

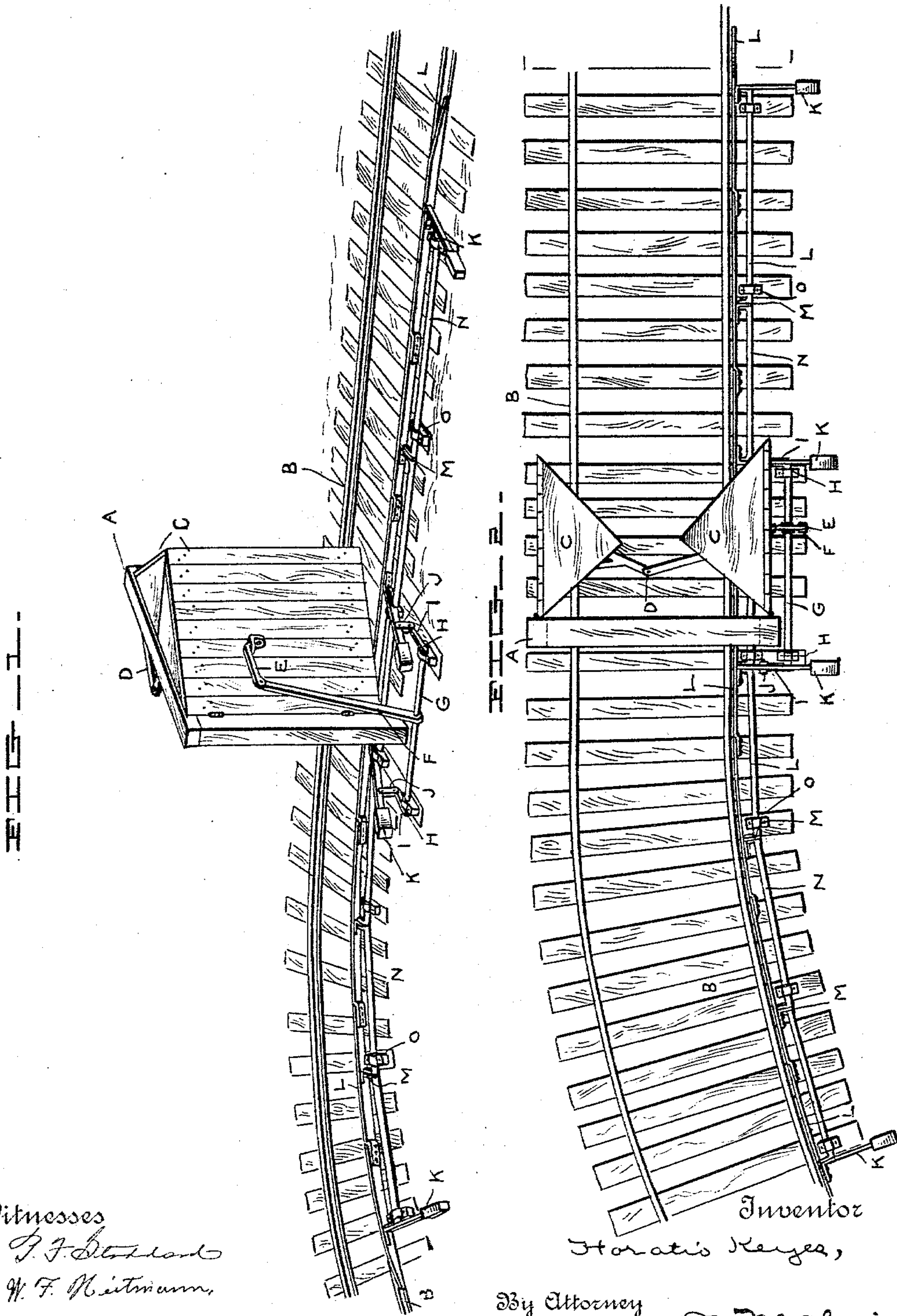
(No Model.)

3 Sheets—Sheet 1.

H. KEYES.
MINE TRAP DOOR.

No. 571,570.

Patented Nov. 17, 1896.



Witnesses

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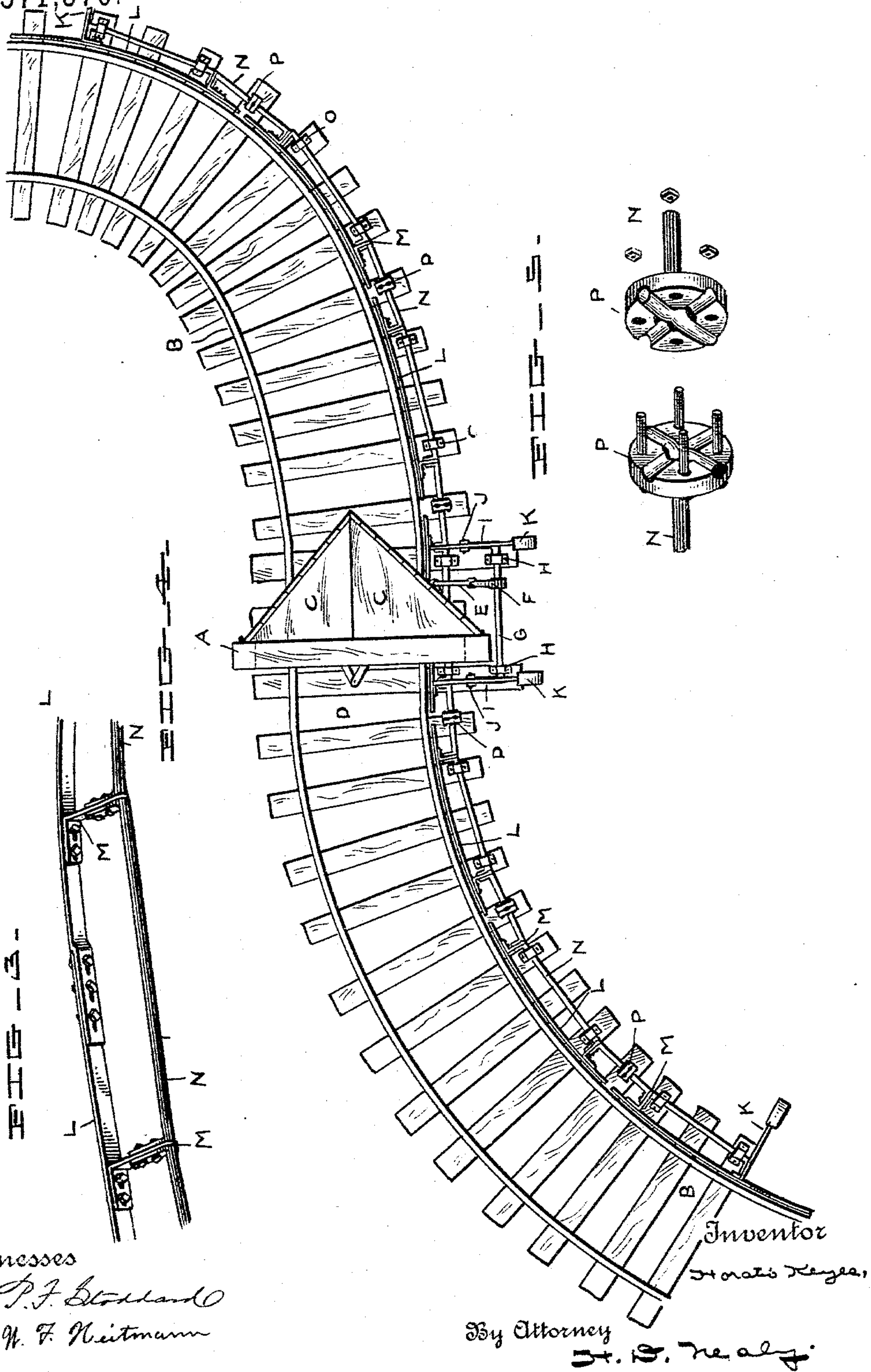
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3 Sheets—Sheet 2.

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3 Sheets—Sheet 3.

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FIG--7--

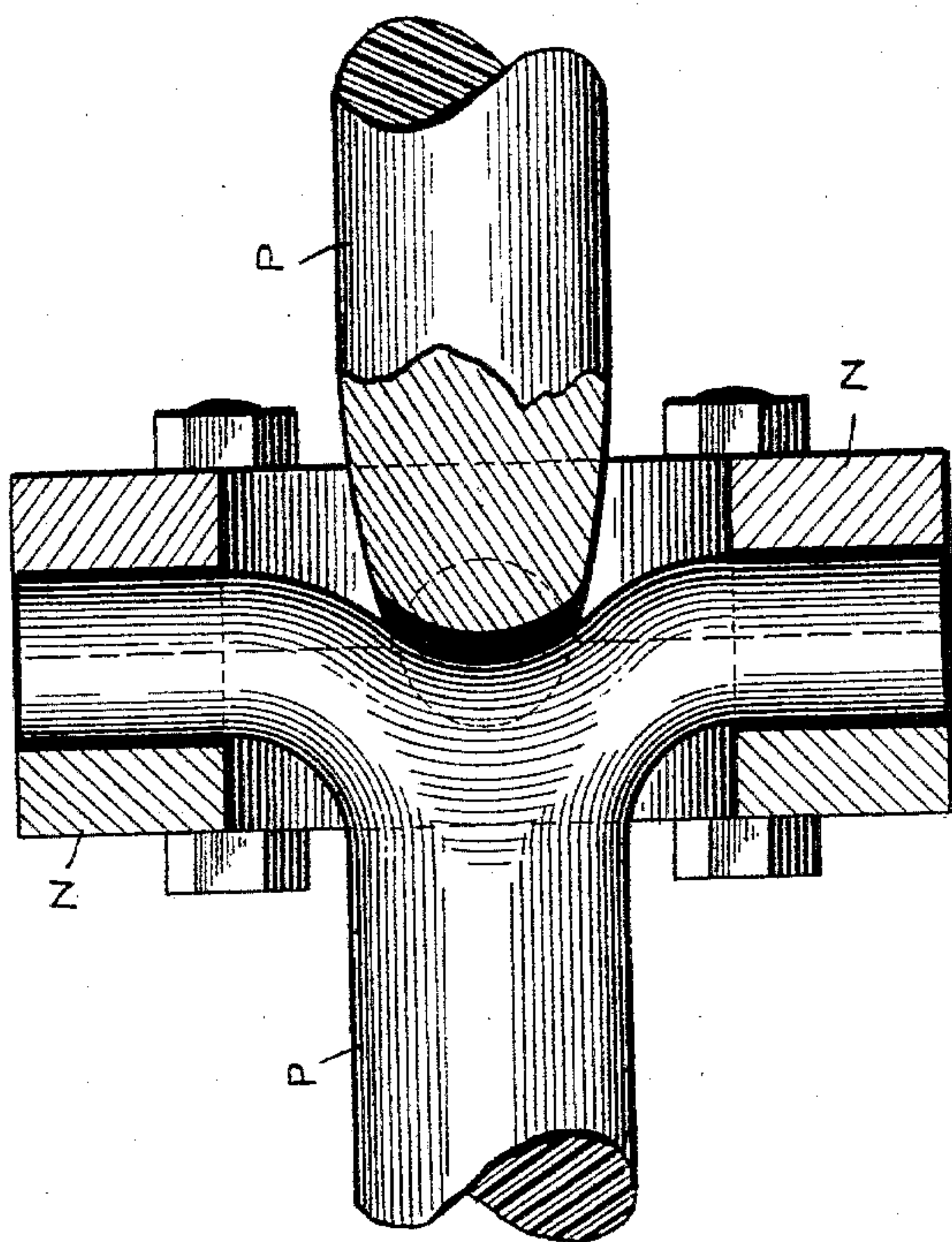
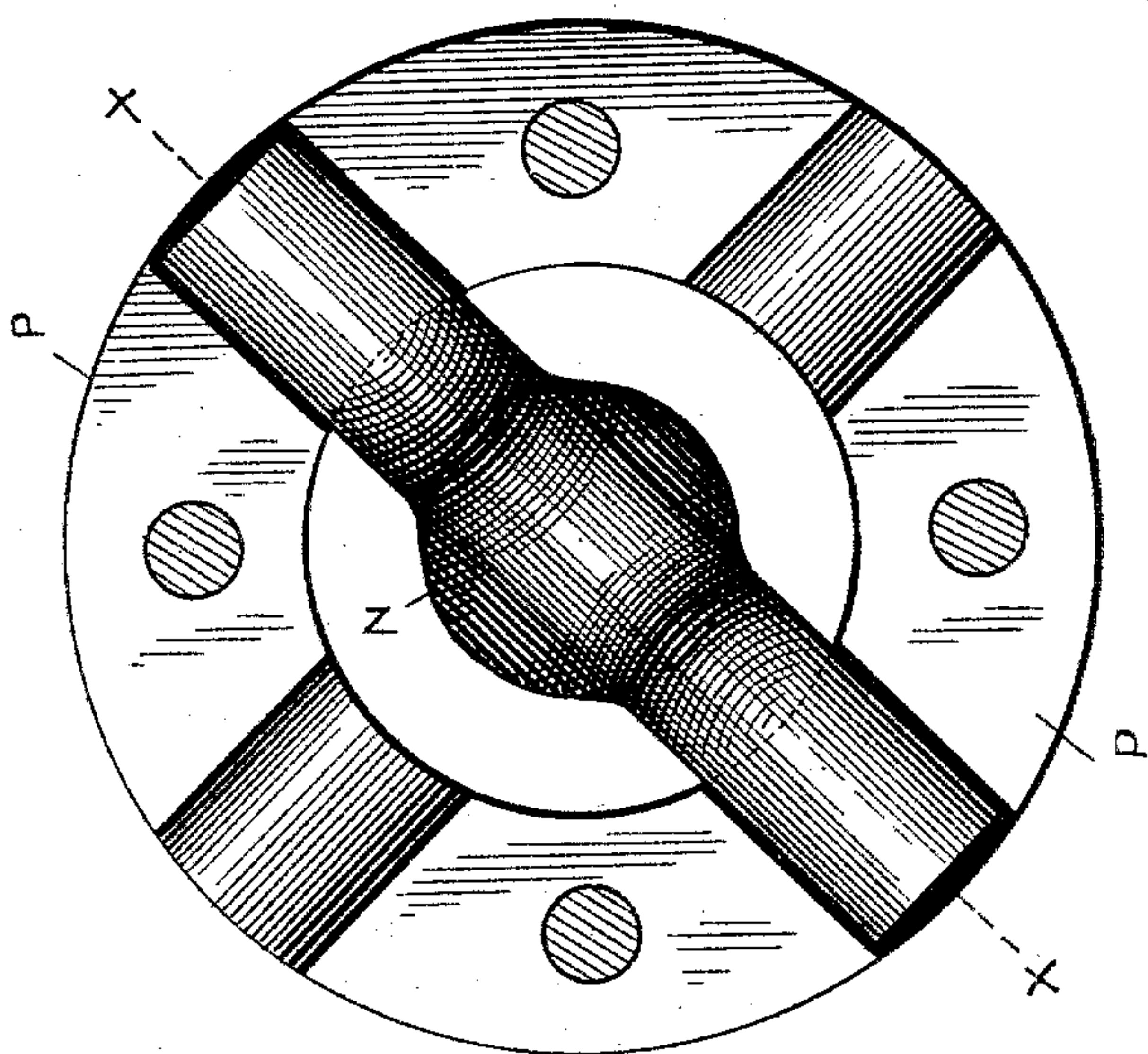


FIG--8--



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UNITED STATES PATENT OFFICE.

HORATIO KEYES, OF TERRE HAUTE, INDIANA.

MINE TRAP-DOOR.

SPECIFICATION forming part of Letters Patent No. 571,570, dated November 17, 1896.

Application filed April 19, 1895. Serial No. 546,318. (No model.)

To all whom it may concern:

Be it known that I, HORATIO KEYES, a citizen of the United States, residing at Terre Haute, in the county of Vigo and State of Indiana, have invented certain new and useful Improvements in Mine Trap-Doors; and I 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 letters of reference marked thereon, which form a part of this specification.

My invention relates to new and useful improvements in mine trap-doors, and to one of that class which is adapted to be placed in the entries or rooms of coal-mines to cut off or control the air-currents through said entries.

The particular object of my invention is to provide such a door and automatic operating mechanism that can be placed in a mine regardless as to whether the entry be straight or curved to any degree and one which can be wholly constructed and ready to be placed in position in the mine without making previous measurements or inspections.

In the drawings, where like letters of reference refer to similar parts and where the preferred construction of my trap-door is shown, Figure 1 is a perspective view of the door in position across a track, such track being straight on one side of the door and curved on the other and showing the adaptability of the operating mechanism to both. Fig. 2 is a plan view of the same, the door being opened, its operating mechanism having been operated from one end by its moving bar having been depressed. Fig. 3 is a detail perspective view showing the manner of connecting the sections of the moving bar shown in Figs. 1 and 2 together and also to the sectional shaft. Fig. 4 is a plan view of a modified form of my device which is specially adapted for use in entries where the curve of the track is of small radius. Fig. 5 is a detail perspective view showing the method of coupling the modified form of sectional moving bar together. Fig. 6 is an inner face view of one-half of one of the couplings of the sectional shaft shown in the modification, with one end

of a shaft-section in place. Fig. 7 is a cross-section through the same on the line xx , showing the complete coupling and the ends of two shaft-sections coupled together.

In detail, A represents the frame of the door, which is supported across the track B in the entry of a mine, C being the double doors, which are hinged to the framework A and are so connected by levers D as to operate simultaneously in opening and closing across the track.

E is a link which connects one of the doors with an operating arm or lever F, which is rigidly fixed to a shaft G, carried in boxings H at the side of the track and outside of the door-frames, the boxes being preferably secured to the cross-ties.

I are short cranks formed on the ends of the shaft G, and these cranks are connected by links J to the weighted arms K, which are attached to the sectional shaft N and their inner ends to the moving bar L.

Lying to either side of the door and at some distance therefrom (preferably fifteen or twenty feet) and close to the side of one of the rails is a moving bar L, which is adapted to be depressed by the wheels of the car passing over the track. This moving bar L is made up of a number of flexible sections, which are connected together in the manner shown in Fig. 3 by bolts which pass through holes in one section of the moving bar and through slotted openings in the next section, allowing the moving bar to be shortened or lengthened at will.

M are brackets secured to the several sections of the moving bar L by bolts which pass through slots in the brackets and holes in the several sections of the moving bar, allowing such moving bar to be adjusted with relation to the brackets, the outturned ends of the brackets being secured between the turned or bent ends of the sections of a shaft N, mounted in boxings O alongside of and parallel with the moving bar and preferably about six inches therefrom.

To the outer ends of the sectional shaft are secured weighted arms K, similar to the ones mentioned before on each side of the door and connected by links J with the cranks I, the outer ones acting, however, only as weighted arms to lift the moving bar to its normal posi-

tion after having been depressed, while the ones on each side of the door also serve, through their connections with such door, to open and close the same.

5 It will be seen that where the trap-door is to be put in a mine where the track is straight no adjustment of the sectional bar is necessary, but where a piece of curved track is found it will be necessary to unloosen the
10 bolts of the several sections L and of the brackets M, which lie along the curved track, as the moving bar must always lie close to although not touching the rail. After the moving bar has been curved to conform to the
15 curve of the rail the bolts are tightened and a perfect curved moving bar is had. In bending or curving the moving bar it is either made shorter or longer, as desired, and the sectional shaft N is made to conform to the
20 same curve by merely bending its turned ends where they are connected to the pressure-bar by the brackets M, as shown in the drawings.

In the modifications shown in Figs. 4 and 5 the moving bar is made in sections similar to
25 the first, but instead of the sections being connected directly together they are only connected together through the sectional shaft N, each section of the moving bar being connected to the sectional shaft at suitable points
30 not too far apart, the shaft-sections being coupled together by a universal coupling P, (shown in Fig. 5,) which allows the shaft-sections to be made straight, and a coupling-bar being required to only every alternate
35 section.

In other respects the construction of this door and its operating mechanism is precisely the same as that of the first. On the approach
40 of a car from either direction its wheels would move on and depress the moving bar, which, through its connections with the sectional shaft N, would cause the same to turn, thus lifting the outer ends of the weighted arms K. As the arms K next to the door are raised,
45 they being connected by the links J with the cranks I on the shaft G would cause such shaft to turn and through the lever F open the door. After the car or cars have passed entirely through the door and off of the moving
50 bar it would be raised to its normal position and the door closed by the dropping of the weighted arms K.

The advantage of this operating mechanism is that a moving bar is obtained which can be
55 made to conform to a rail of any curve. It is, when in position, practically rigid, yet has enough spring or flexibility to prevent any strain in operation. The same form is adapted for rails of different curves. The
60 same door and mechanism can be placed in any entry whether straight or curved, and should a greater or less length of moving bar be required on either side of the door, sections can be removed or added. If one section be
65 damaged or worn, only that section need be removed and can be readily replaced. There is nothing complicated about the operating

mechanism or any part likely to get out of order, yet if it should happen any ordinary mechanic or workman can make the necessary
70 repairs.

Other modifications can be made in the operating mechanism than the one mentioned without departing from the spirit of my invention or without changing the operation.
75 but the forms shown I have found most satisfactory.

Having fully described my invention, what I claim as new, and desire to secure by Letters Patent of the United States, is—
80

1. In a mine trap-door, an expansible moving bar formed in sections whereby it can be made to conform to the line of a straight or curved track, such bar lying in the path of passing cars, a shaft connected with such moving
85 bar, and mechanism between such shaft and door for opening and closing the latter when the bar is operated.

2. In a mine trap-door a moving bar formed in sections, a flexible shaft connected to said
90 moving bar, whereby it may be made to work on the line of either a straight or curved track, and suitable devices connecting such shaft with the door, whereby such door will be opened and closed by the movement of passing
95 cars.

3. In a mine trap-door, a moving bar lying parallel with and close to one of the rails and adapted to be moved by passing cars, said bar being formed of expansible sections adjust-
100 ably connected together, a shaft connected with such moving bar and mechanism between such shaft and door whereby the door will be opened and closed on the operation of the moving bar.
105

4. In a mine trap-door, a moving bar lying parallel with and close to one of the rails and adapted to be moved by passing cars, said bar being formed of sections, a flexible shaft
110 formed of sections connected together and with the moving bar, and devices connected with said shaft and the trap-door, whereby such door will be opened and closed on the operation of the moving bar.

5. In a mine trap-door, a moving bar lying
115 parallel with and close to one of the rails and adapted to be moved by passing cars, said bar being formed of sections adjustably connected together, a flexible shaft formed of sections suitably connected together and with
120 the moving bar, and devices connected with such shaft and the trap-door whereby such door will be opened and closed on the operation of the moving bar.

6. In a mine trap-door, a moving bar lying
125 parallel with and close to one of the rails and adapted to be moved by passing cars, said bar being formed in sections adjustably connected together, a shaft formed of sections connected together by universal couplings
130 and to the moving bar by short arms, and devices connected with said shaft and the trap-door whereby such door will be opened and closed on the operation of the moving bar.

7. The combination with a mine trap-door of a moving bar formed in sections, such bar lying parallel to the track in the path of passing cars; a flexible shaft adapted to carry such bar and permit it to conform to a track of any curvature, and mechanism connecting such shaft with the door for opening and closing the same.

8. In a mine trap-door, a moving bar formed in sections adjustably connected together whereby the bar can be shortened or lengthened, and the device thereby be made to conform to the line of a straight or curved track, such bar lying parallel with the track and in the path of passing cars, a flexible shaft mounted in fixed boxings and carrying such moving bar, and connections between such shaft and door whereby the latter will be opened and closed through the operation of the moving bar.

9. In means for operating a mine trap-door, a moving bar adjustable to lie parallel with the rails of a curved or a straight track; a sectional coupled shaft, adapted to carry such adjustable moving bar, and mechanism con-

necting such shaft with the door, whereby the latter will be opened and closed by the movement of the moving bar.

10. The combination with a mine trap-door of an adjustable moving bar in the path of passing cars; a suitable shaft carrying said moving bar, whereby the two are adapted to be operated on a straight or curved track; and mechanism between said shaft and door for opening and closing the latter when the bar is operated.

11. The combination with a mine trap-door of a moving bar, such bar lying parallel to the track, a suitable shaft adapted to carry such bar and permit it to conform to a track of any curvature, and mechanism connecting such shaft with the door for opening and closing the same.

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

HORATIO KEYES.

Witnesses:

LENA REICHERT,

CHARLES O. REICHERT.