

(No Model.)

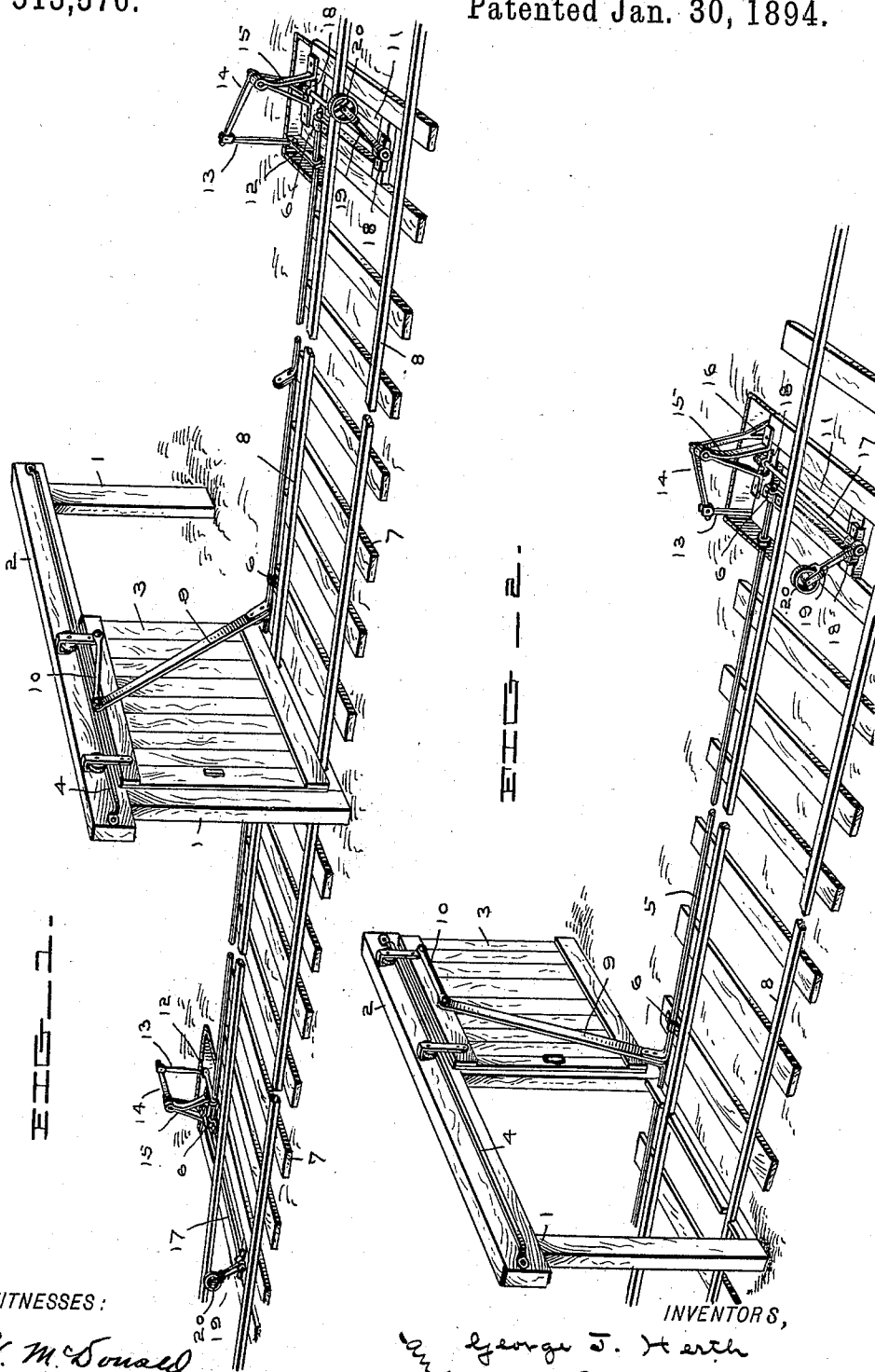
2 Sheets—Sheet 1.

G. J. HERTH & G. BONENBERGER.

MINE TRAP DOOR.

No. 513,576.

Patented Jan. 30, 1894.



WITNESSES:

Y. W. McDonald
J. M. Cropper

INVENTORS,

George J. Herth
and George Bonenberger
by H. D. Neely.
ATTORNEY.

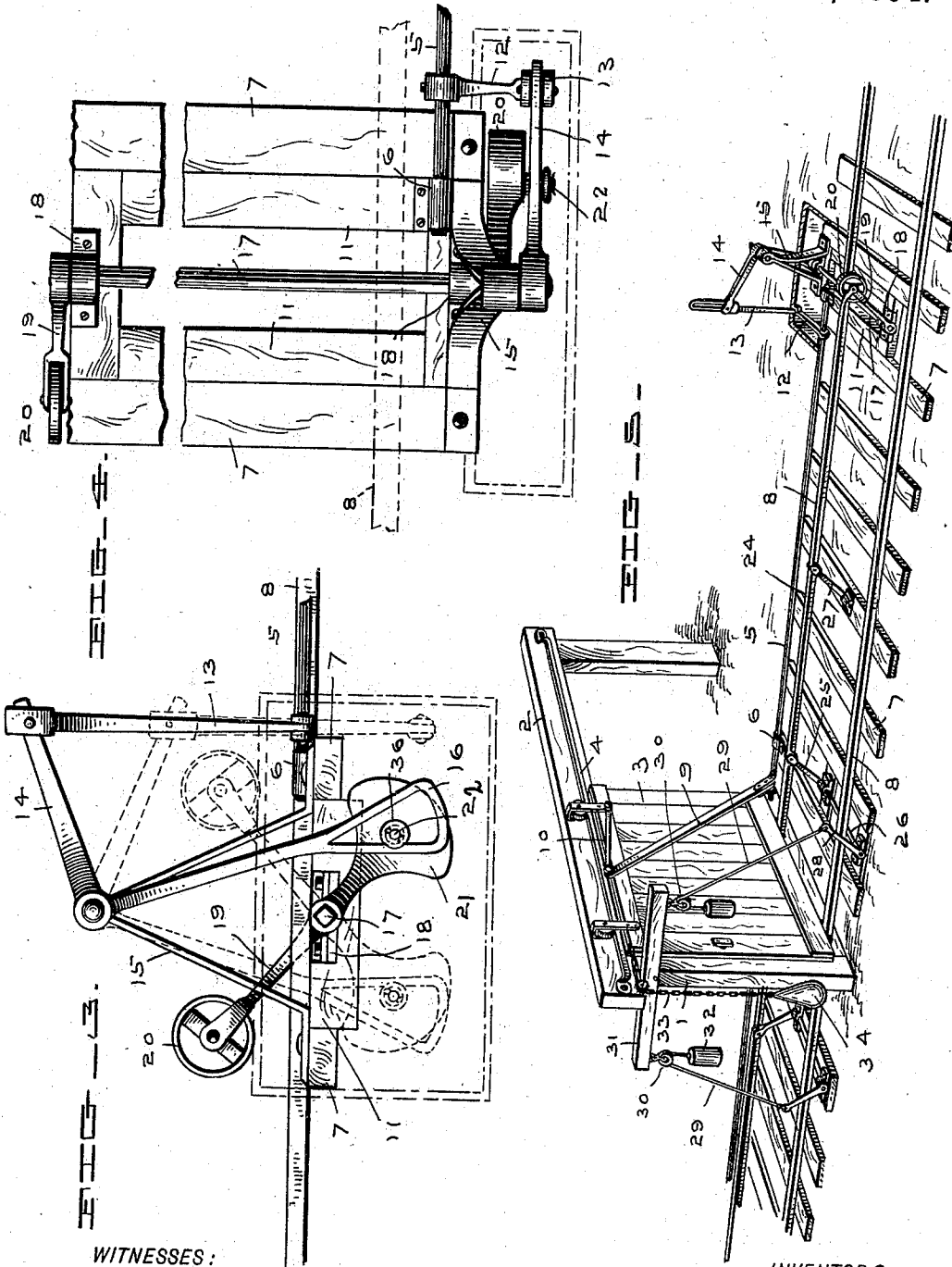
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and George Bonenberger
by H. D. Neely
ATTORNEY.

UNITED STATES PATENT OFFICE.

GEORGE J. HERTH AND GEORGE BONENBERGER, OF EVANSVILLE, INDIANA.

MINE TRAP-DOOR.

SPECIFICATION forming part of Letters Patent No. 513,576, dated January 30, 1894.

Application filed September 20, 1893. Serial No. 485,962. (No model.)

To all whom it may concern:

Be it known that we, GEORGE J. HERTH and GEORGE BONENBERGER, citizens of the United States, residing at Evansville, in the county of Vanderburg and State of Indiana, have invented certain new and useful Improvements in Mine Trap-Doors; and we do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form a part of this specification.

Our invention relates to new and useful improvements in mine trap-doors and to one adapted to control or cut off air currents from the different entries or rooms, and is automatic in operation, being opened by a car passing through the entry on a track from either direction and is also automatically closed after the passage of such car through the trap door.

Referring to the drawings, Figure 1 is a perspective view of our improved trap door and the mechanism for operating the same, the door being closed; Fig. 2, a similar view, one end of the operating mechanism being broken away and the door opened. Fig. 3 is an outer end view of the tripping mechanism, its movement being shown in dotted lines. Fig. 4 is a top plan view of the same. Fig. 5 is a perspective view of our trap door, showing a trip of a different form.

In detail, 1 represents a framework which is supported across the track in an entry of a mine the inner end 2 extending into a recess cut in the wall of the entry for its reception, this recess being large enough to allow the door 3 to be pushed back into it when opened. The door 3 has hangers on its top in which are carried wheels, these running on a horizontal track 4 on the upper cross piece of the framework 1.

5 is a shaft or rod having bearings in boxes 6 secured to the cross ties 7 of the track 8, and outside of and parallel with such track, the shaft extending under the door and to any desired distance on each side, and to this shaft on one side of the door is rigidly secured an operating lever or arm 9, its lower end being bolted or otherwise fastened be-

tween the bent ends of the sections of shaft 5, the upper end having pivoted to it the link 10 which is in turn pivoted to the door near its top. The outer boxing 6 at each extreme end of the shaft 5 is secured to the frame 11 set in the ground between two cross ties and below the rails, there being rigidly secured to the shaft 5 near this point a crank 12 which extends outward and is pivoted at its end to a link 13 whose upper end is pivoted to an arm of a bell crank lever 14 which is pivoted to a bracket or base 15 secured to the frame 11, the lower arms of such lever being in the form of a stirrup 16.

17 is a horizontal shaft or rod mounted in boxes 18 secured to the frame 11 and extends nearly across the track, an arm 19 being rigidly attached to the end between the rails and a wheel 20 being mounted in the end of such arm. The outer end of the shaft 17 extends under the bracket 15 and has a weighted arm 21 rigidly secured to it, this arm lying just within the stirrup 16 formed on the lower arm of the bell crank lever 14 and a pin or projection 22 on the side of the weighted arm extending into such stirrup such pin having a flanged wheel 36 thereon. The stirrup 16, weighted arm 21 and crank 12 all work in an inclosing box set in the ground at one side of the track, the form of this box being shown in dotted lines in Figs. 3 and 4.

The operation of our device is as follows: The door being closed and the parts in the position shown in Figs. 1 and 3, upon a car coming toward the door on the track 8 the bottom of the car will come in contact with the wheel 20 on the arm 19 moving such arm toward the door and its end nearly to the ground. This movement of the arm will turn the shaft 17 and the weighted arm 21; and, wheel 36 mounted on the pin 22 on the side of such arm 21 bearing against the side of the stirrup 16 as shown in Fig. 3. The bell crank lever 14 will be turned on its pivot and through the link 13 will depress the crank 12 and thus turn the shaft or rod 5 which will in turn operate through the lever 9 and link 10 to open the door 3 as shown in Fig. 2. As soon as the car or cars have passed over the wheel and arm 20 and 19 and ceased to bear on the former, the weighted arm 21 will through gravity act to lift the arm 19 and

wheel 20 to their original height as shown in dotted lines only pointing toward the trap-door instead of outward and the wheel 36 on the side of the weighted arm bearing against the inner side of the stirrup 16. When the tripping mechanism on one side of the door is operated and the door opened the mechanism on the opposite side will be simultaneously operated so that after the car has passed through the door the arm and wheel 19 and 20 on that side will be pointing toward it and so when the car comes in contact with the wheel the tripping mechanism will be operated precisely as before stated, only in an opposite direction, thus closing the door behind the car.

In the modification shown in Fig. 5 the parts of the mechanism are all the same except that the link 13 is not pivoted to the bell crank lever 14, but instead a slot 23 is formed in the upper end of the link through which a pin in the end of the upper arm of the bell crank lever passes allowing a movement of such lever independent of the crank. In addition the modified form has a rod 24 connecting the arm 19 with an arm 25 both being at the same angle and the latter rigidly mounted on a shaft 26 near the door a pivoted supporting arm 27 being provided also at the center of the rod. The shaft 26 is mounted in brackets secured to a cross tie and to the end of the shaft outside of the rails is rigidly attached an arm 28 to the end of which is secured a wire cord 29 passing over a pulley 30 on a cross piece 31 secured to the main frame 1, a weight 32 being secured to the end of the cord 29, for the purpose of assisting the lifting of the arms 19. A chain or cord 33 is also secured to the door 3 and after passing over a pulley has a weight 34 attached to it, this serving to close the door in the modified form.

The modified device shown in Fig. 5 operates substantially like the first, the car or cars riding over the wheel 20 forcing it inward and downward together with the rod 24 the turning of the shaft 17 operating the bell crank lever and through it the shaft 5 and thus opening the door. The car or cars will continue to bear on the rod 24 until the front end has passed through the open door and riding on top of the other rod 24 will hold it down after the car has left the first one and is entirely through the door, thus holding the door open until the car or cars have entirely passed through, and out of contact with the rod 24, when the weights 32 will aid in lifting the arms 19, and through the shaft 17 and bell crank lever on each side of the gate lift the arm 14 from the bottom of the slot in the link 13 when the weight 34 will operate to close the door. The advantage of this arrangement is that the tripping mechanisms can be placed very close to the door while in the first they must be at least, as far away as the longest train which will pass through it. Another point of advantage is that the gate by this ar-

range ment can never be left open when miners pass through, the weight always operating to close it. At the same time when the gate is opened by hand the tripping mechanism is not operated at all, the slot in the link 13 allowing this.

Our improved gate is simple in construction, not likely to get out of order and is perfect in operation. Being direct and positive in action, it can always be relied on to open and close.

Having fully described our invention, what we desire to secure by Letters Patent is—

1. In a trip for mine trap doors, an arm mounted on a shaft on each side of the door in the path of passing cars, a weighted arm on the outer end of each of such shafts, and a bell crank lever engaging with each weighted arm, and also with mechanism for opening and shutting the door, substantially as set forth.

2. In a trip for mine trap doors, a wheel carrying arm mounted on a shaft on each side of the door in the path of passing cars, a weighted arm on the outer end of each of such shafts having a projection thereon, and a bell crank lever having a stirrup engaging with the projections on each weighted arm, said lever engaging also with mechanism for opening and shutting the door, substantially as set forth.

3. In combination with a mine trap door, a lever connected thereto and mounted on a shaft below, a crank mounted on such shaft on each side of the door, a bell crank lever connected with each of such cranks, a stirrup formed on each bell crank lever, a trip arm mounted on a shaft on each side of the door in the path of the cars, and arms on the outer ends of such shafts, one of such arms engaging with the stirrup of each bell crank lever, substantially as set forth.

4. In combination with a mine trap door, a lever connected thereto and mounted on a shaft below, a crank mounted on such shaft on each side of the door, a bell crank lever connected with each of such cranks by a link, a stirrup formed on each bell crank lever, a trip arm mounted on a shaft on each side of the door in the path of the cars, weighted arms on the outer ends of such shafts and a roller pivoted to each of such weighted arms, one of such rollers engaging with the stirrup of each bell crank lever, substantially as set forth.

5. In a trip for mine trap doors, a trip arm mounted on a shaft on each side of the door at a distance therefrom and in the path of passing cars, a similar trip arm mounted on a shaft on each side of the door and in proximity thereto, a rod connecting the ends of the two trips on each side of the door and means for holding the trips and their rods raised, a bell crank lever suitably connected with each of the outer trip arms, a link having a pin and slot connection with each of the bell crank levers and also connected by suitable mechanism with the door, and means for shutting the

door after a car has passed through it, substantially as set forth.

6. In a trip for mine trap doors, a trip arm mounted on a shaft on each side of the door at a distance therefrom and in the path of passing cars, a similar trip arm mounted on a shaft on each side of the door and in proximity thereto, a rod connecting the ends of the two trip arms on each side of the door together and means for holding them up, a weighted arm mounted on the outer end of each of the outer trip shafts, mechanism connecting such shafts with the door for opening it and suitable means connected with the door for closing it, substantially as set forth.

7. In a trip for mine trap doors, a trip arm mounted on a shaft on each side of the door at a distance therefrom and in line with pass-

ing cars, a similar trip arm mounted on a shaft on each side of such door and in proximity thereto, a rod connecting the two on each side of the door, together, weights suitably connected to such arms and rods normally holding them in a raised position, mechanism connecting the outer trip shafts with the door for opening it, and a weight suitably connected with the door for closing it, substantially as set forth.

In testimony whereof we affix our signatures in presence of two witnesses.

GEORGE J. HERTH.
GEO. BONENBERGER.

Witnesses:

CHARLES L. ROBERTS,
EMIL W. SAUPER.