the movable dipper support, mechanism for moving the dipper and its support to dump a load carried by the dipper, and a centering mechanism mounted on the rotatable table and located in the path traversed by the dipper support during the dumping movement, said centering mechanism comprising means resiliently connecting the truck and the rotatable table, and means engageable by the dipper support to center the rotatable table during the dumping movement of the dipper.

4. In a shoveling machine of the type described, the combination of a truck, a table rotatably mounted on the truck, a movable dipper support mounted on the table, a dipper carried by the movable dipper support, mechanism for moving the dipper and its support to dump a load carried by the dipper, and centering mechanism mounted on the rotatable table and located in the path traversed by the dipper and its support during dumping movement, said centering mechanism comprising flexible means connecting the truck and the rotatable table, guiding means associated with the flexible means and fixed to the rotatable table, and a centering lever yieldably connected to the flexible means and engageable by the dipper support to center the rotatable table during the dumping movement of the dipper.

5. In apparatus of the type described, for centering a rotatable structure with respect to a fixed structure, the combination of a bar and an arm mounted on the rotatable structure and yieldably connected to each other, flexible means connecting the bar and the fixed structure, guiding means for said flexible means, a centering lever connected to the arm and means to act on the centering lever to tension the flexible means whereby the flexible means exerts a force on the guiding means to center the rotatable structure.

6. In apparatus of the type described, for centering a rotatable structure with respect to a fixed structure, the combination of a bar pivotally mounted on the rotatable structure, an arm pivotally mounted on the rotatable structure, means yieldably connecting the free ends of the bar and arm, means connecting the bar and the fixed structure, guiding means for the connecting means, and a centering lever connected to the arm.

7. In apparatus of the type described, for centering a rotatable structure with respect to a fixed structure, the combination of a bar and an arm pivotally mounted on the rotatable structure, yieldable means connecting the free ends of the bar and arm, flexible means connecting the free ends of the bar and the fixed structure, means to be acted upon by the flexible member to center the rotatable structure, and means to move the bar to tension the flexible member to act on said means.

8. In apparatus of the type described, for centering a rotatable structure with respect to a fixed structure, the combination of an arm pivotally mounted on the rotatable structure, a bar pivotally mounted on the rotatable structure, yieldable means connecting the outer ends of the bar and the arm, flexible means connecting the fixed structure to the outer end of the bar, means for maintaining the apparatus in neutral position, and means fixed to the rotatable structure to be acted upon by the flexible member to move the fixed structure to centering position.

9. In apparatus of the type described, for centering a rotatable structure with respect to a fixed structure, the combination of a lug on the fixed structure, a bracket on the movable structure, a support on the movable structure, a bar and a centering lever mounted on said support and yieldably connected to each other, a cable connecting the bar and the lug, guiding means for the cable mounted on the bracket, and means on said rotatable structure to operatively engage the centering lever to tension the cable whereby a force is exerted upon said guide to center the rotatable structure.

10. In apparatus of the type described, for centering a rotatable structure with respect to a fixed structure, the combination of a support fixed to the rotatable structure, an arm rotatably mounted on said support, a bar rotatably mounted on said support, a pin pivoted to the free end of the arm and slidably connected to the bar, a compression spring mounted on the pin between the arm and the bar, a cable connecting the outer end of the bar to the fixed structure, means fixed to the rotatable structure to be acted upon by the cable, and of means to move the bar to tension the cable to act on the said means.

11. In apparatus of the type described, for centering a rotatable structure with respect to a fixed structure, the combination of a support fixed to the rotatable structure, an arm rotatably mounted on said support, a bar rotatably mounted on said support, a pin

pivoted to the free end of the arm and slidably connected to the bar, a compression spring mounted on the pin between the arm and the bar, a flexible means connecting the outer end of the bar to the fixed structure, means fixed to the rotatable structure to be acted upon by the flexible means, and of means to move the bar to tension the flexible means to act on the said means.

12. In apparatus of the type described, for centering a rotatable structure with respect to a fixed structure, the combination of a support fixed to the rotatable structure, an arm rotatably mounted on said support, a bar rotatably mounted on said support, a pin pivoted to the free end of the arm and slidably connected to the bar, a compression spring mounted on the pin between the arm and the bar, a cable connecting the outer end of the bar to the fixed structure, means fixed to the rotatable structure to be acted upon by the cable, movable means on the rotatable structure, and of a centering lever secured to the arm and in the path of the movable means whereby upon a predetermined motion, the movable means acts upon the centering lever to center the rotatable structure.

13. In apparatus of the type described, for centering a rotatable structure with respect to a fixed structure, the combination of a support fixed to the rotatable structure, an arm rotatably mounted on said support, a bar rotatably mounted on said support, a pin pivoted to the free end of the arm and slidably connected to the bar, a compression spring mounted on the pin between the arm and the bar, a cable connecting the outer end of the bar to the fixed structure, means fixed to the rotatable structure to be acted upon by the cable, a centering lever secured to the arm, means yieldably to maintain the apparatus in neutral position, and of means to act on the centering lever to center the rotatable structure.

14. In apparatus of the type described, for centering a rotatable structure with respect to a fixed structure, the combination of a support fixed to the rotatable structure, an arm rotatably mounted on said support, a bar rotatably mounted on said support, a pin pivoted to the free end of the arm and slidably connected to the bar, a compression spring mounted on the pin between the arm and the bar, flexible means connecting the outer end of the bar to the fixed structure, means fixed to the rotatable structure to be acted upon by the rotatable means, a centering lever secured to the arm, means yieldably to maintain the apparatus in neutral position, and of means to act on the centering lever to center the rotatable structure.

15. In apparatus of the type described, for centering a rotatable structure with respect to a fixed structure, the combination of a support fixed to the rotatable structure, an arm rotatably mounted on said support, a bar rotatably mounted on said support, a pin pivoted to the free end of the arm and slidably connected to the bar, a compression spring mounted on the pin between the arm and the bar, a cable connecting the outer end of the bar to the fixed structure, means fixed to the rotatable member, two sheaves mounted on the bracket adjacent to the cable to be acted on by the cable to center the rotatable structure, movable means on the rotatable structure, and of a centering lever secured to the arm and in the path of the movable means whereby upon a predetermined motion, the movable means acts upon the centering lever to center the rotatable structure.

16. In apparatus of the type described, for centering a rotatable structure with respect to a fixed structure, the combination of a support fixed to the rotatable structure, an arm rotatably mounted on said support, a bar rotatably mounted on said support, a pin pivoted to the free end of the arm and slidably connected to the bar, a compression spring mounted on the pin between the arm and the bar, a cable connecting the outer end of the bar to the fixed structure, a bracket fixed to the rotatable member, two sheaves mounted on the bracket adjacent to the cable to be acted on by the cable to center the rotatable structure, movable means on the rotatable structure, means yieldably to maintain the apparatus in neutral position, and of a centering lever secured to the arm and in the path of the movable means whereby upon a predetermined motion, the movable means acts upon the centering lever to center the rotatable structure.

17. In a shoveling machine of the type described, the combination of a truck, a table rotatably mounted on the truck, a movable dipper and a carrier therefor movably mounted on the table, mechanism to move the dipper and its carrier to dump a load carried by the dipper, and centering mechanism located in the path traversed by the dipper and its carrier during dumping movement, said centering mechanism comprising a support mounted on the table, an arm rotatably mounted on the support, a bar rotatably mounted on the support, flexible means connecting the truck and the outer end of the bar, a yieldable connection between the arm and the bar, and a centering lever secured to the arm and engageable by the dipper carrier to center the table during the dumping movement of the dipper.

18. In a shoveling machine of the type described, the combination of a truck, a table rotatably mounted on the truck, a dipper and a carrier therefor movably mounted on the table, mechanism to move the dipper and its carrier to dump a load carried by the dipper, and centering mechanism located in the

path traversed by the dipper and its carrier during dumping movement, said centering mechanism comprising a support mounted on the table, an arm rotatably mounted on the support, a bar rotatably mounted on the support, a pin pivotally mounted on the outer end of the arm and slidably connected to the bar, a compression spring on said pin between the arm and the bar, flexible means connecting the truck and the outer end of the bar, a bracket mounted on the table, guiding means for the flexible means mounted on the bracket, a centering lever secured to the arm and engageable by the dipper carrier to tension the flexible means and exert a force on the guide means to center the table during the dumping movement of the dipper.

In testimony whereof, we affix our signatures.

JOHN SPENCE FINLAY.
EDWIN BURTON ROYLE.