

(No Model.)

2 Sheets—Sheet 1.

H. KENNEDY & J. W. HIGGS.

MANUFACTURE OF MINERAL WOOL.

No. 328,226.

Patented Oct. 13, 1885.

Fig. 1.

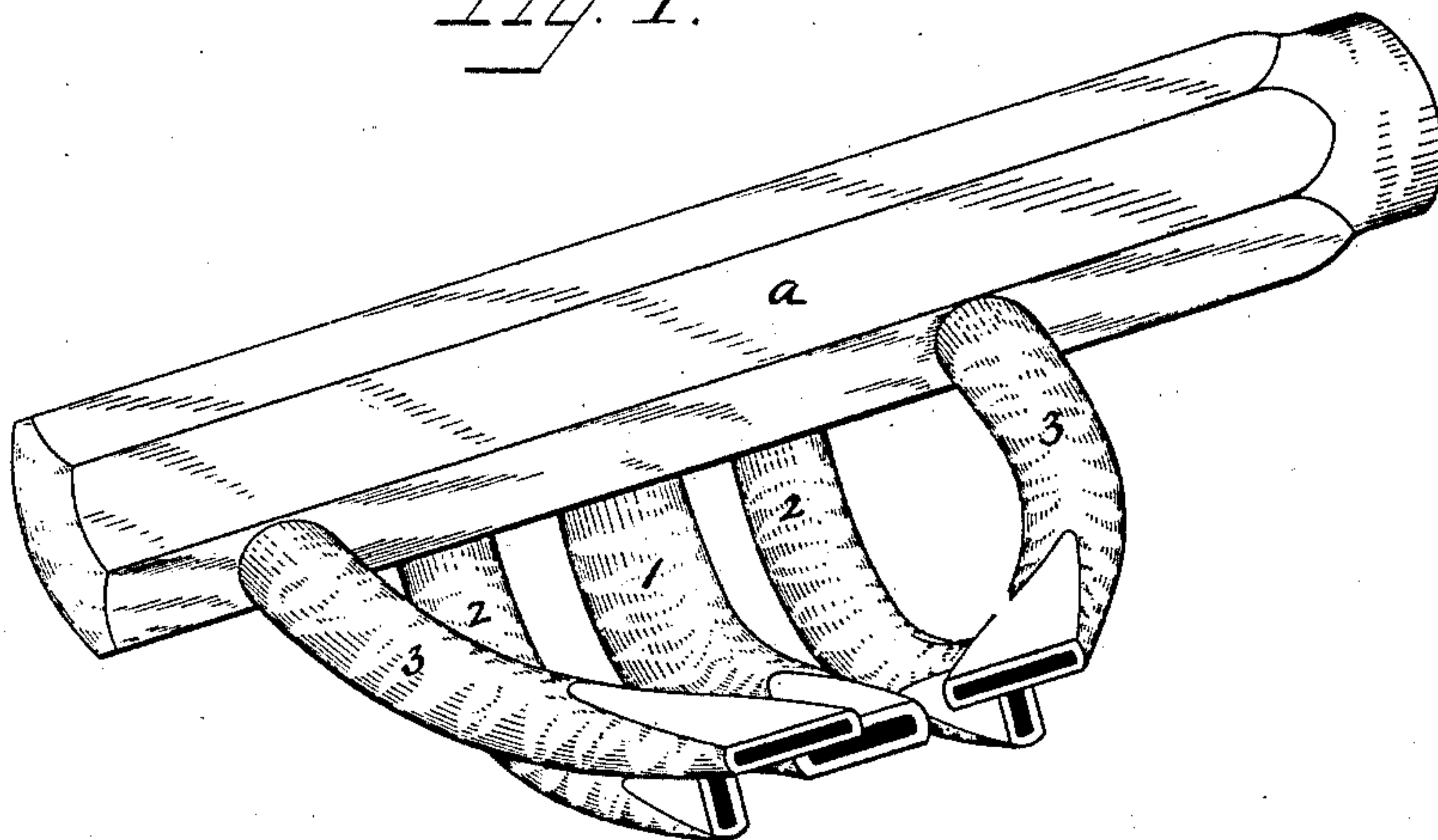
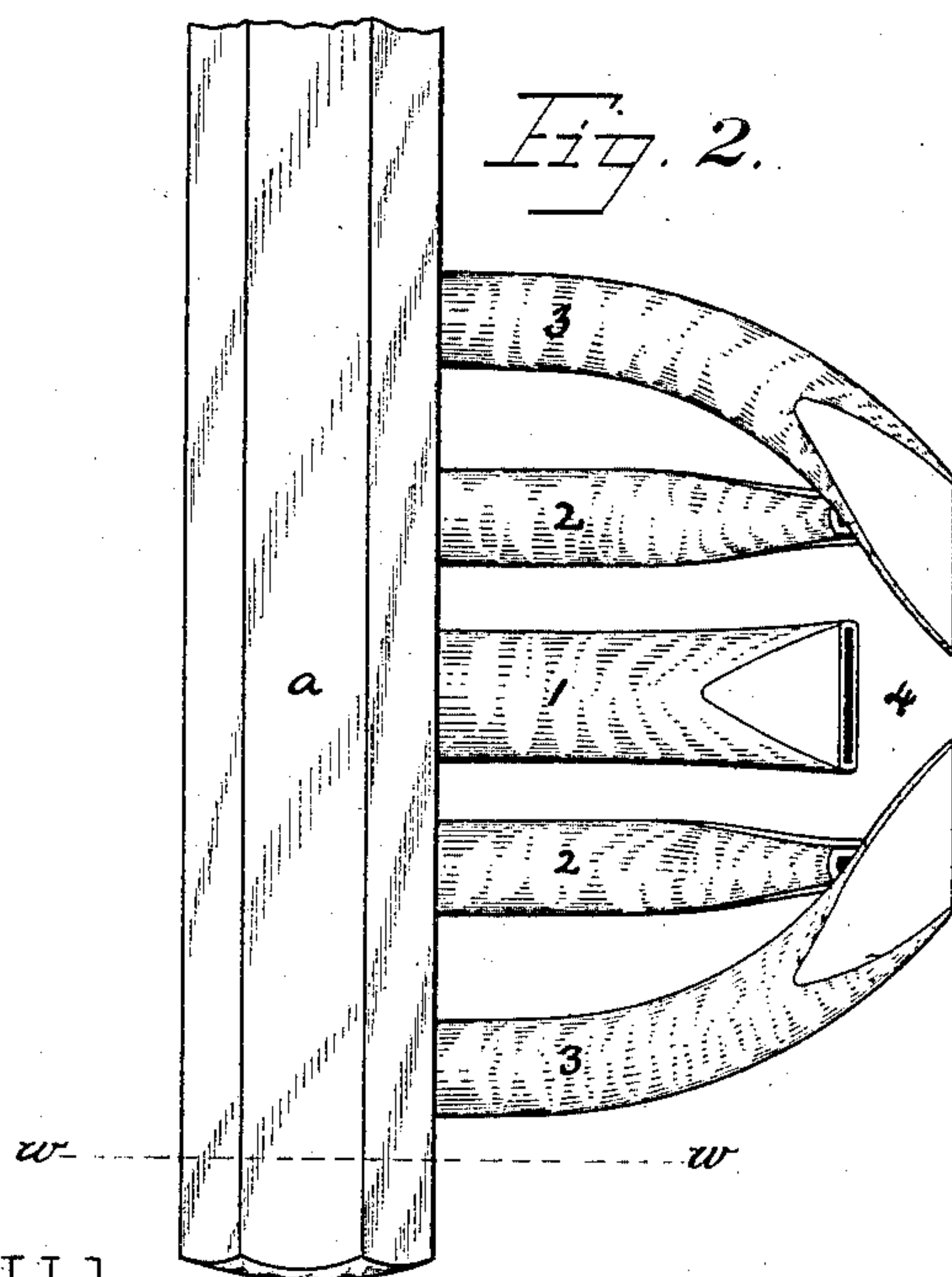


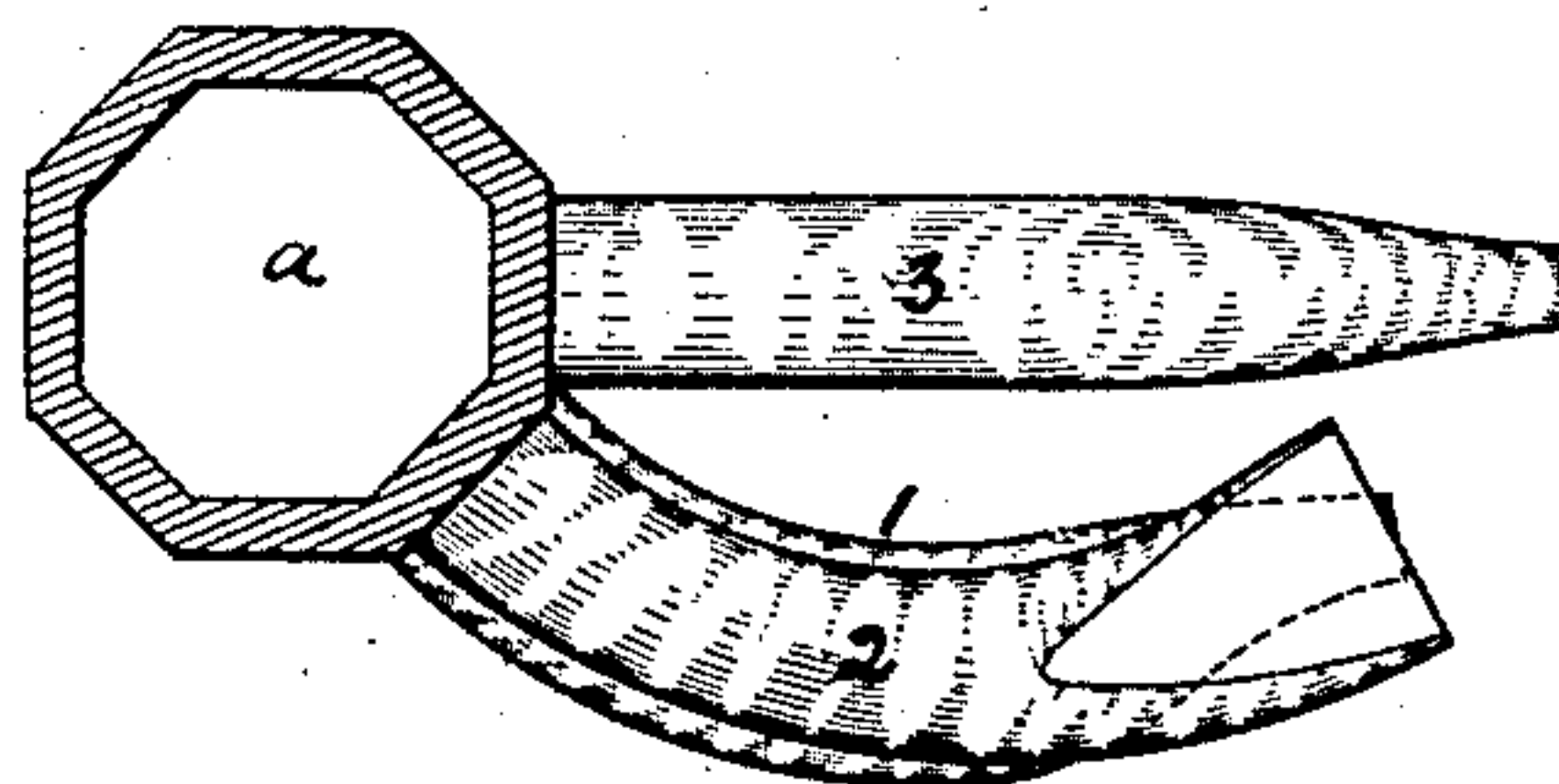
Fig. 2.



Witnesses.

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Fig. 3.



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Hugh Kennedy
John W. Higgs
by their attys.
Bakerwell & Kern

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Fig. 4

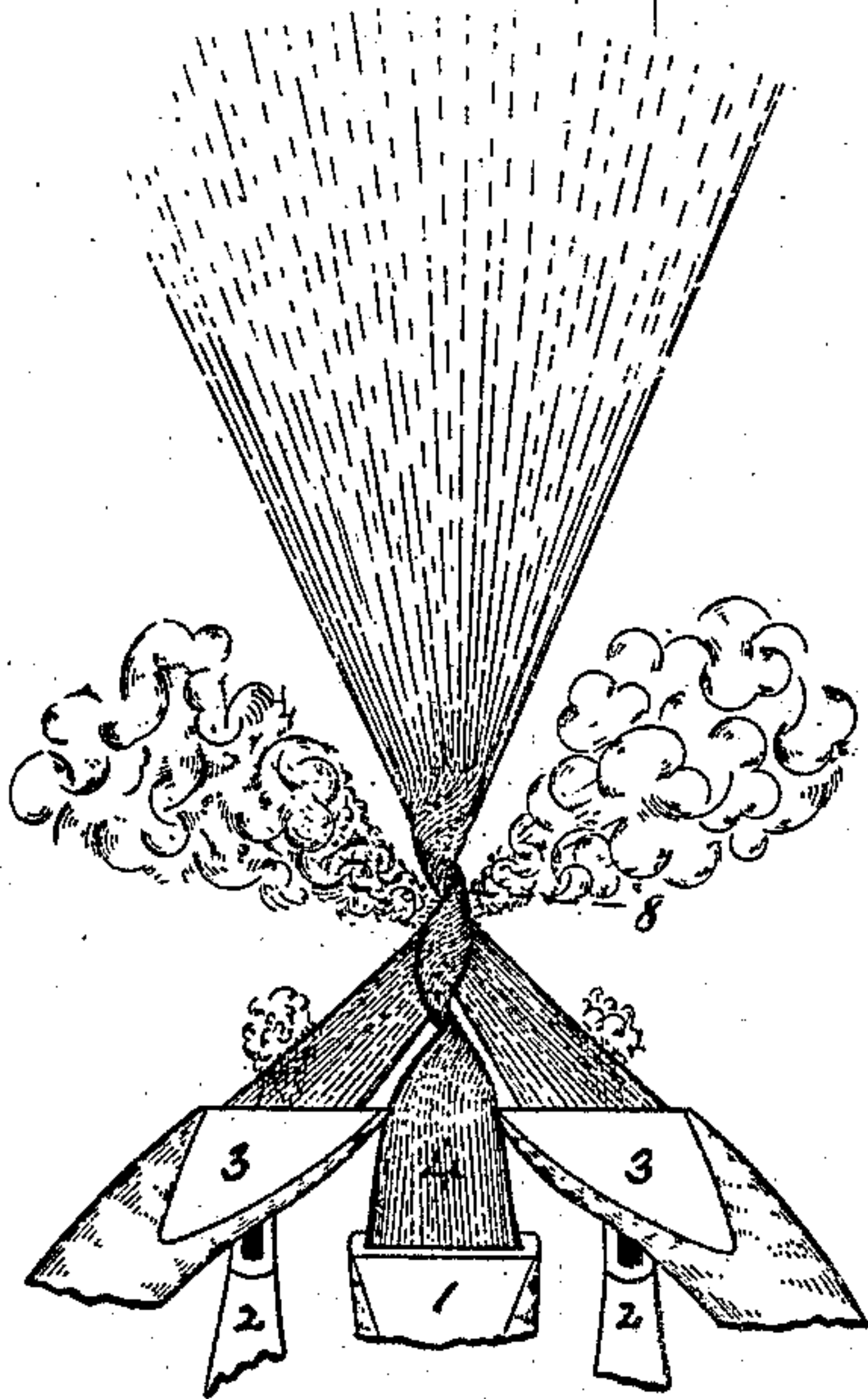


Fig. 5

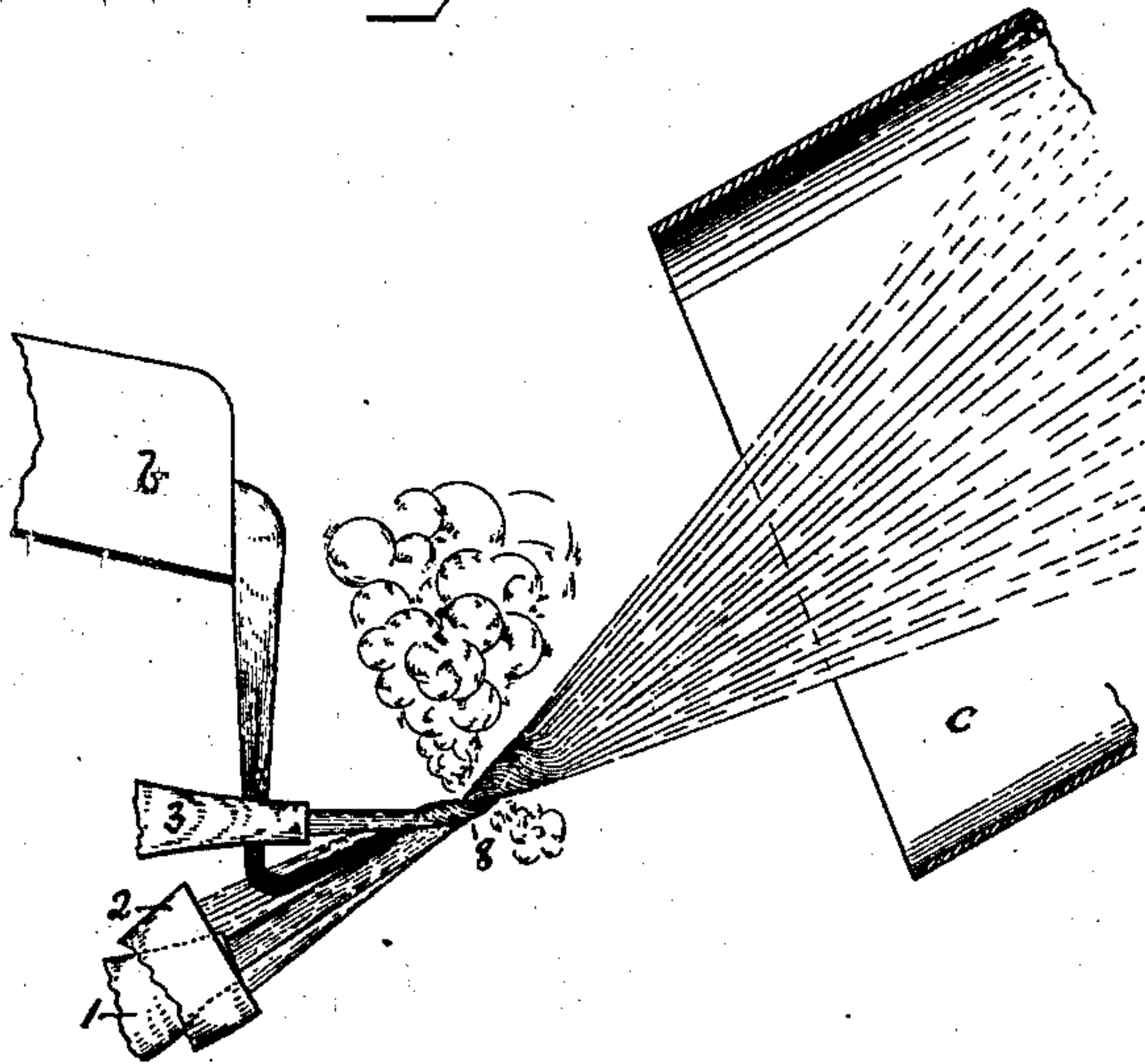


Fig. 6.

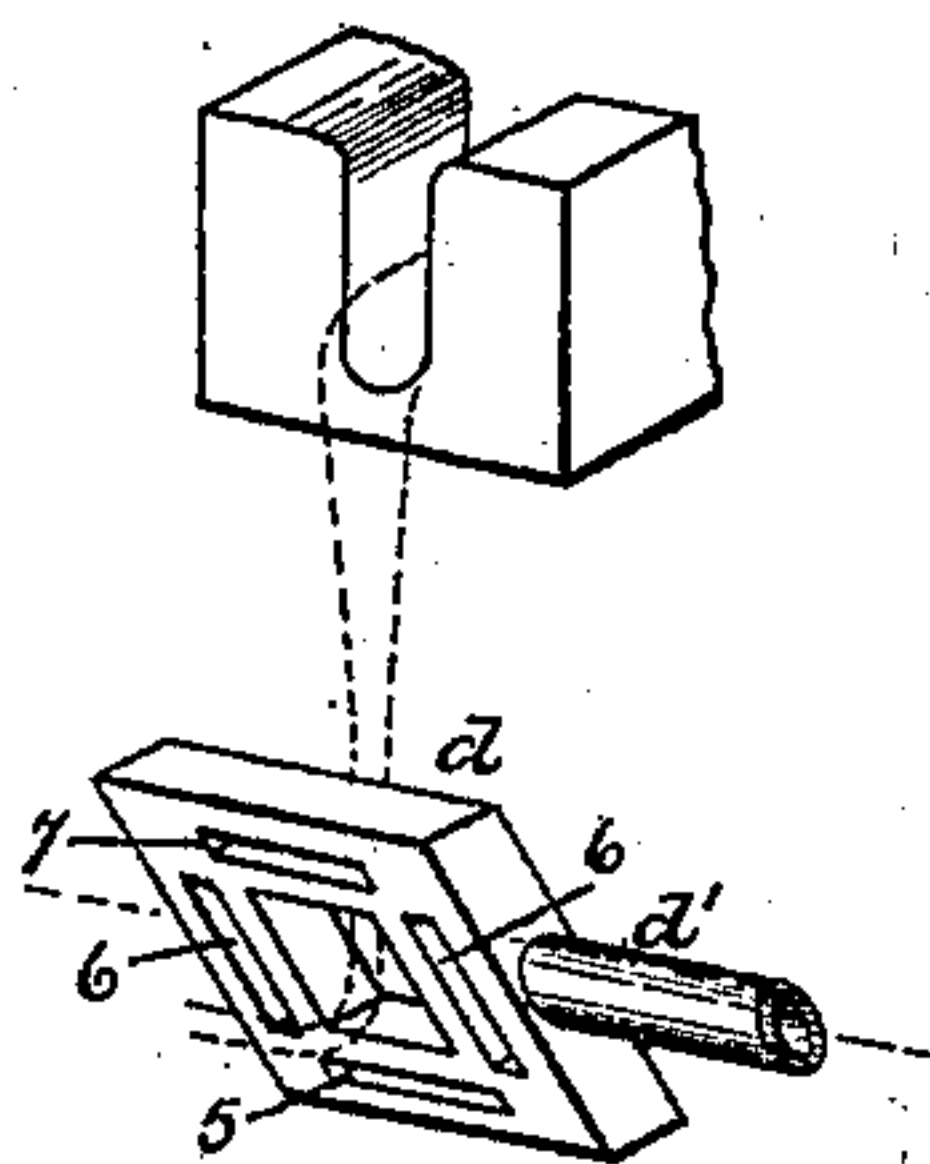


Fig. 7.

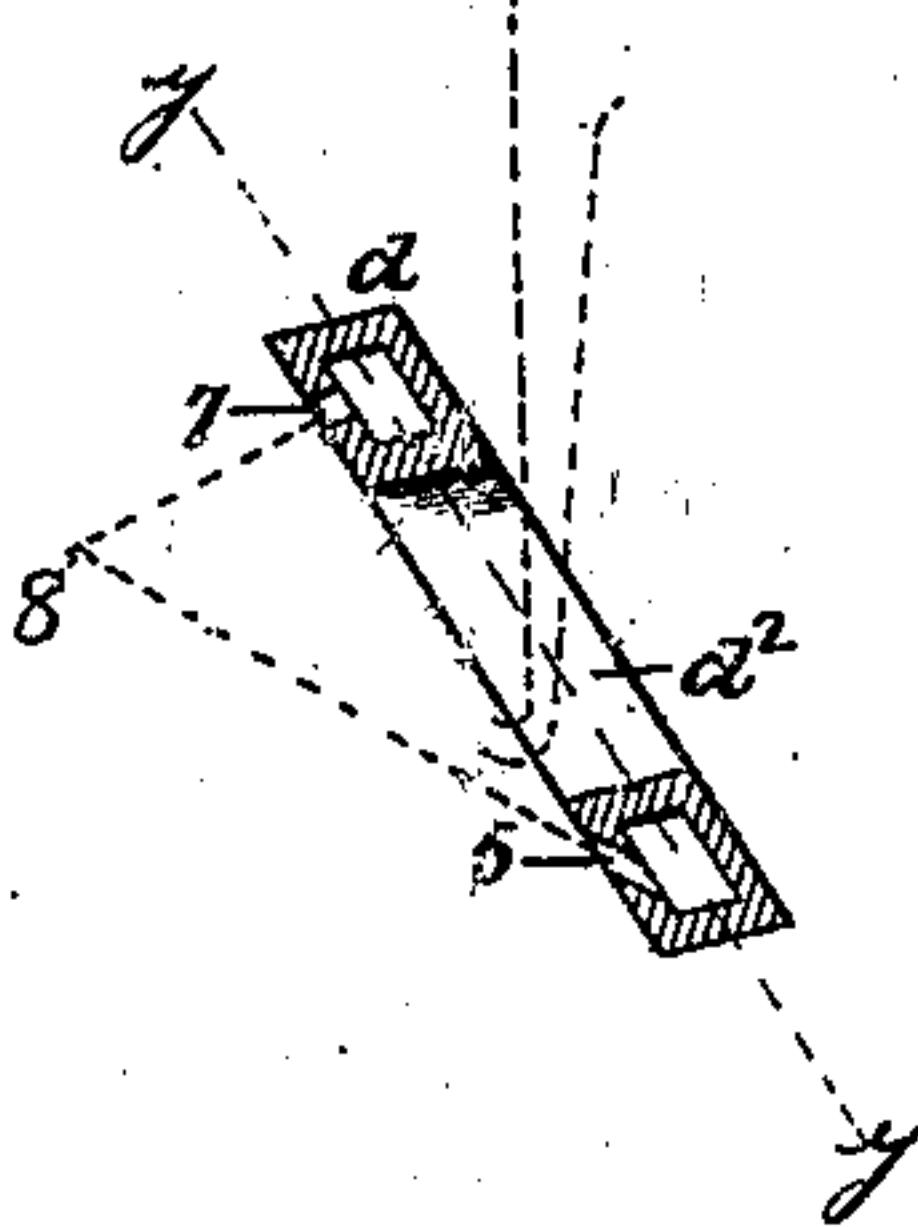
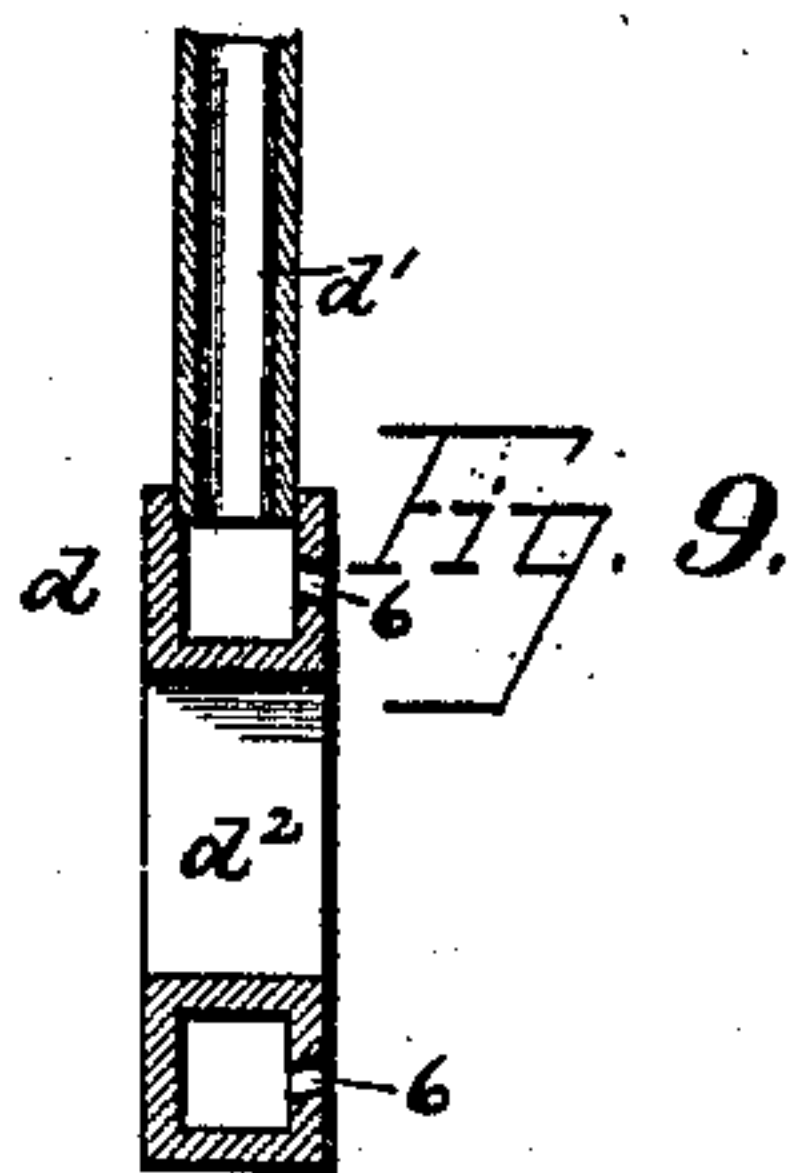
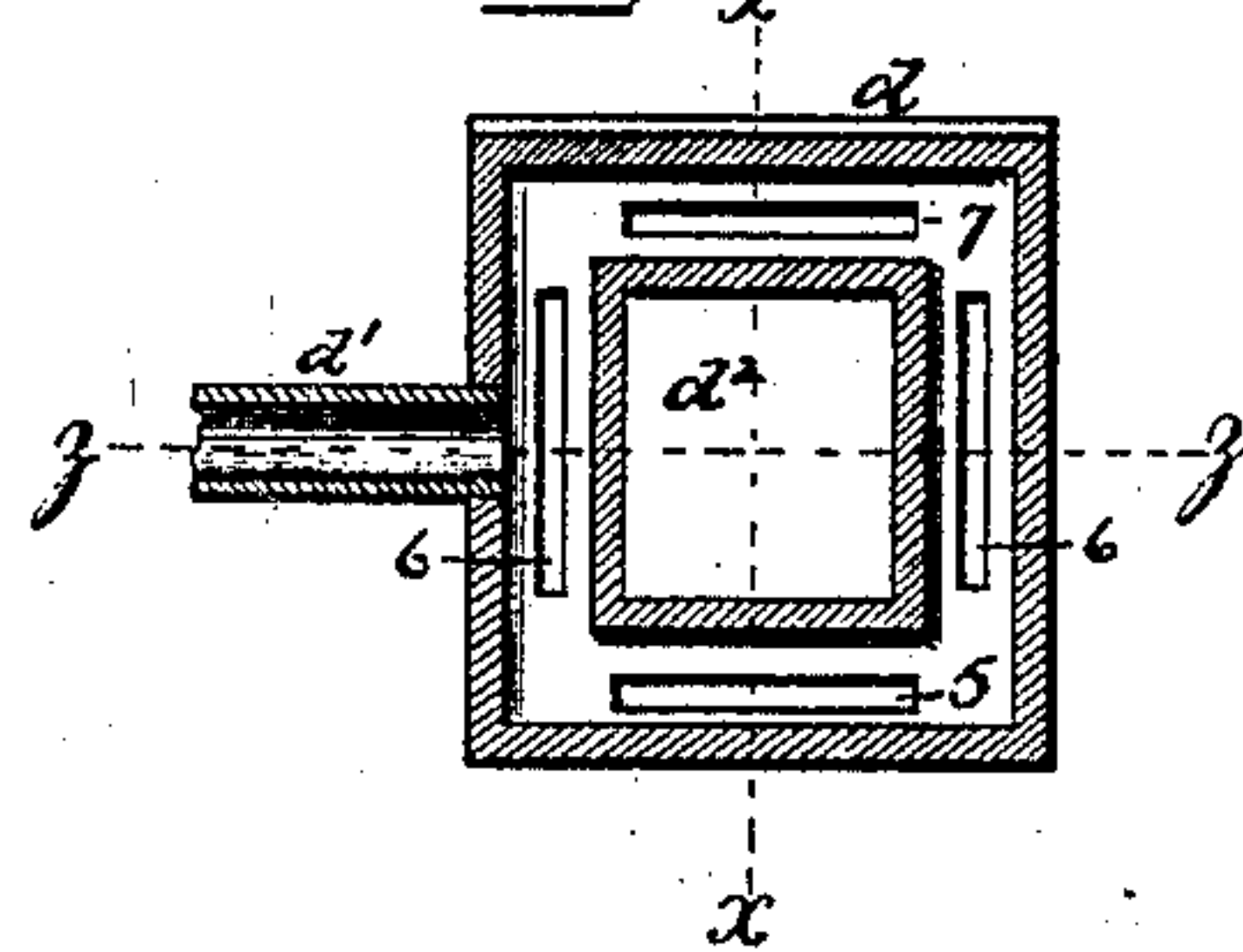


Fig. 8.



Witnesses.

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Fig. 11.

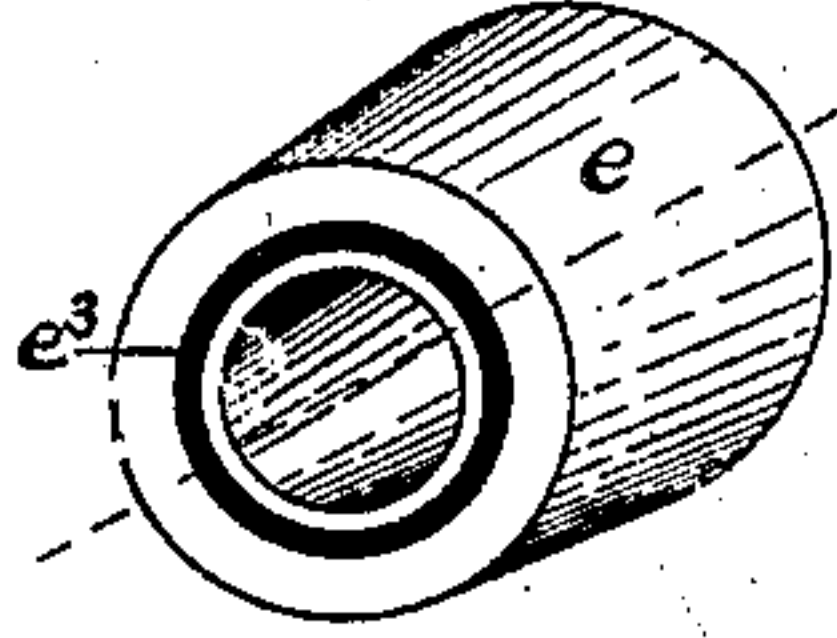
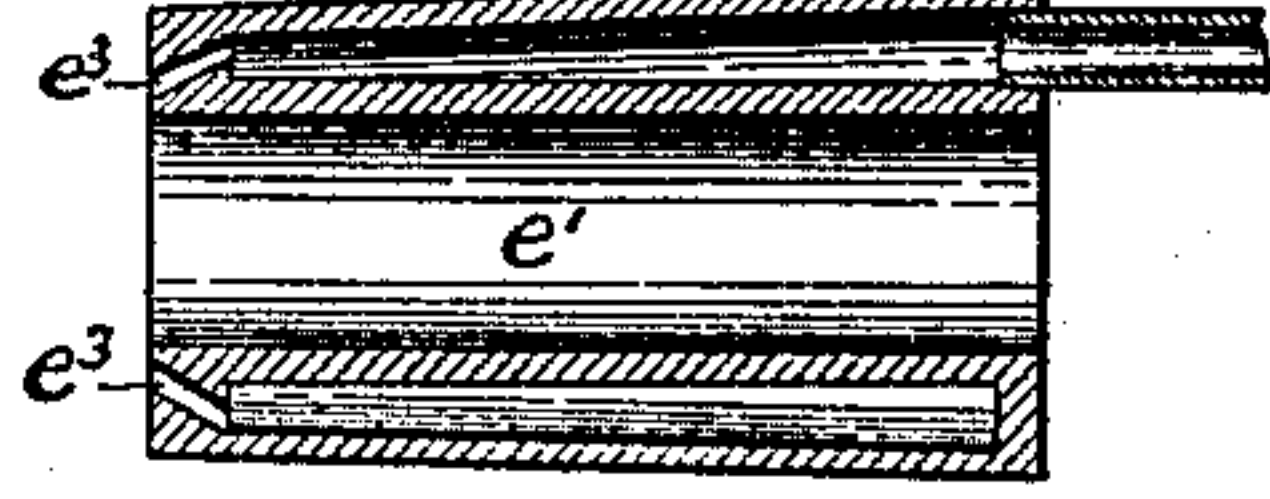


Fig. 10.



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UNITED STATES PATENT OFFICE.

HUGH KENNEDY AND JOHN W. HIGGS, OF SHARPSBURG, ASSIGNORS TO THE
PITTSBURG MINERAL WOOL COMPANY, OF ETNA, PENNSYLVANIA.

MANUFACTURE OF MINERAL WOOL.

SPECIFICATION forming part of Letters Patent No. 328,226, dated October 13, 1885.

Application filed March 20, 1885. Serial No. 159,611. (No model.)

To all whom it may concern:

Be it known that we, HUGH KENNEDY and JOHN W. HIGGS, of Sharpsburg, in the county of Allegheny and State of Pennsylvania, have
5 invented a new and useful Improvement in the Manufacture of Mineral Wool; and we do hereby declare the following to be a full, clear, and exact description thereof.

Mineral wool is usually made by blowing a
10 jet or jets of steam or air through or against a small stream of molten slag, whereby the same is converted into fine vitrified fibers. The original and simplest method is to inject through the stream of molten slag a single jet
15 of steam; but it is open to the objection that only a part of the slag is converted into fiber, while a large part is formed into hard granules or shot. Various devices have been adopted for separating the fiber from the shot. For
20 instance, it has been beaten and sifted; but this has a tendency to break up the fiber and partially destroy its usefulness. Another method is to expose the mixed wool and granules to a lateral jet of steam, which raises the
25 lighter fibers and permits the granules to fall by their greater weight. This method is objectionable, because it does not effect a perfect separation, is very wasteful, and produces several inferior grades of wool.

30 By our improvement all, or nearly all, of the slag is converted into fiber without increasing the power used, and there is not only a greater product, but it is very light and soft, uniform in quality, and very free from granules or shot.

We will now describe our invention, so that others skilled in the art may employ the same, reference being had to the accompanying drawings, in which—

40 Figure 1 is a perspective view of one form of apparatus which may be employed. Fig. 2 is a plan view. Fig. 3 is a section on the line *ww* of Fig. 2. Figs. 4 and 5 are respectively plan and side views illustrating the operation. Figs. 6, 7, 8, and 9 are views of
45 modifications, Fig. 7 being a section on *xx* of Fig. 8, 8 a section on *yy* of Fig. 7, and 9 a section on *zz* of Fig. 8. Figs. 10 and 11 are respectively a longitudinal section and a per-
50 spective view of another modification.

Like letters of reference indicate like parts.

Broadly stated, our invention consists in a method of converting a stream of molten slag into fiber or mineral wool by treating it with a jet or jets of steam or air, which surround
55 it on all sides, and the preferable operation is to give the projected stream of wool a swirling or twisting motion, and while the apparatus herein described is applicable to the purpose of our invention, the same result may be
60 produced by other arrangements of tuyeres or jet-pipes which are capable of projecting jets of steam or air around and against a stream of slag.

Referring now to Fig. 1, *a* indicates a steam-
65 pipe having a series of five jet-pipes provided, preferably, with flattened discharge ends or orifices. The central jet-pipe, 1, has its flattened orifice extending preferably in a hori-
70 zontal direction. On either side, and at or about the same level, is a jet-pipe, 2, the flattened orifice of which extends preferably in a vertical direction, and above the jet-pipes 2 are two other jet-pipes, 3, the flattened orifices
75 of which extend preferably in a horizontal direction, but are not on the same level, so that the streams or jets therefrom shall tend to pass each other at the point of meeting. The ends of the jet-pipes 1 and 2 turn upward
80 and the ends of the pipes 3 turn inward toward each other and extend some distance beyond the ends of the pipes 1 and 2, so that there is
85 formed between the ends of the jet-pipes a space, 4, into which the stream of molten slag from the trough or pipe *b* is caused to fall.

The operation of this device is illustrated in Figs. 4 and 5, where, it will be observed, the stream of molten slag from the trough *b* falls into the space 4 in front of the end of
90 the central or main jet-pipe, 1, where, being caught by the jet of steam from said pipe, it is projected upward and outward. The tendency of the jet 1 is to spread the stream
95 of slag into a fan shape and to convert only the central portion into fiber, while the sides would be turned into granules or shot. This is prevented by the jets from the pipes 2, which, meeting the spreading stream of slag projected by the pipe 1, force it inward and
100 keep it within the range of action of the jet from the pipe 1, as well as themselves acting upon it to convert it into fiber. The upward

tendency of the stream of slag thus given to it by the pipes 1 and 2 brings it within the range of the jets from the pipes 3, which, as they do not exactly register, give it a swirling or twisting motion and hold it down within the range of action of the jets from the pipes 1 and 2. The jets from the pipes 1, 2, and 3 all converge to a point, 8, some inches away from the ends of the pipes 3, where they practically unite into a single stream, and from that point the stream of molten slag spreads outward into a conical shape and enters the end of the receiving-conduit *c*. During the passage of the slag from the point 4 to the centering-point 8 of the jets it is thoroughly converted into fiber, so that there are so few granules formed that the entire product of the blow is salable as "No. 1" wool.

In Figs. 6, 7, 8, and 9 we show a modified construction, which consists in a hollow casting, *d*, to which the steam is supplied by a pipe, *d'*, and which is provided with a central opening, *d''*, and a series of converging jet-openings or slots, 5, 6, and 7, extending through the sides around the central opening, *d''*. When applied for use, the casting *d* is placed in an inclined position, as shown in Figs. 6 and 7, under the slag-trough *b*. A stream of slag then falls through the opening *d''*, where it encounters the jet of steam from the slot 5, which in this instance answers to the jet-pipe 1 of the first construction. The stream projected by the jet 5 is treated on the other three sides by the jets from the slots 6 and 7. The angles of inclination of the slots are different; but they are caused to converge to a point, 8, as in the first construction. By giving a slight lateral slant to either of the two opposite jets a swirling motion can be given to the slag.

In Figs. 10 and 11 the construction consists of a hollow tubular casting, *e*, provided with a central opening, *e'*, through which the stream of molten slag passes, a steam-pipe, *e''*, which

supplies steam, and an inclined jet-opening, *e''*, at the other end, which gives to the jet of steam a conical shape.

In all the constructions named the stream of molten slag is enveloped on all sides by jets of steam or air, which cause it to be thoroughly treated and converted into mineral wool. We prefer the construction shown in Figs. 1 to 5, as we have had it in practical use for some time, and it has been proven to be a thorough and efficient means of carrying our invention into practice.

The product of our invention is a remarkably fine, soft, light, flexible fiber, and, as before stated, the process is attended with little or no waste, and consequently yields an increased product.

We prefer to use the construction of apparatus which gives a swirling motion to the projected stream of slag, for the reason that the thorough treatment of the slag is thereby insured and the fiber produced will be lighter and better.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. The method herein described of making mineral wool, which consists in treating a stream of molten slag to an encircling jet or jets of steam or air, substantially as and for the purposes described.

2. The method herein described of making mineral wool, which consists in treating a stream of molten slag to encircling jets of steam or air, whereby the projected stream is given a twisting or swirling motion, substantially as and for the purposes described.

In testimony whereof we have hereunto set our hands this 16th day of March, A. D. 1885.

HUGH KENNEDY.
JOHN W. HIGGS.

Witnesses:

J. J. HILL,
GEORGE WANNER.