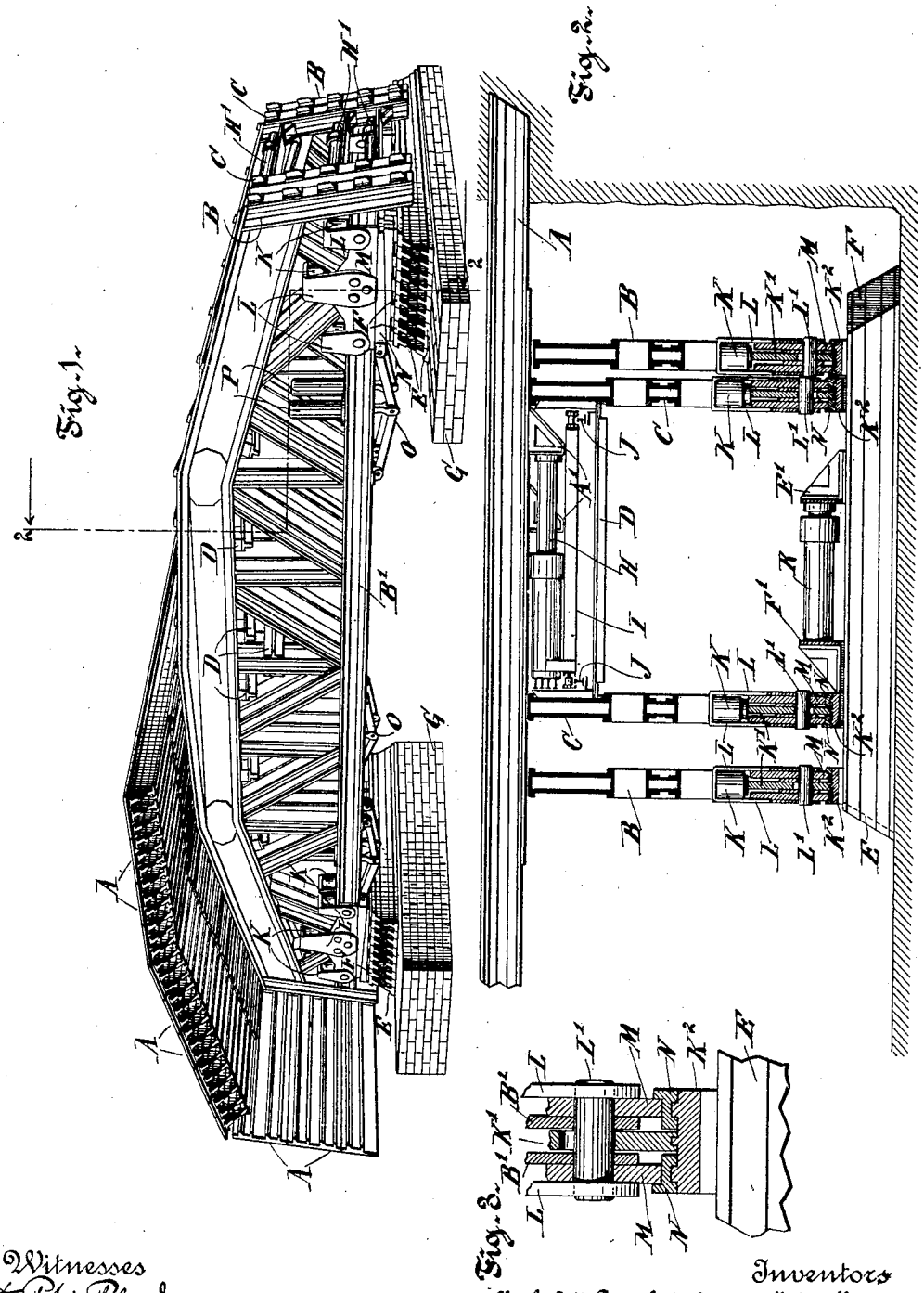
No. 810,428. PATENTED JAN. 23, 1906.

C. L. PARMELEE & E. G. WILLIAMS.

TUNNEL SHIELD.

APPLICATION FILED JAN. 3, 1905.



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UNITED STATES PATENT OFFICE.

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TUNNEL-SHIELD.

No. 810,428. Specification of Letters Patent. Patented Jan. 23, 1906.

Application filed January 3, 1905. Serial No. 239,299.

To all whom it may concern:

Be it known that we, CHARLES LESTER PARMELEE, a resident of Orange, in the county of Essex and State of New Jersey, and EDWARD GILBERT WILLIAMS, a resident of the city of Washington, in the District of Columbia, citizens of the United States, have jointly invented certain new and useful Improvements in Tunnel-Shields, of which the following is a specification.

Our invention relates to tunnel-shields, and more particularly to that class thereof wherein movable supports are employed to hold the roof in position. We contemplate the employment of a plurality of such supports which are independently operable and may be separately advanced as the excavation proceeds.

To this end our invention consists in the novel construction and arrangement of parts described in the specification, illustrated in the drawings, and finally pointed out in the claims.

Referring to the drawings, Figure 1 is a perspective view of the improved tunnel-shield and connected parts, a portion of the roof or poling boards being removed. Fig. 2 is a transverse vertical section of the same, taken substantially on the lines 2 2 of Fig. 1; and Fig. 3 is an enlarged sectional detail of certain of the parts shown in Fig. 2.

The roof proper may be of any desired form or construction, although, as illustrated, it consists of a plurality of independent sections or poling-boards A A, which are advanced one by one into the earth, as shown in Fig. 2. This particular construction of the roof proper, however, forms no part of the present invention, which relates more particularly to the supporting means therefor. The roof A A rests upon and is alternately supported by the truss constructions B B and C C. As shown in the drawings, the outer truss construction B B is composed of two separate members B and B, connected to each other in any suitable manner—as, for instance, by the transverse beams D D. The inner truss construction C C is similarly composed of two members C and C, suitably connected. The trusses C C are located entirely within the trusses B B (see Fig. 2) in such manner that a certain amount of relative lateral movement is provided for, the extent of this movement being determined by the distance intervening between the two, as plainly shown. In addition to this capability for lateral movement of the truss constructions B B and C C they are also provided with means whereby they may be separately elevated and lowered, so as to alternately bear the weight of the roof A A and the earth thereover. As shown in the drawings, these elevating means consist of jacks K K, connected by the straps or lifting-pieces L L to side plates M M, which embrace a portion of the truss construction, such as B′. A bolt or bar L′ passes through the straps L L and plates M M and truss element B′, so that when power is applied to the jacks K K the truss B B is elevated thereby. Each jack K is provided with a plunger K′, which rests upon the base K^2, the plunger K′ being slotted to permit the free passage therethrough of the bar L′.

In order to hold the truss in its elevated position after the action of the jacks K K, we have provided sliding wedge-pieces N N, which are movable into and out of the space left between the plates M M of truss element B′ and the base K^2 when the truss is elevated. The wedge N is arranged to coact with an oppositely-formed wedge-surface upon the base K^2, forming, in effect, a double wedge, and thereby insuring the accurate parallelism of the upper surface of the wedge N with relation to the truss element B′ at any degree of elevation. The wedges N N may be inserted into and removed from the space between the truss element B′ and the base K^2 by any suitable means—such, for instance, as the toggle-joints O O and the jacks P P. The provision of the wedges and the operating means therefor thus insures the retention of the trusses in their elevated positions and relieves the strain upon the jacks K K when the latter are not in use.

The bases K^2 K^2 of the truss B B at each end thereof are mounted upon longitudinally-movable tracks E E E, and the bases K^2 K^2 of the truss C C at each end thereof are mounted upon longitudinally-movable tracks F F F. The tracks E E E of the truss B B and the tracks F F F of the truss C C are arranged alternately and in close proximity to each other, so that as the tracks E E E or the tracks F F F are separately advanced each

set acts as a guide for the other. As shown in Fig. 1, the tracks E E E and F F F rest upon the side walls G G of the tunnel and are movable thereon. The tracks E E E are provided with a transverse piece or connection E′, and the tracks F F F are similarly provided with a piece or connection F′, and between the pieces E′ and F′ a jack R or other equivalent means is located to effect the alternate forward movement of the tracks E E E and F F F. The jack R is capable of effective action in two directions—namely, a push, which acting upon the transverse piece E′ advances the tracks E E E relatively to the tracks F F F, and a pull action upon the transverse piece F′, which advances the tracks F F F relatively to the tracks E E E. If desired, pairs of plain jacks acting in opposite directions may be substituted for the compound jacks R.

The separate roof-sections or poling-boards A A are formed with depending projections A′ A′, whereby they are severally advanced into the earth. As shown in Fig. 2, the cross-pieces D D of the truss C C are provided with longitudinal tracks J J, upon which a carriage I is adapted to travel, and a hydraulic jack H or other means is mounted upon the carriage I, and thus may be brought into proper position to act upon the projection A′ of any selected one of the top poling-boards A A, so that each may be advanced independently. The poling-boards A A at the side are similarly advanced one by one by means of the stationary jacks H′ H′, located in proper position to engage therewith.

The operation is substantially as follows: The truss C C is first elevated by the jacks K K and the wedges N N are inserted, so that the weight of the roof-shield A A and of the superimposed earth is borne thereby. (See Fig. 2.) In this position the poling-boards A A are advanced one at a time by the jacks H or H′, as previously described. The truss C C at this time is also in its furthermost advanced position, the front member C thereof being in close relation to the front member B of the truss B B, and, as shown, the tracks F F F project beyond the tracks E E E. After the poling-boards A A have been all advanced the truss B B, which is in its lowermost position, is advanced by the jacks R R, connected to the transverse pieces E′ and F′ of the tracks E E E and F F F, respectively, until the rear member B of the truss B B is in close relation to the rear member C of the truss C C. The truss B B is then elevated by the jacks K K, and the wedges N N are inserted beneath it, so that the truss B B is in operative position to sustain the roof-shield A A and the weight thereon. The truss C C is now lowered by the withdrawal of its wedges N N and the action of its jacks K K to its lowermost and free position. The jacks R R are operated in the opposite direction, so as to advance the truss C C to its extreme forward position, and the truss C C is again raised to sustain the roof-shield A A. The truss B B is then lowered, and the parts resume the positions shown in Fig. 2. It will thus be seen that the truss-supports B B and C C may be separately lowered, advanced, and then raised again, so as alternately to support the roof-shield and the weight thereon as the excavation proceeds.

In the drawings the tracks E E E and F F F are shown as resting upon the side walls G G of the tunnel, which are constructed in drifts excavated in advance of the work. It will be obvious, however, that the trusses and roof-shield may be so constructed as to cover the entire roof and both sides of the tunnel without departing from the principles herein described. Other variations will suggest themselves to those skilled in the art without departing from the spirit of our invention, which relates in its broadest term to a construction wherein the roof-shield is supported upon independent elements which may be severally advanced as the excavation proceeds.

Having thus described our invention, its construction and mode of operation, what we claim, and desire to secure by Letters Patent of the United States, is as follows:

1. The combination with a roof-shield of a plurality of supports therefor, together with means for independently advancing the supports as the excavation proceeds.

2. The combination with a roof-shield of a plurality of supports therefor, each of which sustains the entire weight of the shield and may be independently advanced as the excavation proceeds.

3. The combination with a roof-shield of a plurality of supports therefor, together with means for independently moving the said supports into and out of operative position and means for advancing the supports as the excavation proceeds.

4. The combination with a roof-shield of a plurality of supports therefor, together with means for independently raising and lowering the said supports into and out of operative position and means for advancing the supports as the excavation proceeds.

5. The combination with a roof-shield of a plurality of supports therefor, the said supports being independently advanceable and provided with coöperating means whereby each during its advance is guided by the others.

6. The combination with a roof-shield of a plurality of supports therefor, each of which sustains the weight of the shield across its width and may be independently advanced as the excavation proceeds.

7. The combination with a roof-shield comprising a plurality of separately-movable sections of a plurality of supports therefor, each

of which sustains the weight of the movable sections and may be independently advanced as the excavation proceeds.

8. The combination with a roof-shield of a plurality of supports therefor, each of which sustains the weight of the shield across its width and may be independently raised and lowered into and out of operative position.

9. The combination with a roof-shield comprising a plurality of separately-movable sections of a plurality of supports therefor, each of which sustains the weight of the movable sections and may be independently raised and lowered into and out of operative position.

10. The combination with a roof-shield of a plurality of supports therefor, each of which sustains the weight of the shield across its width and may be independently moved into and out of operative position and advanced as the excavation proceeds.

11. The combination with a roof-shield comprising a plurality of separately-movable sections of a plurality of supports therefor, each of which sustains the weight of the movable sections and may be independently moved into and out of operative position and advanced as the excavation proceeds.

12. The combination with a roof-shield of a plurality of supports therefor, each of which sustains the weight of the shield across its width and may be independently raised and lowered into and out of operative position and advanced as the excavation proceeds.

13. The combination with a roof-shield comprising a plurality of separately-movable sections of a plurality of supports therefor, each of which sustains the weight of the movable sections and may be independently raised and lowered into and out of operative position and advanced as the excavation proceeds.

14. The combination with a roof-shield of a plurality of supports therefor, each of which sustains the weight of the shield across its width, together with means for independently raising and lowering the said supports into and out of operative position.

15. The combination with a roof-shield comprising a plurality of separately-movable sections of a plurality of supports therefor, each of which sustains the weight of the movable sections, together with means for independently raising and lowering the said supports into and out of operative position.

16. The combination with a roof-shield of a plurality of supports therefor, each of which sustains the weight of the shield across its width, together with means for independently moving the said supports into and out of operative position.

17. The combination with a roof-shield comprising a plurality of separately-movable sections of a plurality of supports therefor, each of which sustains the weight of the movable sections, together with means for independently moving the said supports into and out of operative position.

In testimony whereof we have hereunto subscribed our names to this specification in the presence of two attesting witnesses.

CHARLES LESTER PARMELEE.
EDWARD GILBERT WILLIAMS.

In presence of—
E. W. MANUEL,
C. B. BROCKWAY.