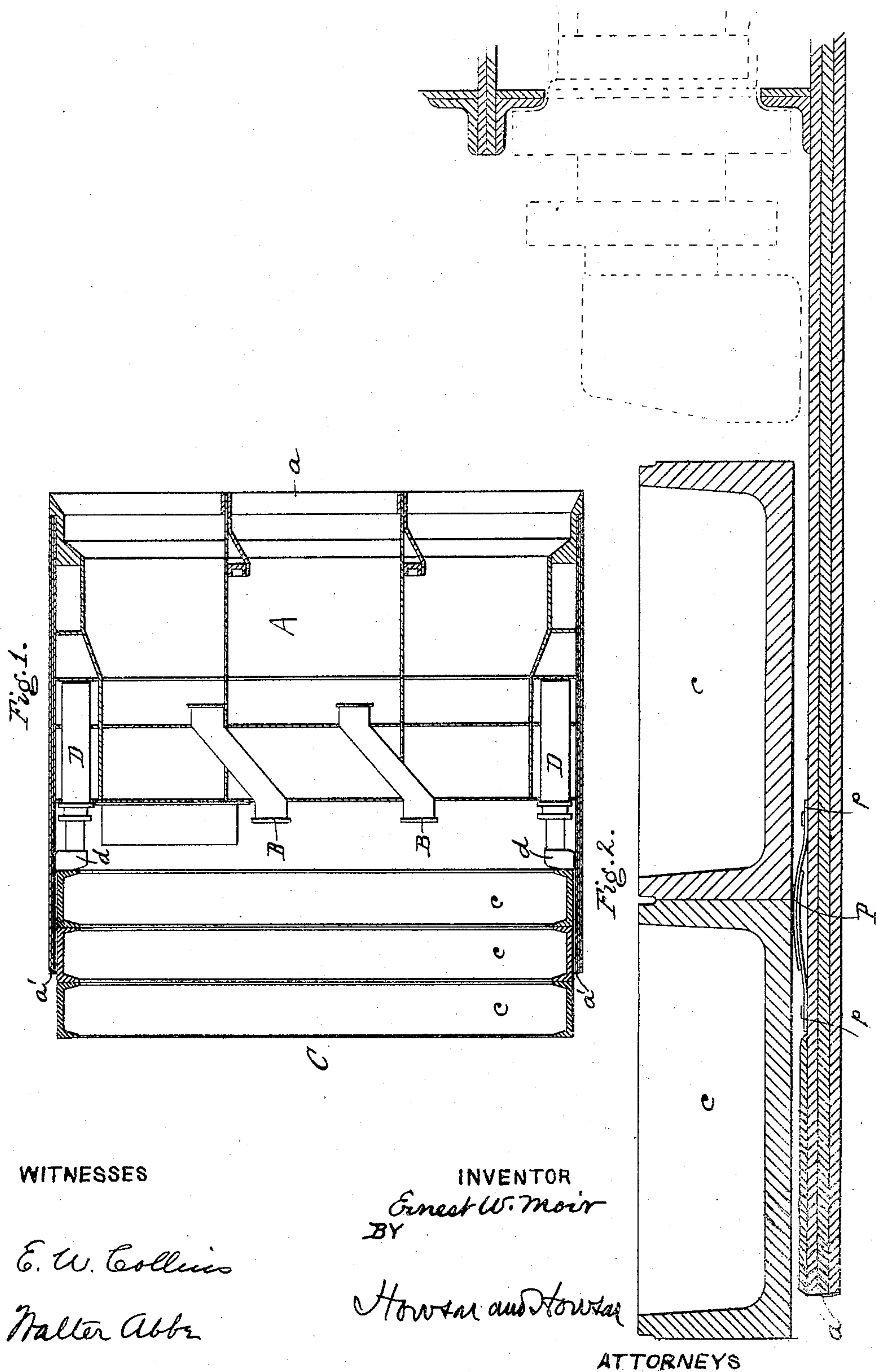


No. 794,633.

PATENTED JULY 11, 1905.

E. W. MOIR.  
TUNNELING SHIELD.  
APPLICATION FILED MAR. 18, 1905.

2 SHEETS—SHEET 1.



WITNESSES

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Walter Abbe

INVENTOR

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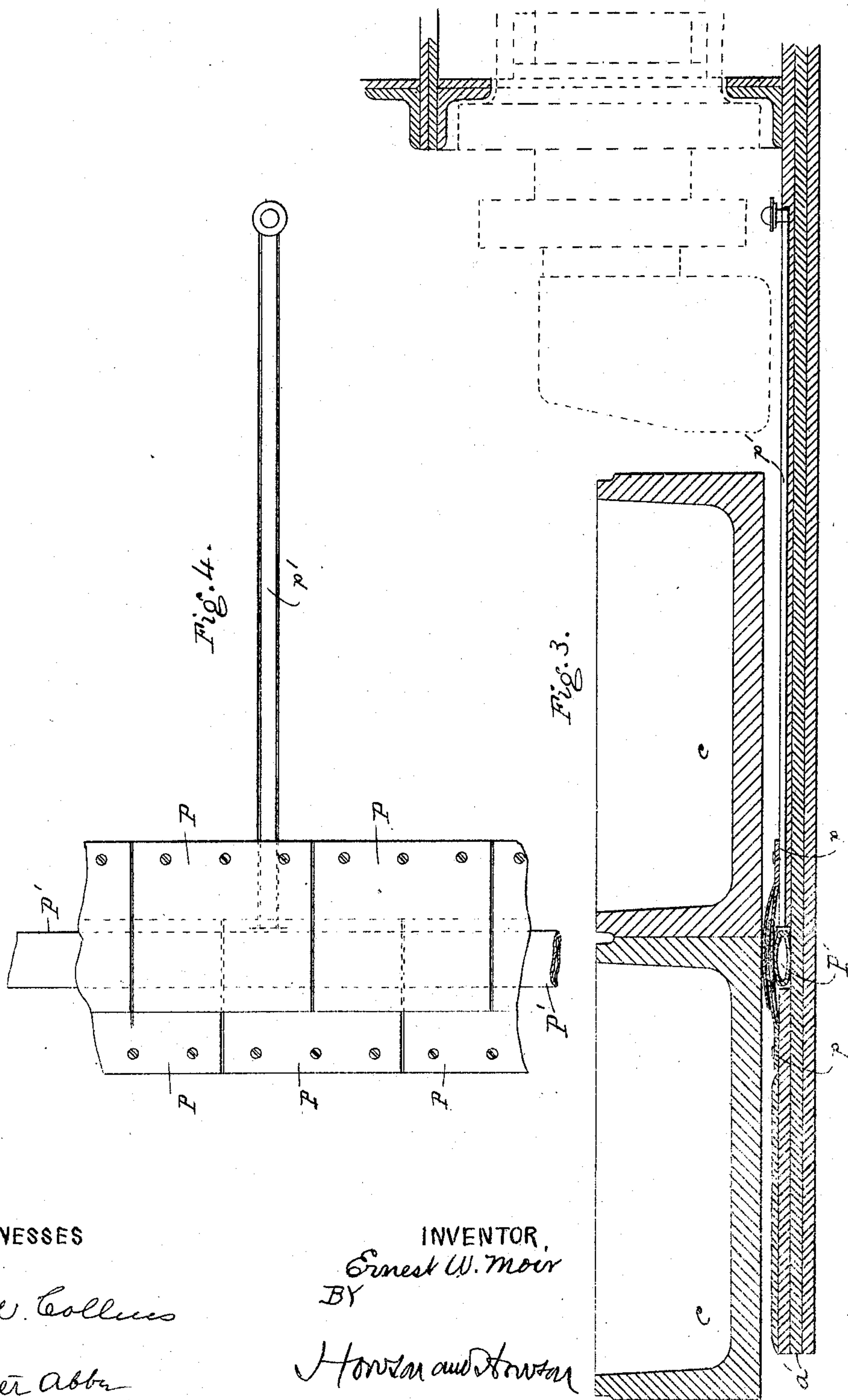
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# UNITED STATES PATENT OFFICE.

ERNEST W. MOIR, OF LONDON, ENGLAND, ASSIGNOR TO S. PEARSON AND SON, INCORPORATED, OF LONG ISLAND CITY, NEW YORK, A CORPORATION OF NEW YORK.

## TUNNELING-SHIELD.

SPECIFICATION forming part of Letters Patent No. 794,633, dated July 11, 1905.

Application filed March 18, 1905. Serial No. 250,784.

*To all whom it may concern:*

Be it known that I, ERNEST W. MOIR, a subject of the King of Great Britain and Ireland, residing in London, England, have invented certain new and useful Improvements in Tunneling-Shields, of which the following is a specification.

My invention relates to apparatus for the construction of tunnels, especially such as are intended to be carried through water-bearing strata and in which an advancing shield is employed as the excavation is advanced and the tunnel-lining is put in back of the shield, the operations being carried on under an air-pressure greater than atmospheric pressure.

The object of my invention is to provide efficient means to prevent an inrush of water or an escape of air between the iron tunnel-lining and the tail end of the shield.

In the accompanying drawings, Figure 1 is a diagram on a small scale indicating a tunnel end and shield. Fig. 2 is an enlarged longitudinal section through a part of the tail end of the shield and the forward segments of the tunnel-lining when provided with my improvement. Fig. 3 is a longitudinal section of a modification, and Fig. 4 is a plan view of a portion of the end of the shield illustrated in Fig. 3.

Referring to Fig. 1, A represents the shield, which has the usual forward cutting edge *a* and air-locks B B. The tunnel-lining, which preferably is built up of curved segments *c*, is represented at C, the annular tail end *a'* of the shield being outside of and surrounding the forward end of the tunnel-lining. Hydraulic jacks D D are mounted on the shield in such positions that their piston-heads *d* can be brought to bear against the forward edges of the latest-inserted segments *c* to force the shield forward at the proper time, as is well understood in the art.

In using tunneling apparatus of the character described it is customary, especially in cutting through water-bearing strata, to em-

ploy compressed air in the working chambers, and it has always been a difficult problem to get a secure and tight joint between the tail end of the shield and the tunnel-lining, such a joint as will prevent, on the one hand, an inrush or flow of water into the space back of the air-locks and, on the other hand, escape of the compressed air. To meet this difficulty, I have provided the annular tail end of the shield with a packing to bear against the outer circumference of the tunnel-lining. As indicated in Figs. 2 and 3, this packing consists of a series of bowed spring-plates P, preferably overlapping each other and secured in any suitable way at *p* to the inner face of the tubular shield. The bowed parts of the plates bear against outer surface of the lining-segments *c*. When the plates overlap each other, as shown, it is preferable to arrange them to break joints, as shown in Fig. 3. To add to the security of this joint, I may provide back of the bowed parts of the springs a rubber tube P', Fig. 4, extending around the shield, and to this rubber tube there may extend from the space immediately back of the shield-diaphragm and forward of the front edge of the lining an air-supply pipe *p'*, by which the tube P' may be expanded to force the plates P tight against the tunnel-lining.

I claim as my invention—

1. In combination with a tunnel-lining and advancing shield, a packing-ring consisting of a series of bowed spring-plates carried by the shield and bearing against the tunnel-lining.

2. In combination with a tunnel-lining and advancing shield, a packing-ring consisting of a series of overlapping bowed spring-plates carried by the shield and bearing against the tunnel-lining.

3. In combination with a tunnel-lining and advancing shield, a packing-ring consisting of a series of overlapping bowed spring-plates carried by the shield and arranged to break joints and bearing against the tunnel-lining.

4. In combination with a tunnel-lining and  
advancing shield, a packing-ring consisting of  
a series of bowed spring-plates carried by the  
shield, and an expanding tube back of the  
5 plates to cause them to bear against the lin-  
ing.

In testimony whereof I have signed my name

to this specification in the presence of two sub-  
scribing witnesses.

ERNEST W. MOIR.

Witnesses:

C. SEDGWICK,

HUBERT HOWSON.