No. 811,404. PATENTED JAN. 30, 1906.

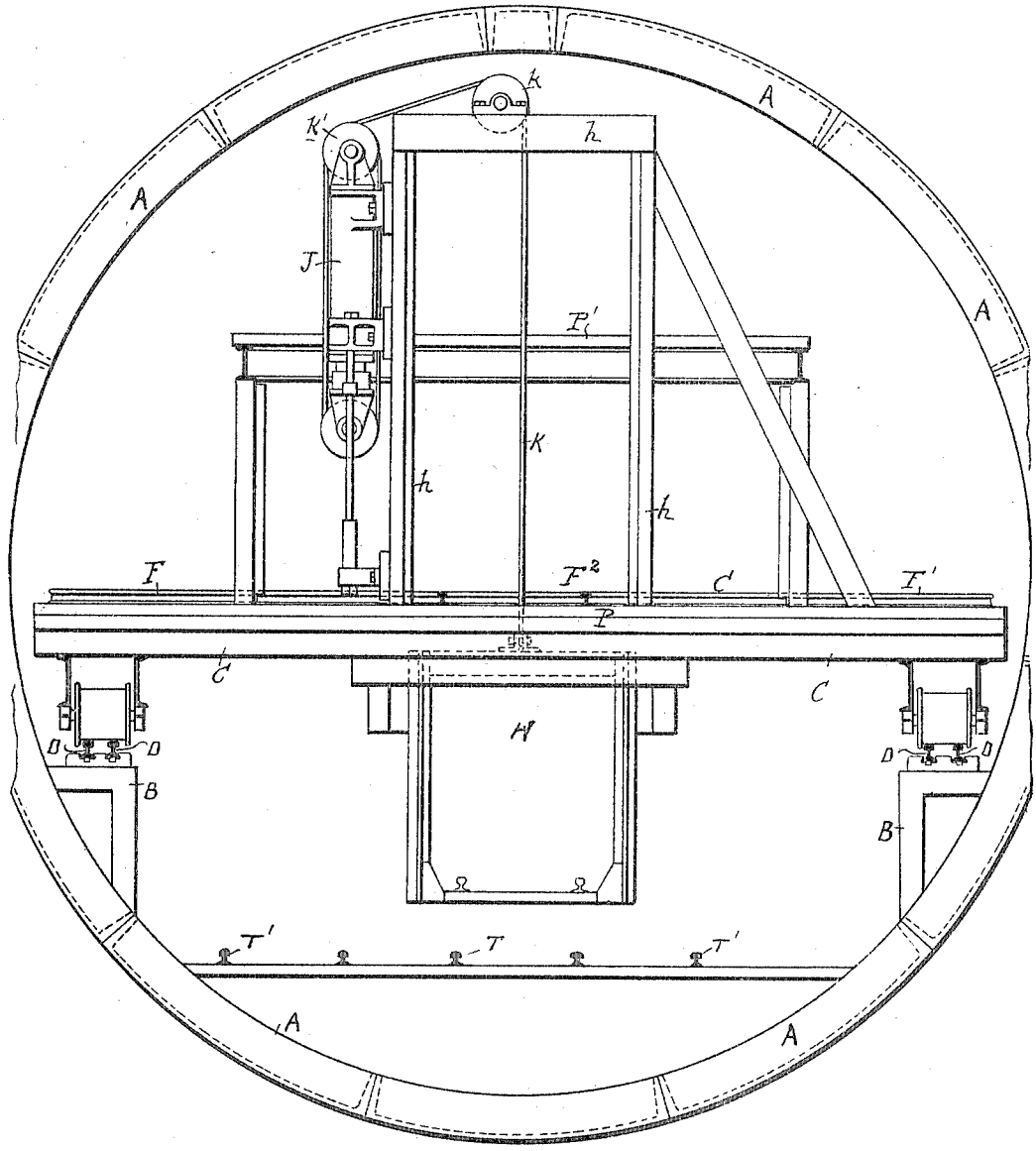
H. JAPP.

APPARATUS FOR ERECTING TUNNELS.

APPLICATION FILED SEPT. 21, 1905.

4 SHEETS—SHEET 1.

FIG. 1



WITNESSES

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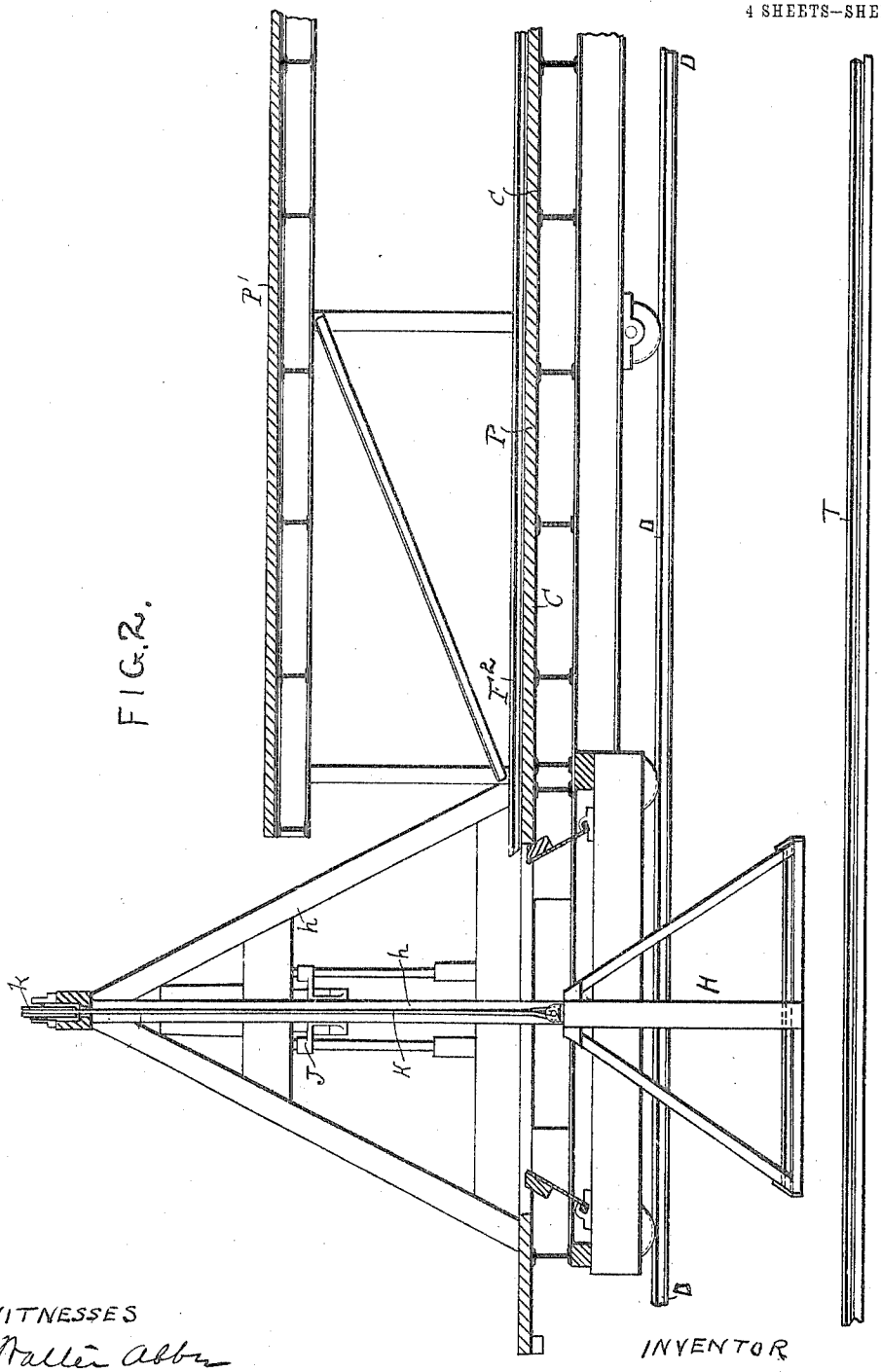
4 SHEETS—SHEET 2.

FIG. 2.



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4 SHEETS—SHEET 3

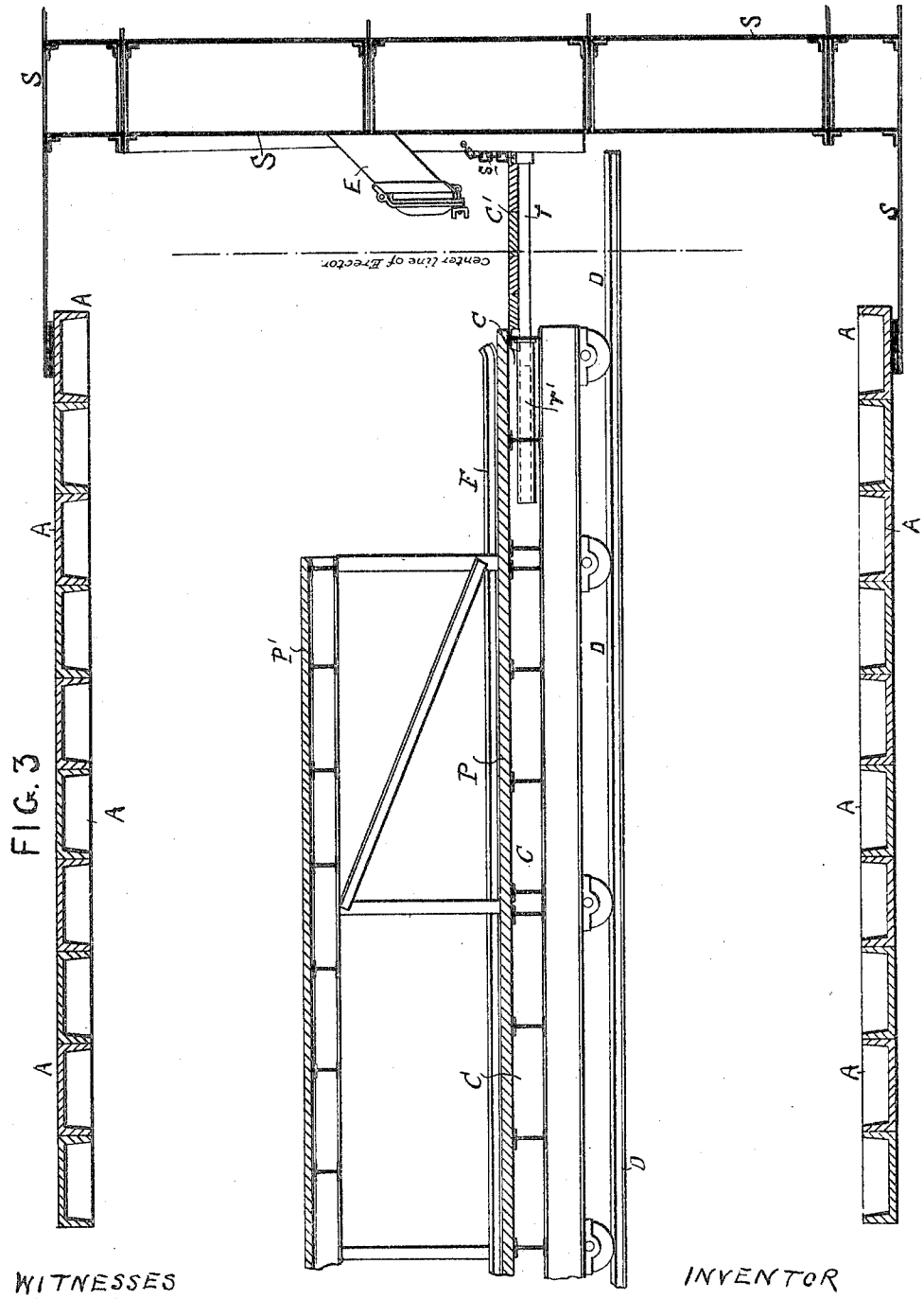

FIG. 3

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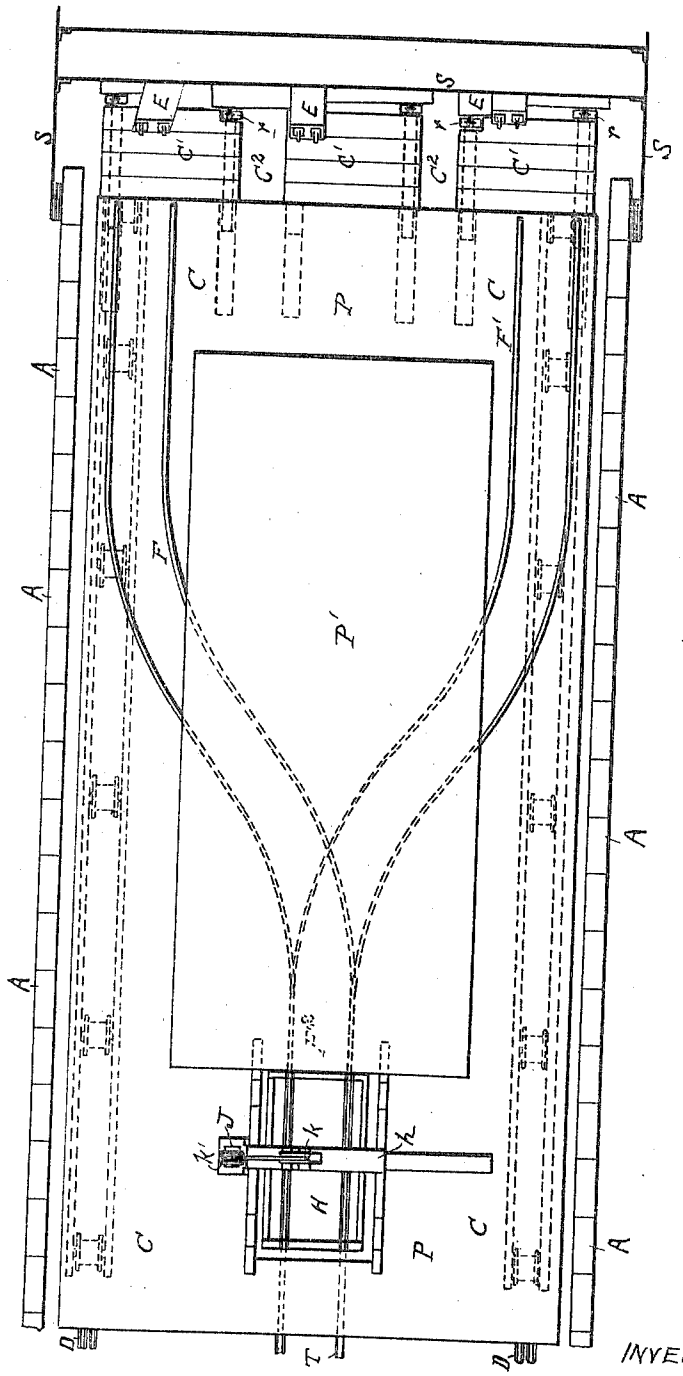
4 SHEETS—SHEET 4.

FIG. 4.



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UNITED STATES PATENT OFFICE.

HENRY JAPP, OF NEW YORK, N. Y., ASSIGNOR TO S. PEARSON AND SON, INC., OF LONG ISLAND CITY, NEW YORK, A CORPORATION OF NEW YORK.

APPARATUS FOR ERECTING TUNNELS.

No. 811,404. Specification of Letters Patent. Patented Jan. 30, 1906.

Application filed September 21, 1905. Serial No. 279,552.

To all whom it may concern:

Be it known that I, HENRY JAPP, a subject of the King of Great Britain and Ireland, and a resident of the borough of Manhattan, in the city, county, and State of New York, have invented certain new and useful Improvements in Apparatus for Erecting Tunnels, of which the following is a specification.

The present improvements are chiefly intended for and applicable to apparatus for erecting tunnels of the type disclosed in the United States Patent of Ernest W. Moir, No. 794,635, dated July 11, 1905.

The main objects of this invention are to improve the construction and operative capacity of the apparatus and to facilitate the discharge of the material to be removed and the handling of the segments to be put into place.

In the accompanying drawings, Figure 1 is a transverse section through the tunnel at the rear of the traveling erecting-stage, the tunnel itself being indicated only in outline. Fig. 2 is a longitudinal section through the rear of the erecting-stage. Fig. 3 is a corresponding longitudinal section through the forward end of the erecting-stage and the shield, and Fig. 4 is a plan view of the stage.

Characteristic features of the apparatus shown in the above-mentioned Moir patent are the construction of the lining of the tunnel of iron or steel segments and the putting of these segments into place by means of a hydraulic erector as the tunnel is excavated and the shield is advanced. This erector was mounted on a stage traveling lengthwise of the tunnel on rails carried by brackets secured to the erected tunnel-lining.

Referring to the drawings, A A are the metallic segments, which are fitted together to form the finished tubular lining of the tunnel, and B B are the brackets, which are bolted at a suitable height to the flanges of the segments, of which the finished lining has been built up. On these brackets are mounted rails D D, on which travel the wheels of the stage C. On this stage may be suitably mounted the hydraulic erector mechanism intended to put the segments into place, as described in the Moir patent; but such erector forms no essential part of the present invention.

In Fig. 3 there is shown in transverse section the shield S, which is advanced in the usual manner as the tunnel is excavated, the material excavated on the forward side of the tunnel being discharged through passages or chutes E onto platforms carried by the stage C. For this purpose there may be provided removable or extension platforms C′, carried by rods *r*, which slide and can be telescoped back into tubes *r*′, carried by the framework of the stage. Between adjacent extension-platforms C′ are provided spaces C^2 for the hydraulic erectors, and when either of the latter is to be operated to put a segment into position such of the platforms C′ as may be necessary are removed and their rods *r* telescoped back out of the way.

The stage C may be connected to the shield S by links *s*, Fig. 3, so that the stage will be advanced as the shield is advanced. The stage C is provided in addition to the main platform P with a superstructure or upper platform P′ to facilitate the handling of the cement, bolts, and other building material, and there is left sufficient space between the upper platform and the lower or main platform for the workmen and for the running of dumping cars or wagons on the tracks F F′ on the main platform. There are two tracks toward the forward end of this main platform, as shown in Fig. 4, but at the rear the two tracks join into one central track F^2, leading to a vertical hoist H, working through an opening near the rear of the stage. This hoist or cage H travels on the upright frame *h h* on the stage and can be raised or lowered by means of a hydraulic or other hoisting means, such as shown at J, Fig. 1, with the hoisting-rope K passing over pulleys *k k*′ on the upright frame *h h*. This hoist or cage can be lowered onto the central track T at the bottom of the tunnel to run the loaded or unloaded cars or wagons from or onto the cage H, or the latter may be raised to the level of the main platform P of the stage or to the level of the upper platform P′.

By having the two branch tracks F F′ leading to the opposite sides of the front end of the platform, where they are loaded with the excavated material delivered through the shield from the forward side of the latter, and by having these two tracks connect to the single track F^2, leading to the cage, the material can be handled with rapidity, providing almost a continuous service.

In addition to the central track-rails T on

the bottom of the tunnel it is preferable to provide one or two side tracks T' T', Figs. 3 and 4, on which to run the main cars, which may also be used to carry the segments to be placed in position to form the tunnel-lining.

I claim as my invention—

1. The combination of a tunnel with tracks for cars, a stage adapted to be traversed longitudinally above the tracks in the tunnel and a hoisting-cage carried by the stage and adapted to be lowered to the tracks and to be hoisted to the level of the stage-platform.

2. The combination of a tunnel with a stage adapted to travel longitudinally therein, tracks on the main platform of the stage and a hoisting-cage carried by the stage.

3. The combination of a tunnel with a stage adapted to travel longitudinally therein, said stage having a main platform and an upper platform and a cage with means to raise and lower the latter, both cage and hoisting means being carried by the stage.

4. The combination of a tunnel with a shield, a stage adapted to travel longitudinally in the tunnel, a hoisting-cage carried by the stage toward its rear, and tracks on the main platform of the stage branching from the cage to the front of the stage.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HENRY JAPP.

Witnesses:
J. E. FRANCIS,
W. J. LEIG.