P. MACE.

MINE DOOR OPERATOR.

APPLICATION FILED OCT. 2, 1909.

1,014,886.

Patented Jan. 16, 1912.

4 SHEETS—SHEET 1.

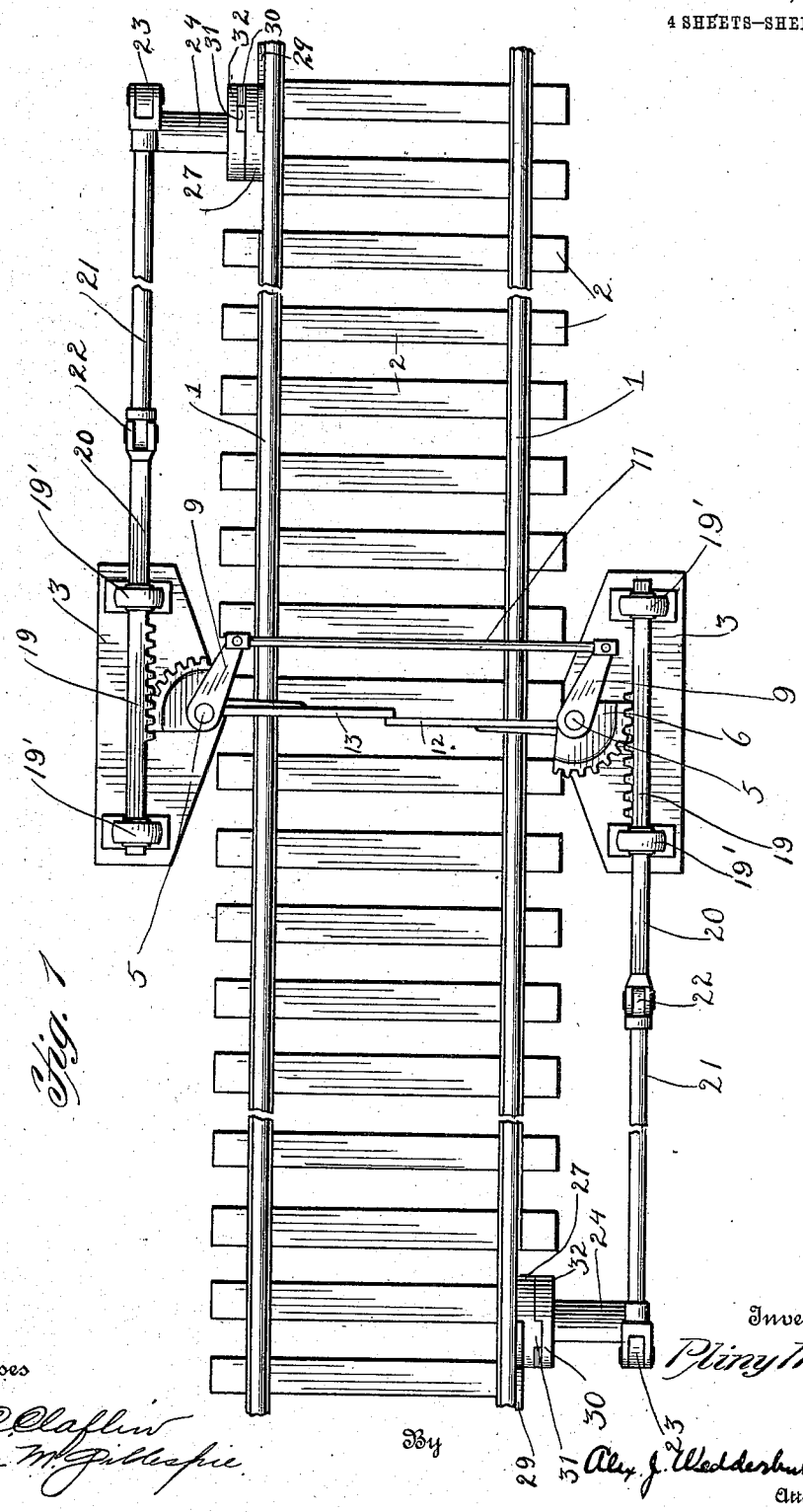

Fig. 1

Witnesses

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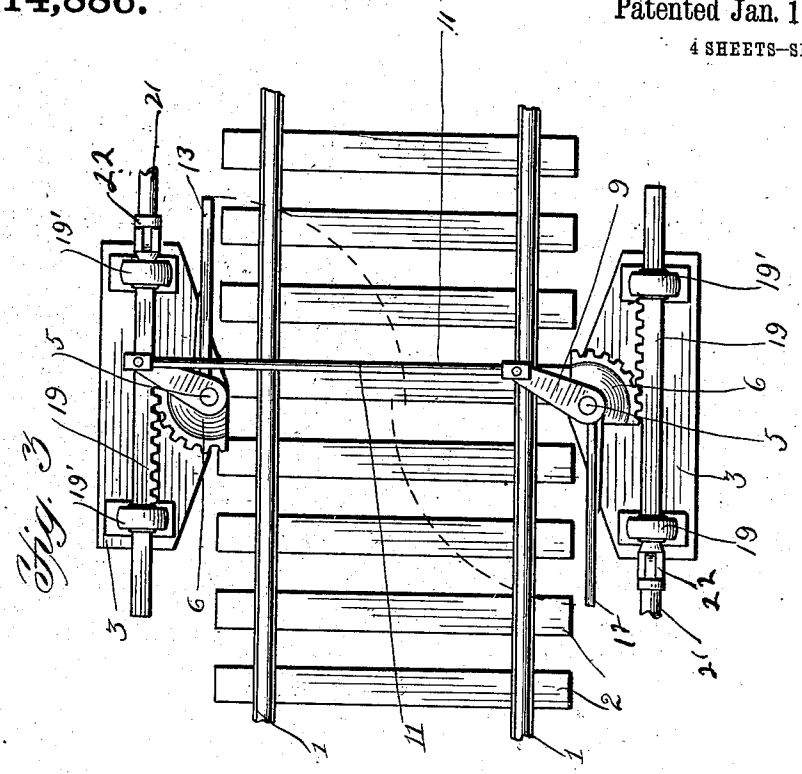

Fig. 3

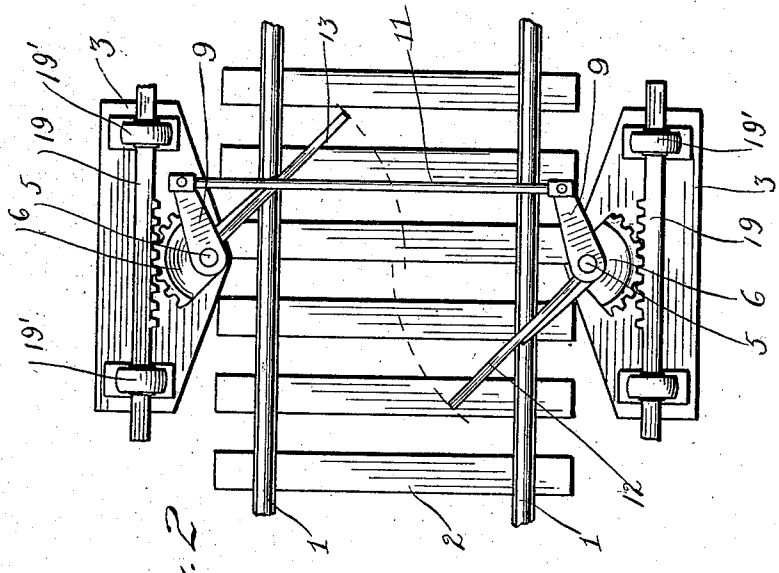

Fig. 2

Witnesses

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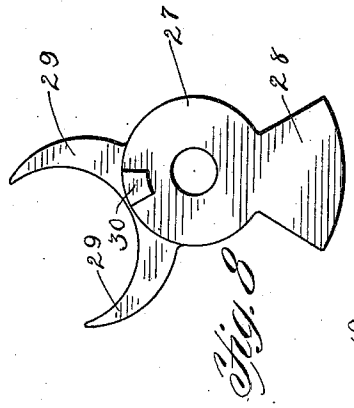


Fig. 8

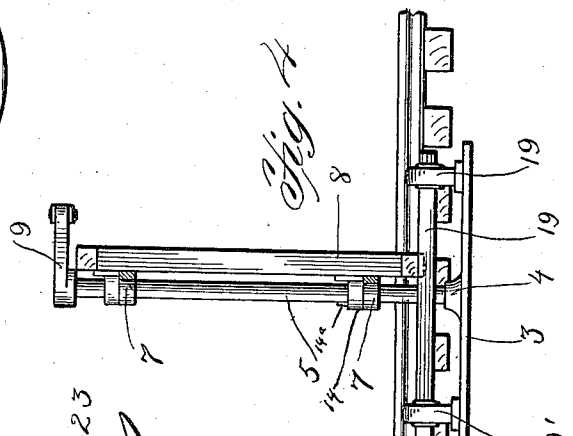


Fig. 4

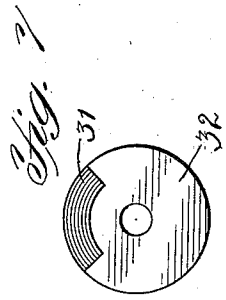


Fig. 7

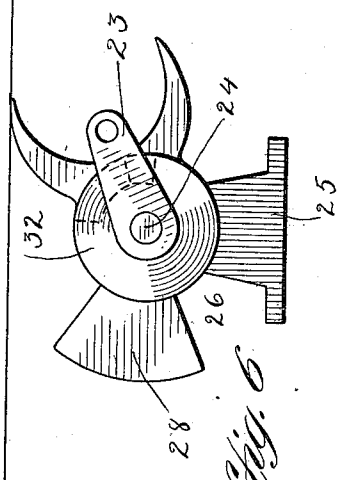


Fig. 6

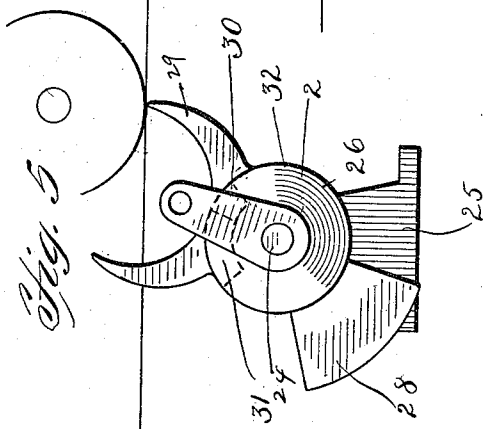
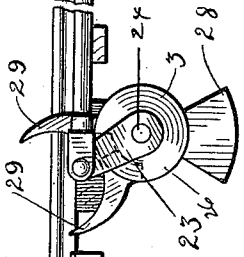


Fig. 5



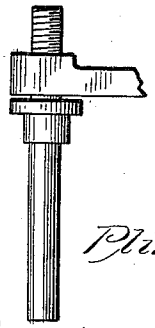


Fig. 9

Witnesses

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4 SHEETS—SHEET 4.

Fig. 10

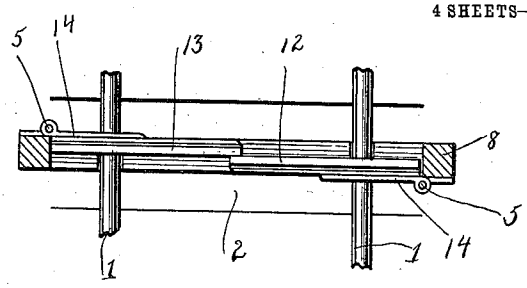


Fig. 11

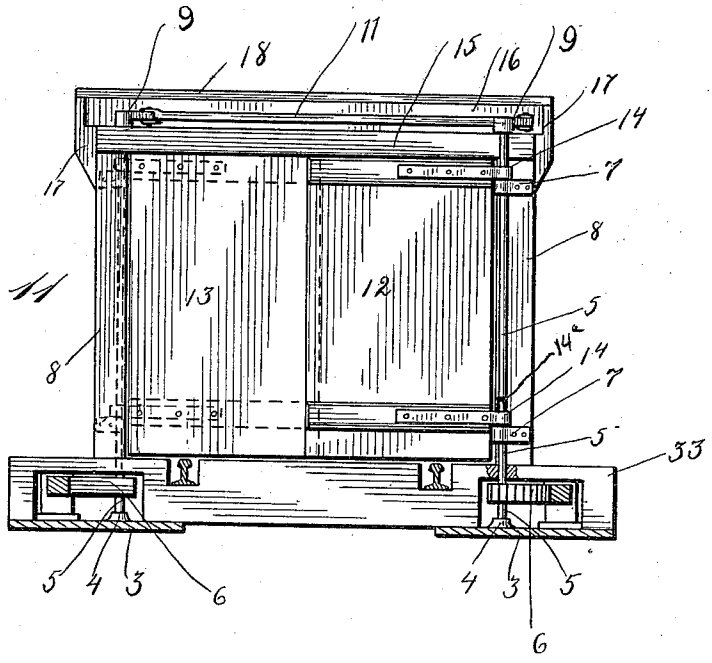
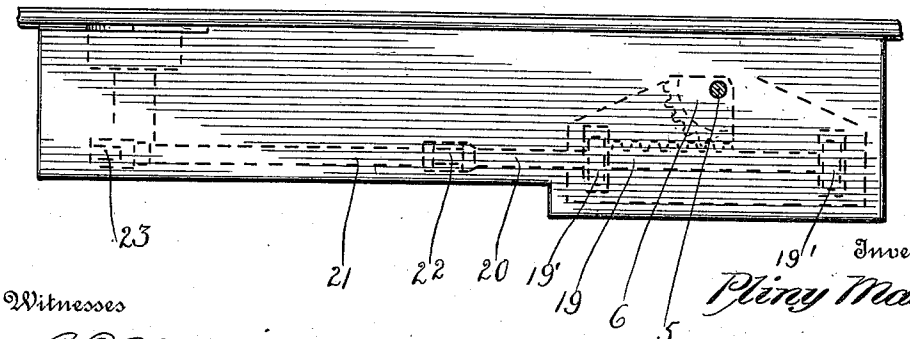


Fig. 12



Witnesses

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UNITED STATES PATENT OFFICE.

PLINY MACE, OF IRWIN, PENNSYLVANIA.

MINE-DOOR OPERATOR.

1,014,886. Specification of Letters Patent. Patented Jan. 16, 1912.

Application filed October 2, 1909. Serial No. 520,610.

To all whom it may concern:

Be it known that I, PLINY MACE, a citizen of the United States, residing at Irwin, in the county of Westmoreland and State of Pennsylvania, have invented certain new and useful Improvements in Mine-Door Operators, of which the following is a specification.

This invention relates to car operated door operators and is especially designed for use in connection with mine doors.

One of the objects of the invention is the construction of a device having a car wheel engaged mechanism and means connected to a mine door whereby the same may be opened.

Another object of the invention is the construction of means whereby a mine door can be readily opened and closed by a passing car without interfering with the movement of the car.

Another object of the invention is the construction of means for operating mine doors whereby two doors may be moved in opposite directions by the actuation of a moving car.

Another object of the invention is the construction of door operating means and wheel engaging means adapted to be returned to its normal position so that a passing car wheel can engage with the same.

With the above and other objects in view the invention consists in certain combinations, constructions, and arrangements of parts, clearly described in the following specification and clearly shown in the accompanying drawings, in which,

Figure 1 is a top plan view of a railroad track having the improved door operating mechanism operatively arranged upon its roadbed, with the main operating parts exposed, and the mine doors shown closed, Fig. 2 is a detail top plan view of the mine doors and the adjacent mechanism shown the doors partly opened, Fig. 3 is a similar view with the mine doors fully opened, Fig. 4 is a side elevation, showing the mounting of the mine doors, and the wheel operated mechanism, Fig. 5 is a detail side elevation showing the wheel operated mechanism, whereby the doors are opened, Fig. 6 is a similar view showing the wheel operated mechanism after a wheel has engaged therewith, Fig. 7 is a detail of a disk, Fig. 8 is a detail side elevation of an operating member engaged by the wheel of a car, Fig. 9 is a detail of a rod connection, Fig. 10 is a detail top plan view of the mine doors, with parts shown in section. Fig. 11 is an end view of the mechanism for operating the mine doors, which is partly shown in section, and Fig. 12 is a plan view of a boxing for the operating parts, which are shown in dotted lines.

Referring to the accompanying drawings illustrating the invention 1 denotes a pair of rails arranged on ties 2. On the sides of the rails 1 base plates 3 are located, each of said base plates having bearings 4 for the lower ends of operating vertical shafts 5, which are provided with segmental gears 6, mounted on said lower ends. The shafts 5 are journaled by brackets 7 to posts 8, on either side of the rails 1. On the upper ends of said vertical shafts 5 cranks 9 are mounted. The cranks 9 normally occupy an angular position with relation to the rails 1 and their outer ends are pivotally connected to a horizontal tie rod 11, which extends across the rails 1. Two mine doors 12 and 13 are fixed to the vertical shafts 5 by straps 14 by means of keys 14^a or otherwise, which rest on the brackets 7. A cross bar 15 connects the top ends of the posts 8, thus holding the posts rigid on their bases. On the posts 8 and the cross bar 15 a wind shield 16 is fastened to prevent air from passing over the tops of the doors when the same are closed, said wind shield being provided with end members 17 and with a top member 18, completely protecting the upper part of the door openings.

The gears 6, which comprise segments of one quarter of a complete gear, are disposed on the lower ends of the vertical shafts 5 in opposite directions, and engage with racks 19 connected to operating rods 20, which move in bearings 19′, arranged on the base plates 3. The rods 20 connect with rods 21 by pivot couplings or joints 22, which couplings or joints permit of swinging movement of the rods 21 on the rods 20. The outer ends of the rods 21 are connected pivotally with cranks 23, mounted on shafts 24, supported by bearing blocks 25. The shafts 24 carry wheel operated devices 26, which comprise central bearing portions 27, weighted lower ends 28 and spaced arcuate arms 29, with which the car wheels engage. The central portions 27 are provided with

lateral lugs 30, which normally move in arcuate slots 31 of disks 32, carried by the shafts 24. The wheel operated devices 26 are loosely mounted on the shafts 24 and the disks 32 are fixed thereto. The gears 6 and the racks 19, with the operating mechanism on the shafts 24 are inclosed by boxings 33, whereby dust is prevented from affecting said gears.

When the mine doors 12 and 13 are closed, or in engagement with each other, as shown in Figs. 1, 10 and 11, the arcuate hook arms 29 will project toward the moving car, as indicated in Figs. 1 and 4. In this position one of the hook arms 29 will be held above the plane of the rails 1, and the other arm will be held below the plane of the rails, as clearly shown in Fig. 4. As the car moves toward the hook arms 29 the forward wheel will engage the uppermost arm, and move the same to the position indicated in Fig. 5, which action will cause the rod 21 and the rack 20, connected by the crank 23 to said hook arms, to move forwardly, thereby slightly turning the shafts 5 and partly opening the doors 12 and 13, as shown in Fig. 2. Railway cars, as commonly constructed, are supported at each end by a truck mounted on the axles of two pairs of wheels, one pair of which closely follows the other pair on the rails. The forward wheel of the car engages the forward hook arm, thereby moving the doors to half-way positions, and placing the second hook arm in position to be engaged by the second wheel, which follows immediately behind the first wheel, so that the doors are moved the second step, or wholly opened. When the hook arms are engaged by the wheels the lug 30 will engage with the forward end wall of the slot or recess 31, of the disk 32, and the cranks 23 will be moved or rocked forwardly, so that the door operating gear mechanism will be actuated. After the wheels have left the hook arms, the weight 28 will automatically return the second arm to a raised position, so that should a car stop before passing entirely through the doors and back therefrom, the wheels passing over the hook arms will engage first one, then the other, causing the doors to close.

By means of the connecting rod 11 the two doors 12 and 13 are operated simultaneously. When the segmental gear on one side of the rails is operated the segmental gear on the other side will be operated, and when the doors are thrown wholly open as shown in Fig. 3 the hook arms connected with the mechanism operated indirectly through the tie rod 11 will be moved rearwardly so as to be engaged by the passing wheels of the car, and to enable the car to reverse the operation of the door mechanism, with the result that the doors will be closed after the car has passed them.

No matter which way the car approaches the door, whether from either side, the operating shafts on which the doors are hinged will be actuated so as to open the same as the car approaches the actuating mechanism and returned to their normal positions as the car leaves the mechanism.

The operation of the doors is automatic, requiring no attention from the miners or workers and the invention renders it possible to maintain greater security and safety in the control of the entrance doors to the mines and in the control of the doors separating the various chambers of the mines. This assures the miners that confined gases will not be allowed to escape by partly opened doors, or by defective operating mechanism. The invention may also be applied for the operation of doors of factories, mills, smelters, brickyards, driers, and similar institutions.

By lengthening the operating rods 20 any number of cars can be passed through the doors.

Having described my invention I claim and desire to secure by Letters Patent:—

1. In a door operating mechanism, a door operating shaft, a gear rack connected thereto, a rod connected pivotally to the rack, a disk connected with the rod and means engageable by a passing car wheel operating the disk in steps.

2. In a door operating mechanism, a vertical operating shaft, a door thereon, a segmental gear on the shaft, a gear rack engaging with the gear, a rod connected pivotally with the rack, a disk connected with the rod and means engageable by a passing car operating the disk in steps.

3. In a door operating mechanism, a vertical operating shaft having a door supported thereon, a segmental gear on the lower end of the shaft, a gear rack connected with the gear, a rod pivotally connected with the gear rack, a disk connected to said rod having an arcuate recess therein, a weighted member having a lug moving in the disk recess, means for supporting the member and the disk, and means carried by the member engageable by a passing car.

4. In a door operating mechanism, a pair of vertical shafts, doors carried by the shafts, segmental gears on the lower ends of the shafts, gear racks extending in opposite directions operating the gears, rods pivotally connected with each of the racks, disks connected to the rods by operating cranks, cranks on the upper ends of the shafts, a tie rod pivotally connecting the shaft cranks, car operated members engaging the disks adapted to impart motion to the rods and gear mechanism, and means carried by the members adapted to return the same to their normal positions.

5. In a mine door opener, a shaft support-

ed door, a gear segment connected with the shaft of said door, a gear rack engaging the segment, a weighted member having two hook arms adapted to project above the tread surface of a rail, means for supporting the member and a connection between the rack bar and the weighted member whereby the rack bar is moved in steps when the hook arms of the weighted member are successively engaged by the passing wheels of a car.

In testimony whereof I affix my signature, in presence of two witnesses.

PLINY MACE.

Witnesses:
THOMAS MILES,
JAMES B. GALLEGHER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."