

(No Model.)

A BRANDT.

2 Sheets—Sheet 1.

METHOD OF AND APPARATUS FOR KEEPING TUNNELS, &c., FREE FROM  
RUBBISH PRODUCED BY BLASTING.

No. 557,958.

Patented Apr. 7, 1896.

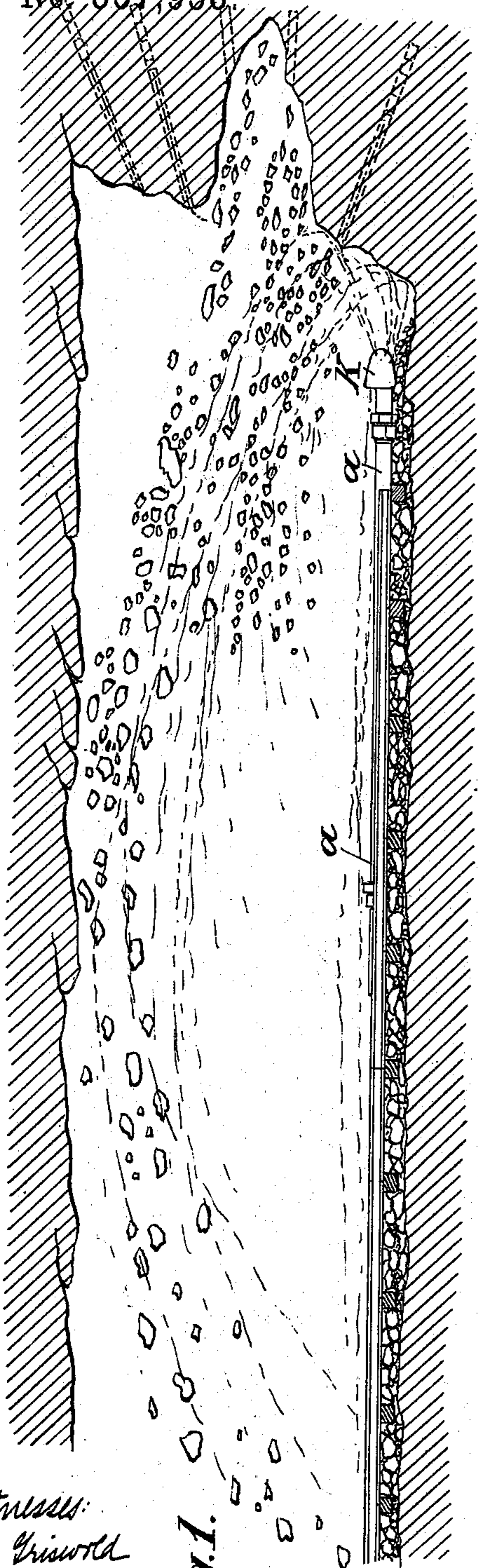
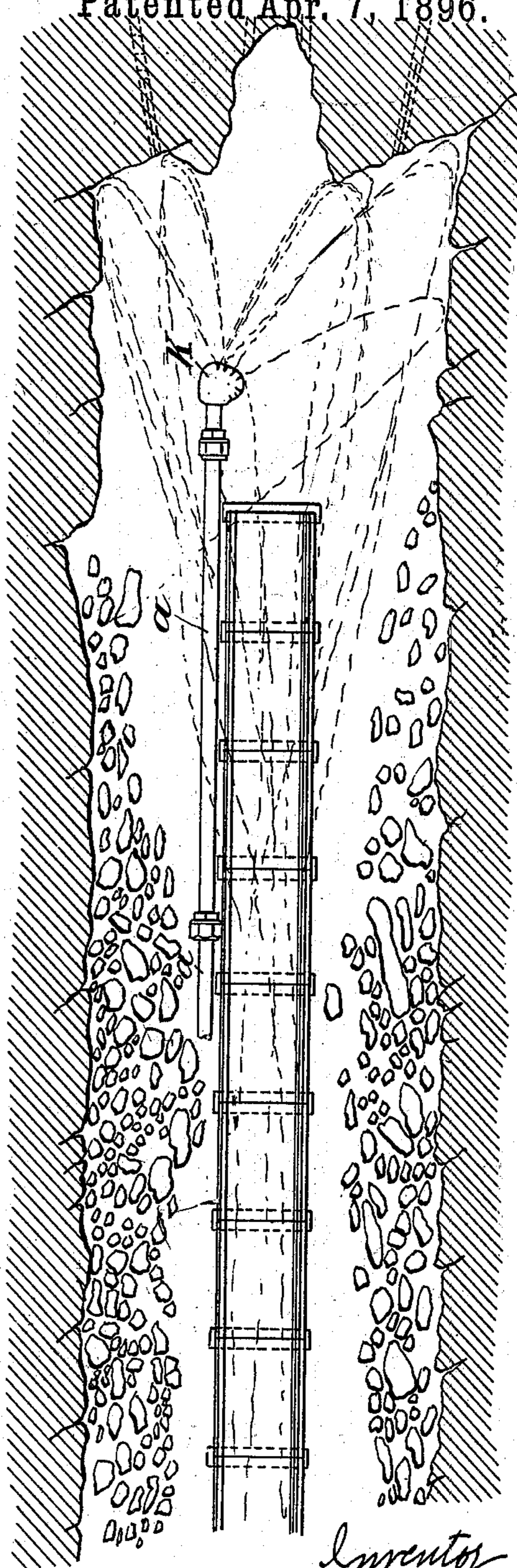


Fig. 1.



Inventor  
Alfred Brandt  
By his attorney  
Horsman and Howard

Witnesses:  
E. J. Griswold  
L. Henke

(No Model.)

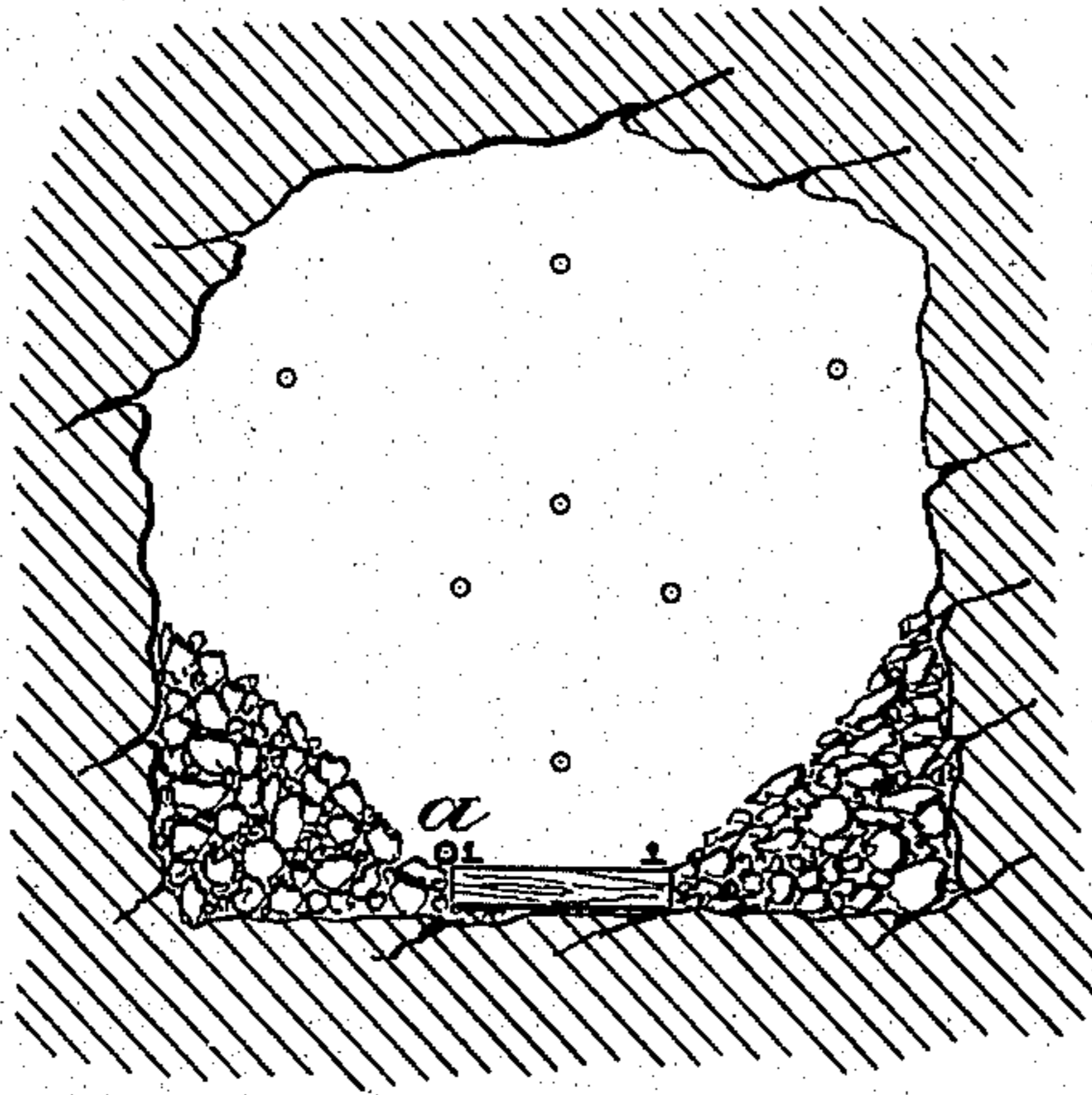
2 Sheets—Sheet 2.

A. BRANDT.  
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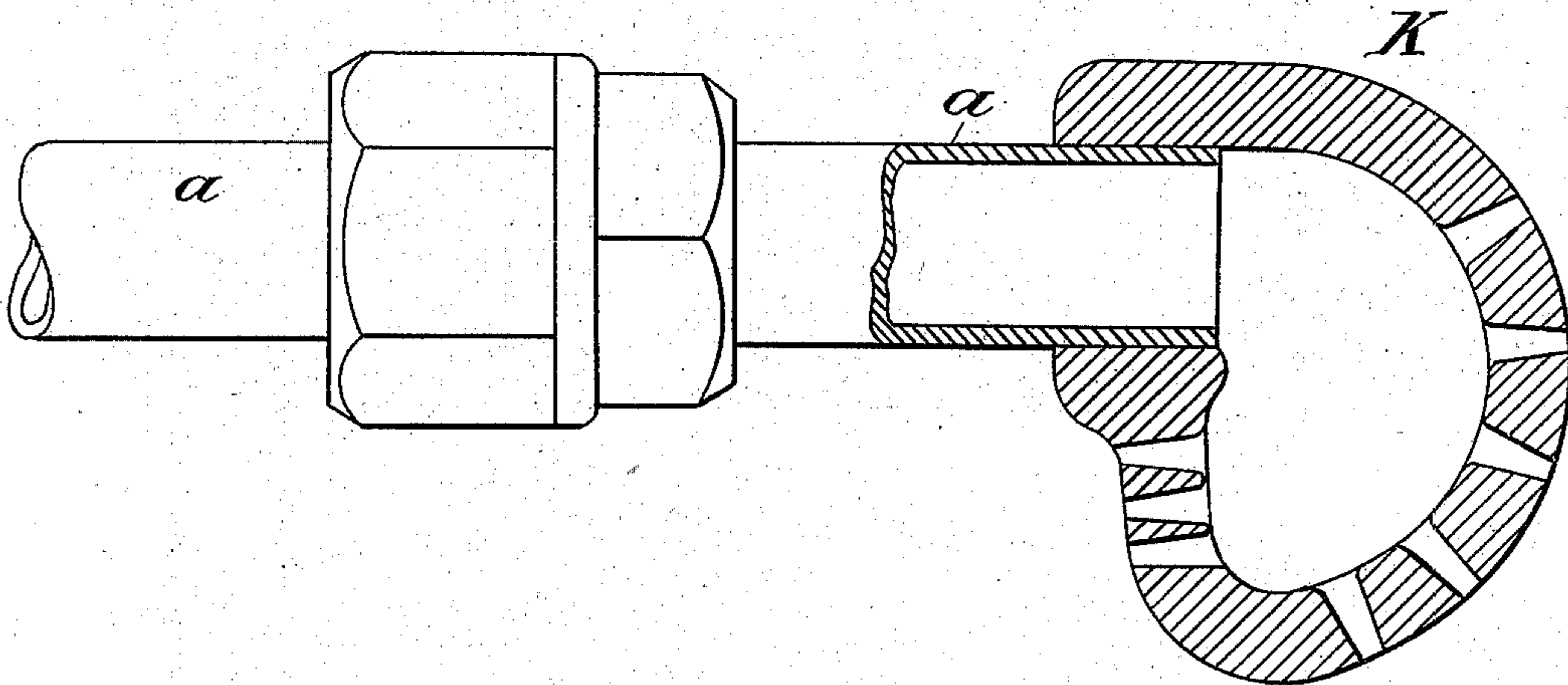
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*Fig. 2.*



*Fig. 4.*



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# UNITED STATES PATENT OFFICE.

ALFRED BRANDT, OF UHLENHORST-HAMBURG, GERMANY.

METHOD OF AND APPARATUS FOR KEEPING TUNNELS, &c., FREE FROM RUBBISH PRODUCED BY BLASTING.

SPECIFICATION forming part of Letters Patent No. 557,958, dated April 7, 1896.

Application filed January 6, 1896. Serial No. 574,467. (No model.) Patented in Germany September 18, 1894, No. 81,320; in France September 18, 1894, No. 241,464; in Belgium September 19, 1894, No. 111,886; in Switzerland September 20, 1894, No. 9,210; in Italy September 30, 1894, LXXIII, 114, and in Austria December 31, 1894, No. 44/6,566.

*To all whom it may concern:*

Be it known that I, ALFRED BRANDT, engineer, a subject of the Emperor of Germany, residing at I Richterstrasse, 7<sup>II</sup> Uhlenhorst-Hamburg, Empire of Germany, have invented Improvements in Methods of and Apparatus for Keeping Galleries, Tunnels, Cuttings, and the Like Free from the Rubbish Produced by Blasting, (for which I have obtained patents as follows: in Austria, No. 44/6,566, dated December 31, 1894; in Switzerland, No. 9,210, dated September 20, 1894; in Italy, LXXIII, 114, dated September 30, 1894; in Germany, No. 81,320, dated September 18, 1894; in France, No. 241,464, dated September 18, 1894, and in Belgium, No. 111,886, dated September 19, 1894,) of which the following is a specification.

My invention relates to improvements in the method of and apparatus for keeping galleries, tunnels, cuttings, and the like free from the rubbish or debris obtained by blasting in driving such structures.

After firing the blasting charges in driving galleries, tunnels, or the like these structures are ordinarily filled with rubbish or debris to such an extent that it requires much time and labor to remove it.

The object of my invention is to almost entirely obviate this loss of time by suitably distributing the rubbish or debris over a large distance in front of the head of the gallery, tunnel, or the like and by partly washing it off. The boring of the new blasting-holes may then at once be commenced, and while it goes on the remainder of the rubbish may be removed without interfering with the boring, whereby much time is saved. I obtain this result by causing the debris set in motion by blasting to be thrown against jets of water of suitable size, shape, and arrangement escaping under high pressure.

In the accompanying drawings, Figure 1 shows a longitudinal section, Fig. 2 a transverse section, and Fig. 3 a plan, of a gallery, illustrating the carrying into effect of my invention. Fig. 4 shows a section of the head from which the jets of water escape on a larger scale.

In the drawings, *a a* is a pipe supplying the water under high pressure.

K is a head at the end of the pipe *a*, provided with a number of suitably-directed nozzles or holes for the water to escape. The direction and arrangement of the holes depend on the size and shape of the head of the gallery, tunnel, or the like and on the position of the head K relatively to this head of the gallery or the like; but always there are two sets of holes in the head K, so that the jets from one of these sets cover the head of the structure and those from the other set cover the rails, Fig. 4.

When all is ready for firing, the jets of water under high pressure are caused to escape from the nozzles. Then the blasting charges are fired. The debris set in motion by the explosion meet with the jets, and are thereby thrown against the side walls of the gallery and carried on to a more or less considerable distance from the head of the structure and are deposited at the sides of the structure, thus leaving free the rails in the center thereof. The water flowing away at the bottom of the structure carries with it part of the rubbish. The escape of the water from the head K is then stopped, and as the head of the structure is freely accessible the boring of new blasting-holes may be at once commenced.

It will be found that the air at the head of the gallery, tunnel, or the like is cooled and freed from dust.

I claim—

1. In driving galleries, tunnels, cuttings or the like by blasting a method of keeping the head of the same and the rails in the same free from rubbish or debris produced by the explosions consisting in directing, when the blasting charges are fired, jets of water under high pressure against the head and rearward, which so deflect the debris from their path, that they are deposited upon the bottom of the gallery at some distance from the head at the sides of the rails and are distributed over a sufficiently long distance, whereupon the water is turned off and the boring of new blasting-holes may be at once commenced.

2. An apparatus for keeping the galleries,  
tunnels, cuttings and the like in driving  
them by blasting free from rubbish or debris,  
consisting of a pipe *a a* supplying water un-  
5 der high pressure and a head *K* at the end  
of such pipe, such head being provided with  
two sets of holes at its end which are so di-  
rected and arranged that the jets from one  
set of holes cover the head of the structure

and those from the other set of holes cover 10  
the rails.

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

ALFRED BRANDT.

Witnesses:

ARNOLD REYS,

ADOLPH HOLTZHAUSEN.