

No. 632,087.

Patented Aug. 29, 1899.

M. BALS.

MAKING MATCHES FROM PASTEBOARD.

(Application filed Dec. 31, 1897.)

(No Model.)

3 Sheets—Sheet 1.

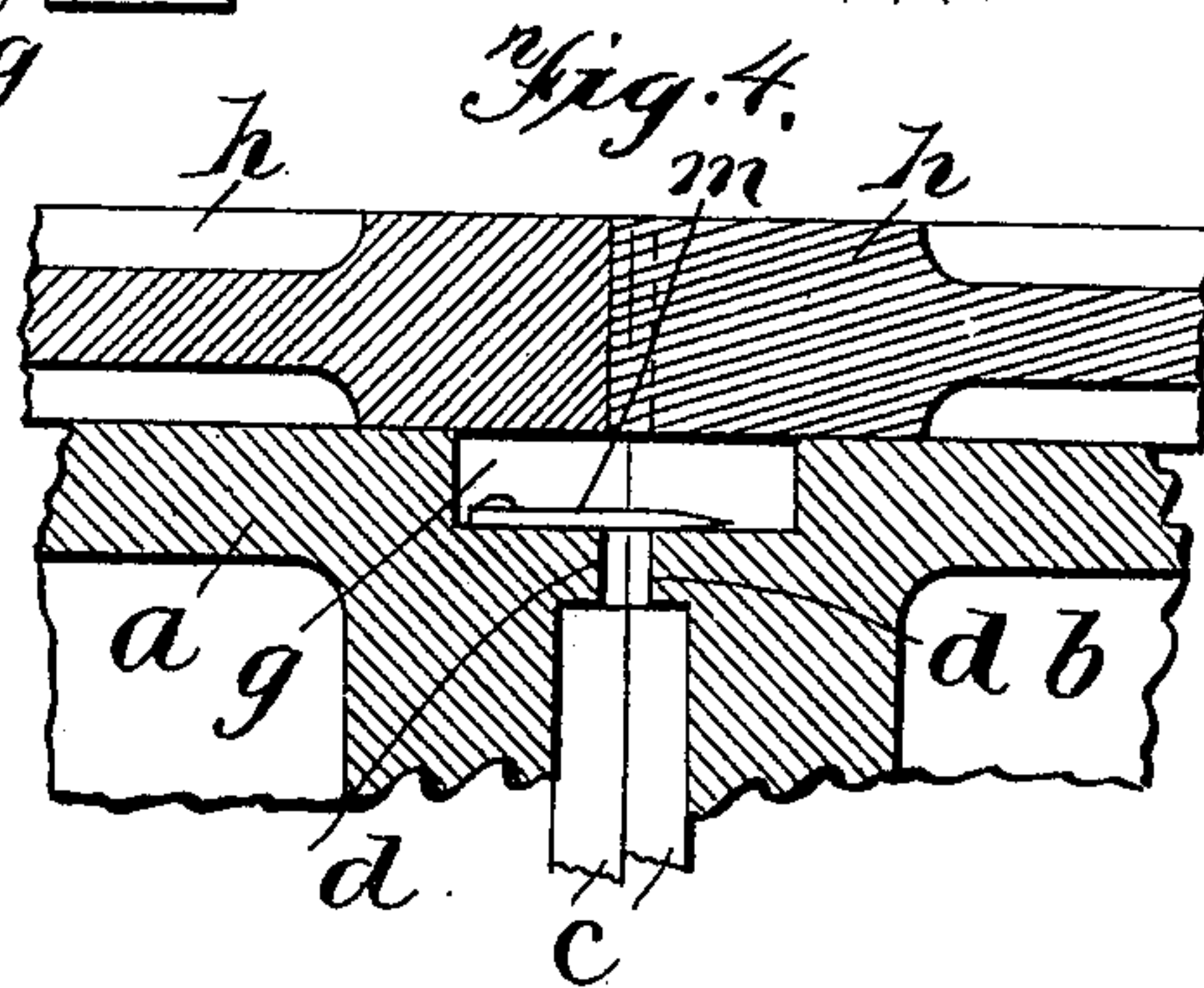
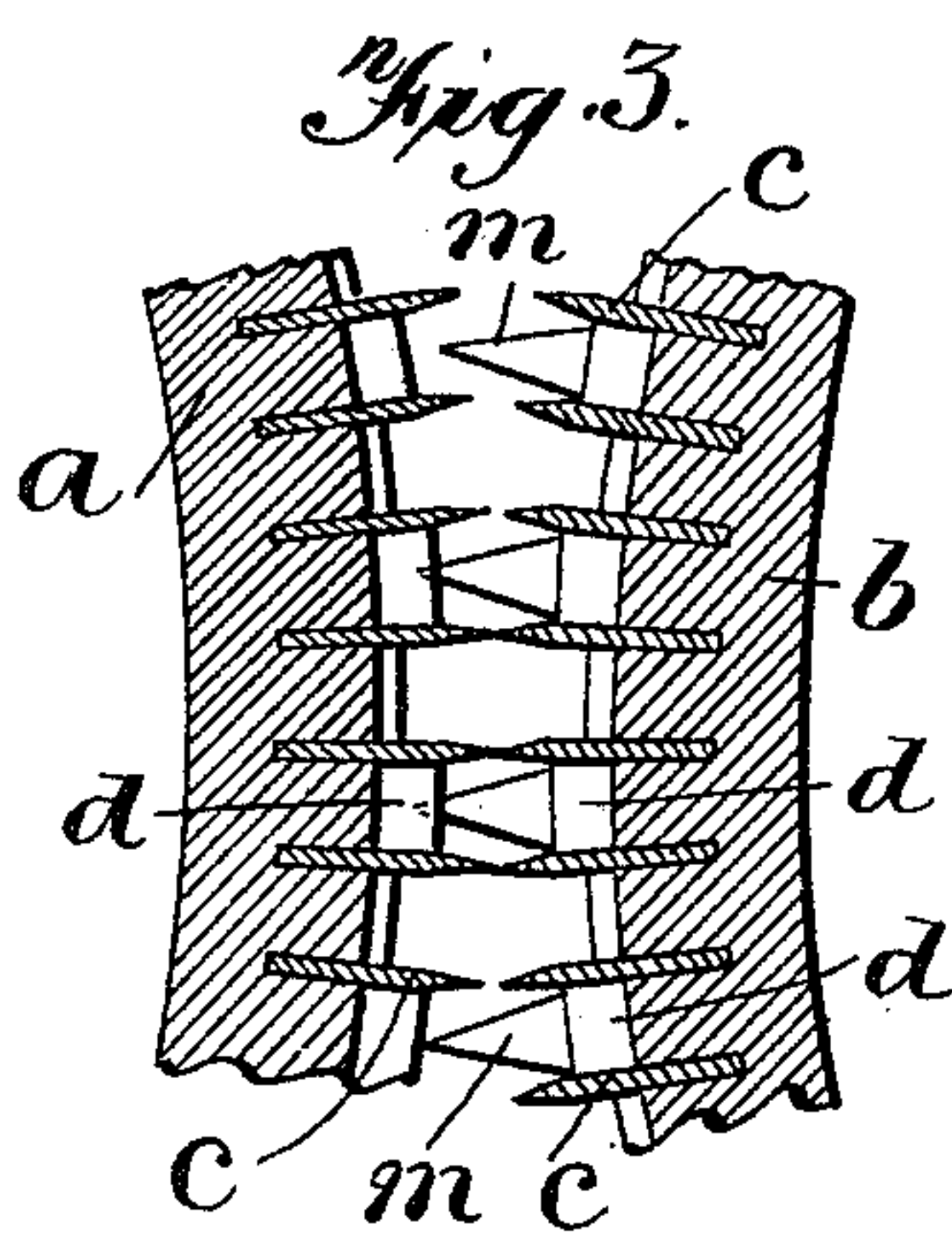
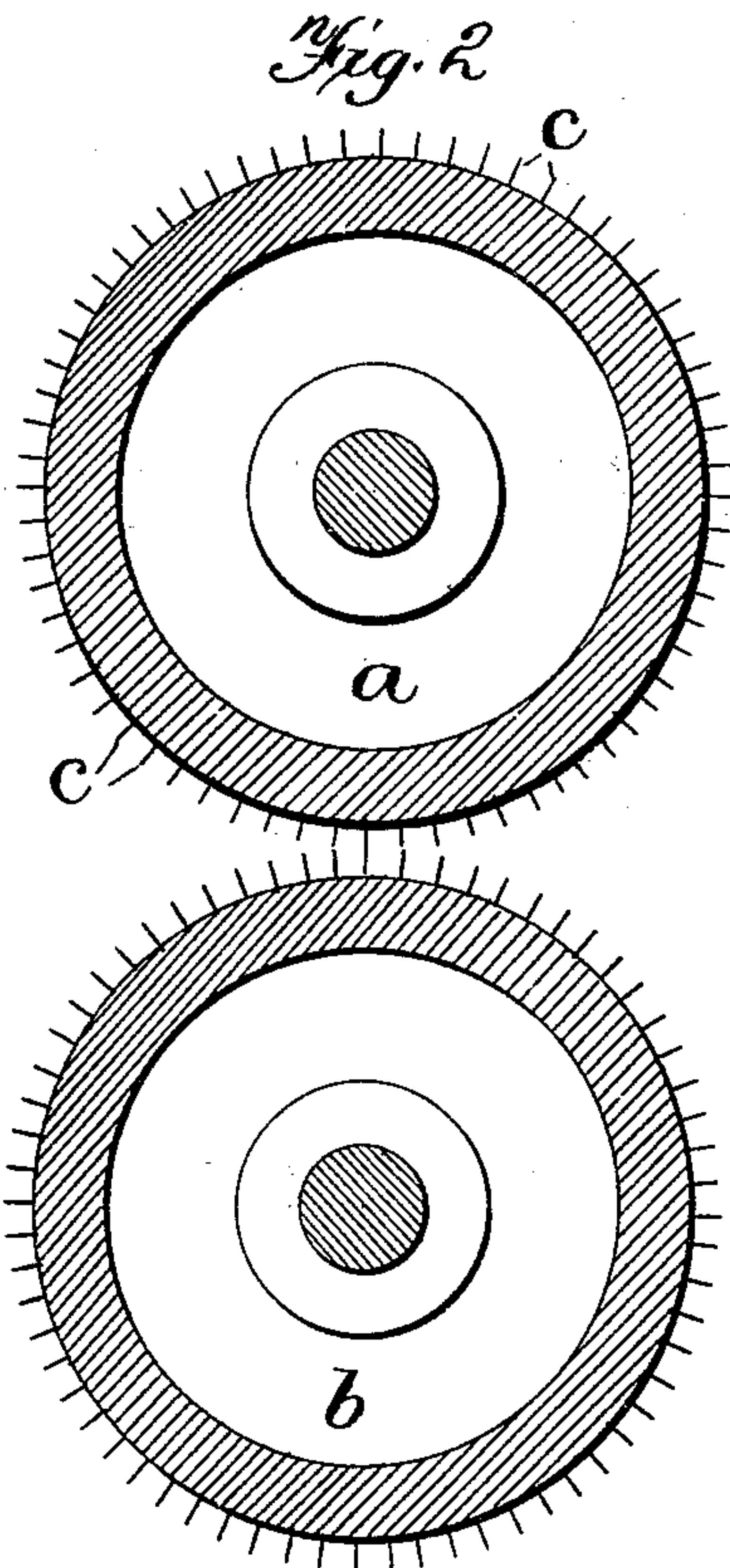
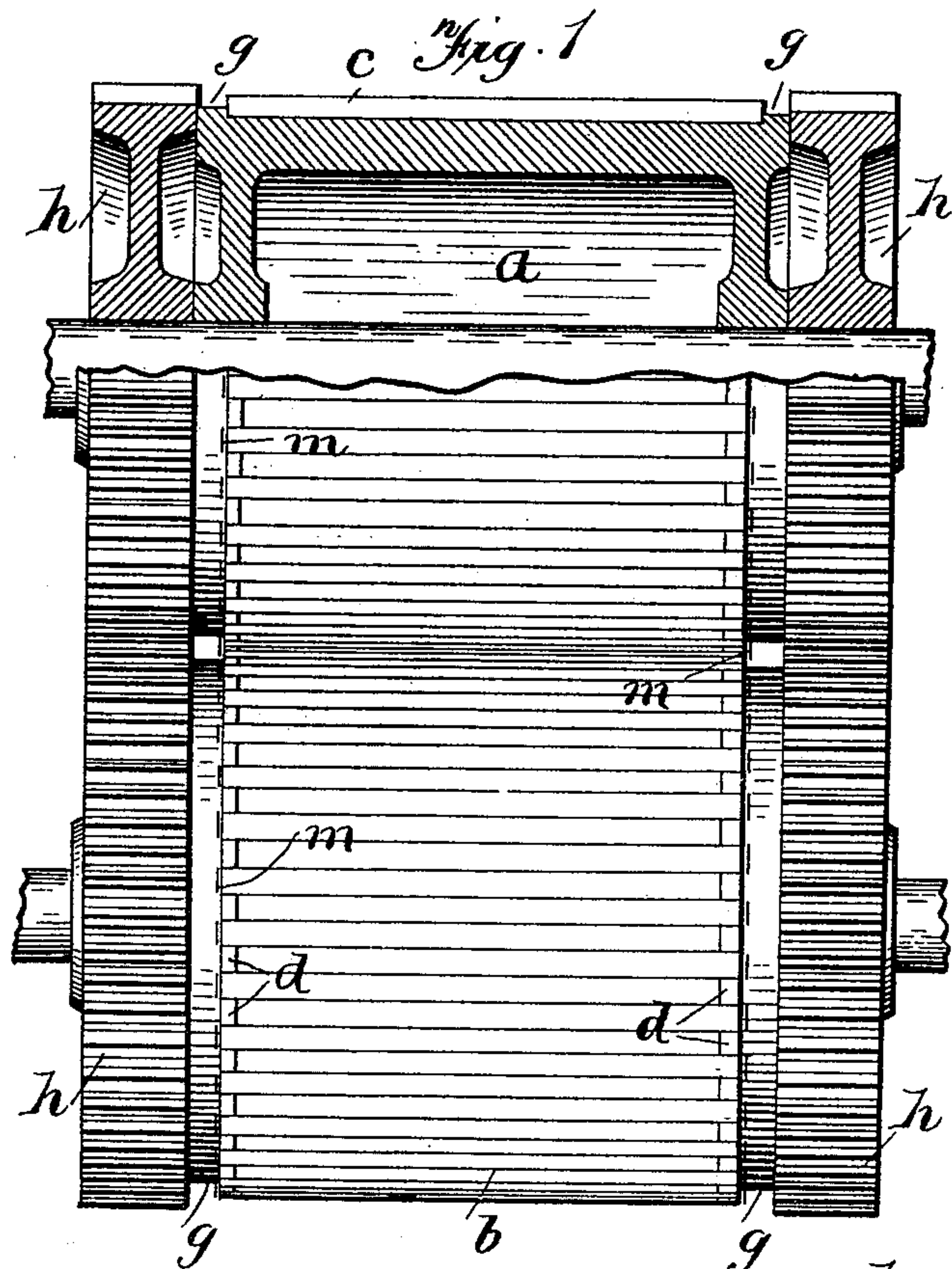
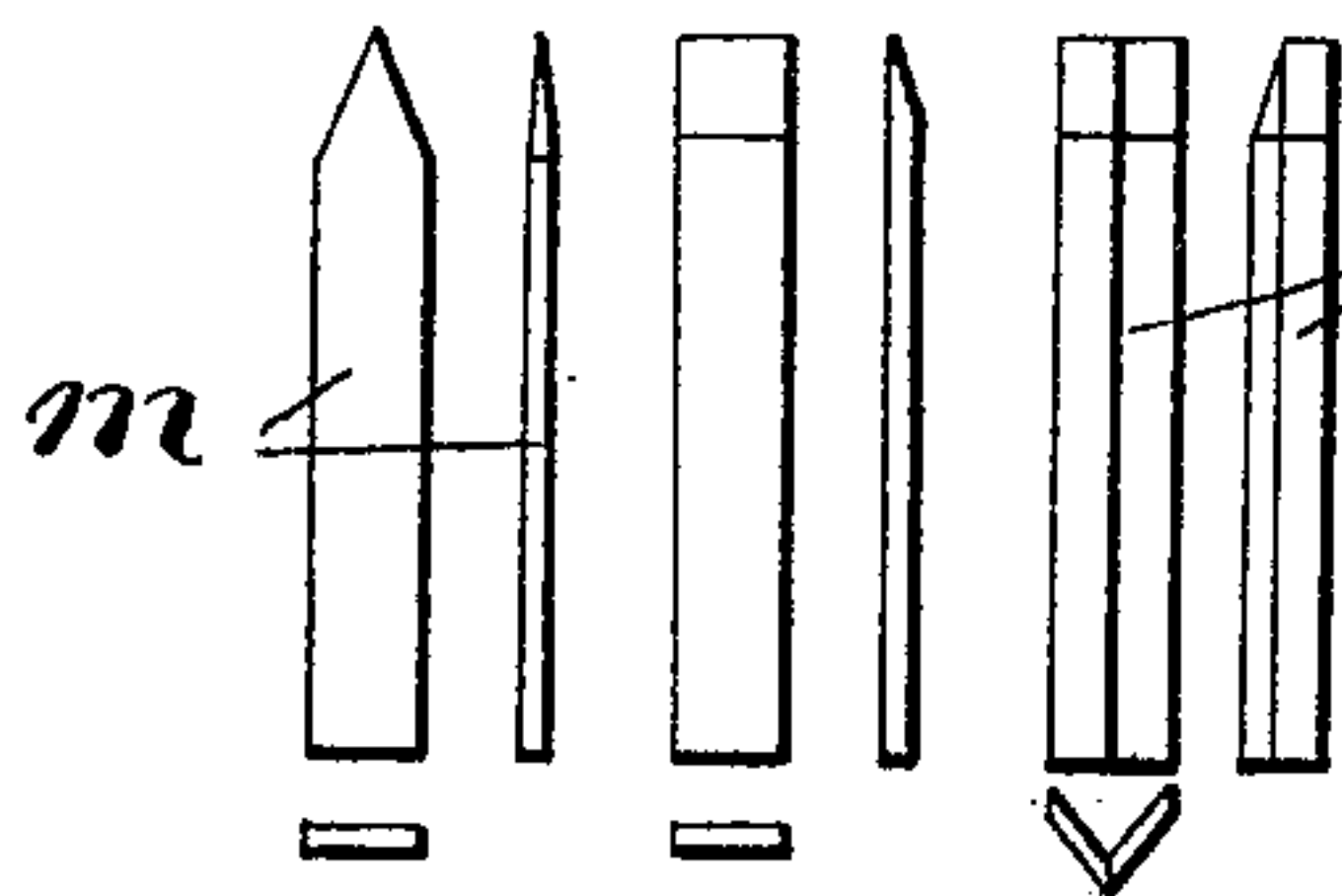


Fig. 5.



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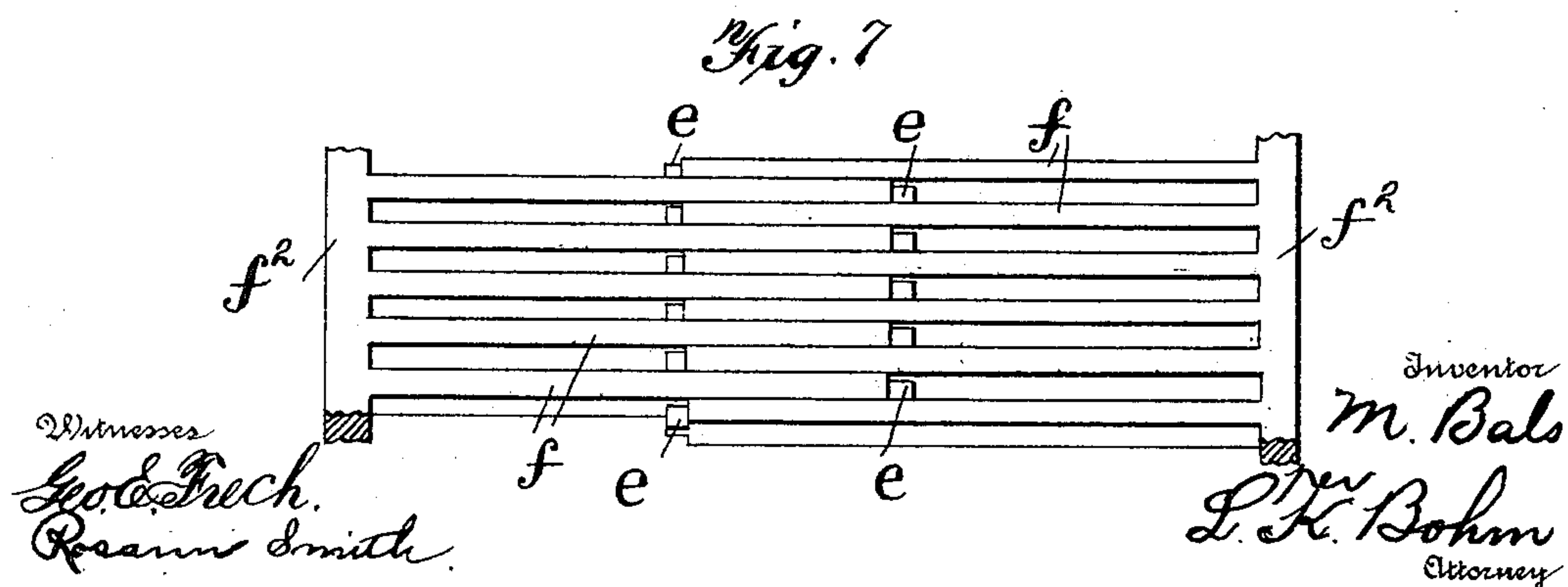
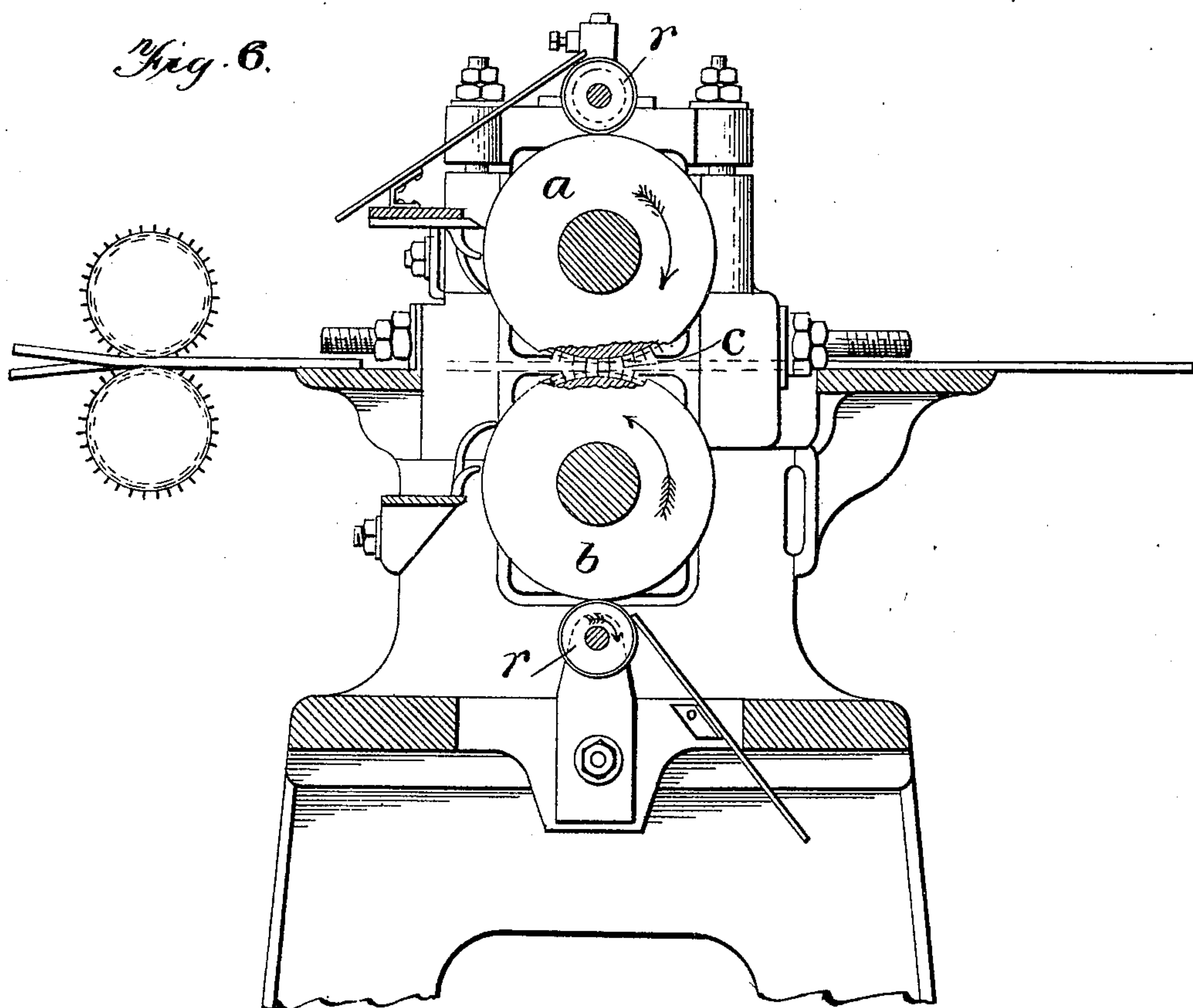
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3 Sheets—Sheet 2.



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3 Sheets—Sheet 3.

Fig. 8.

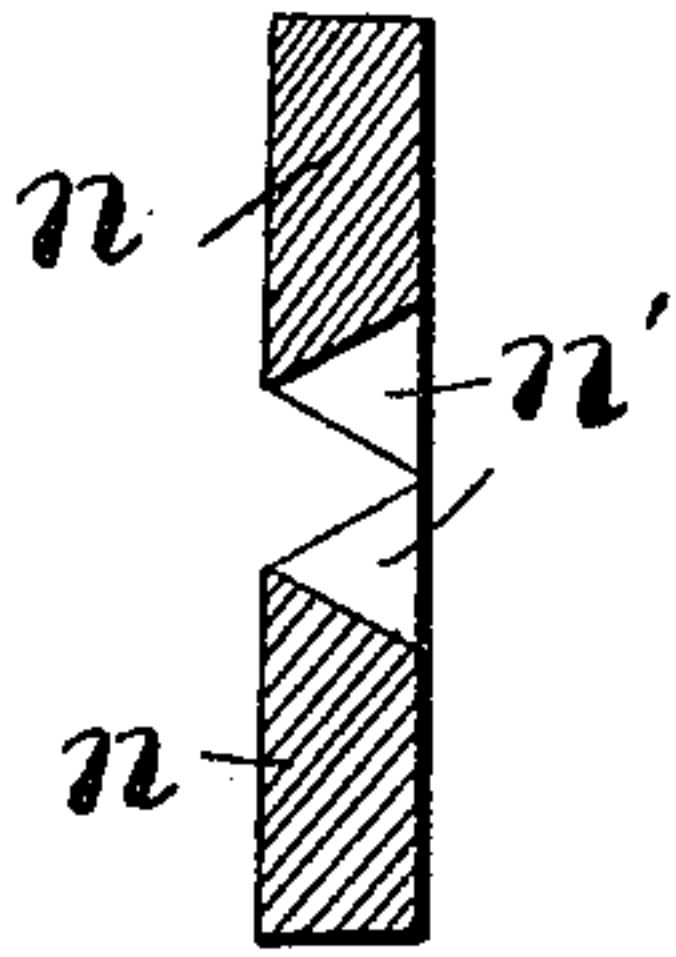


Fig. 11.

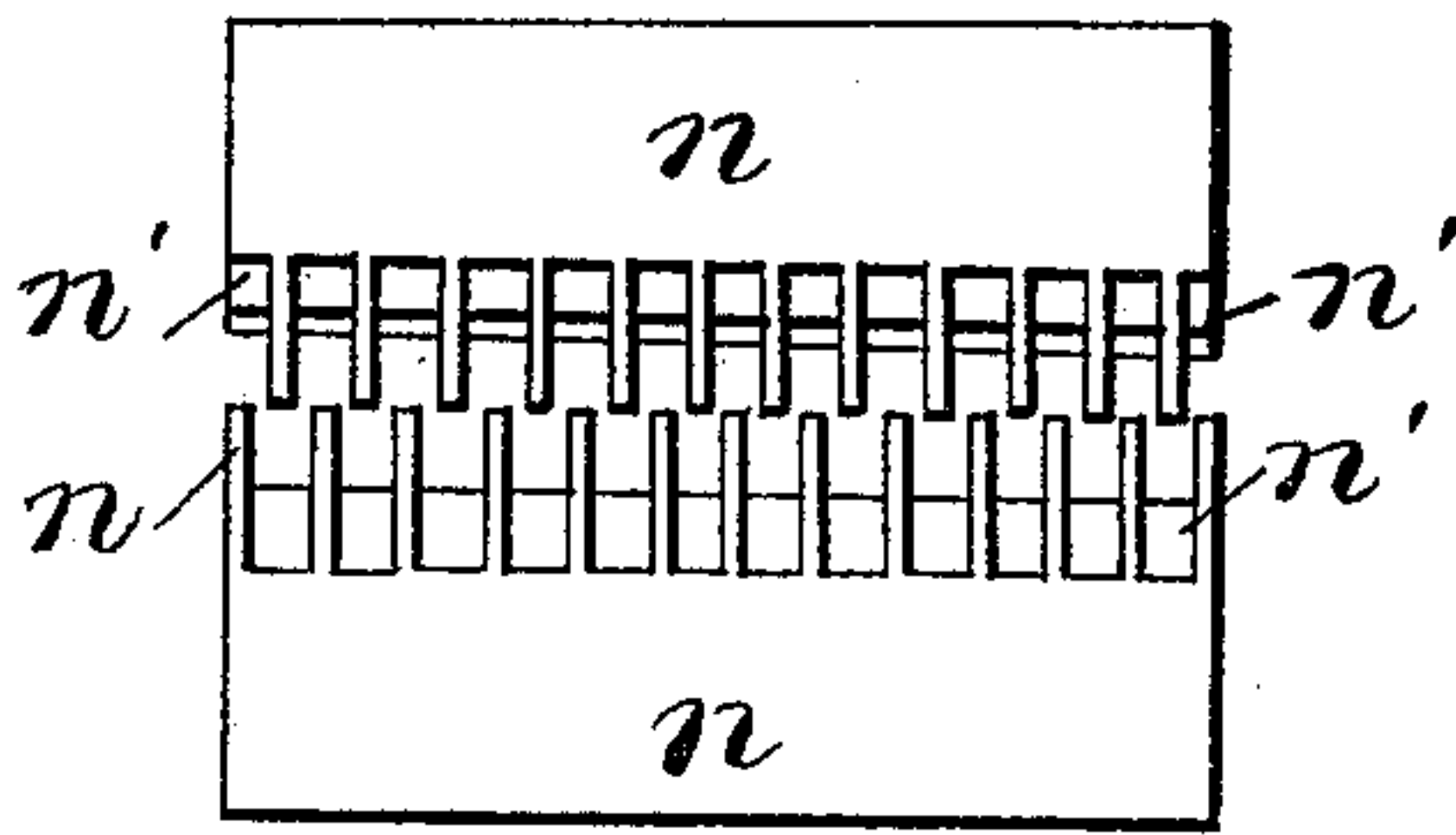


Fig. 9.

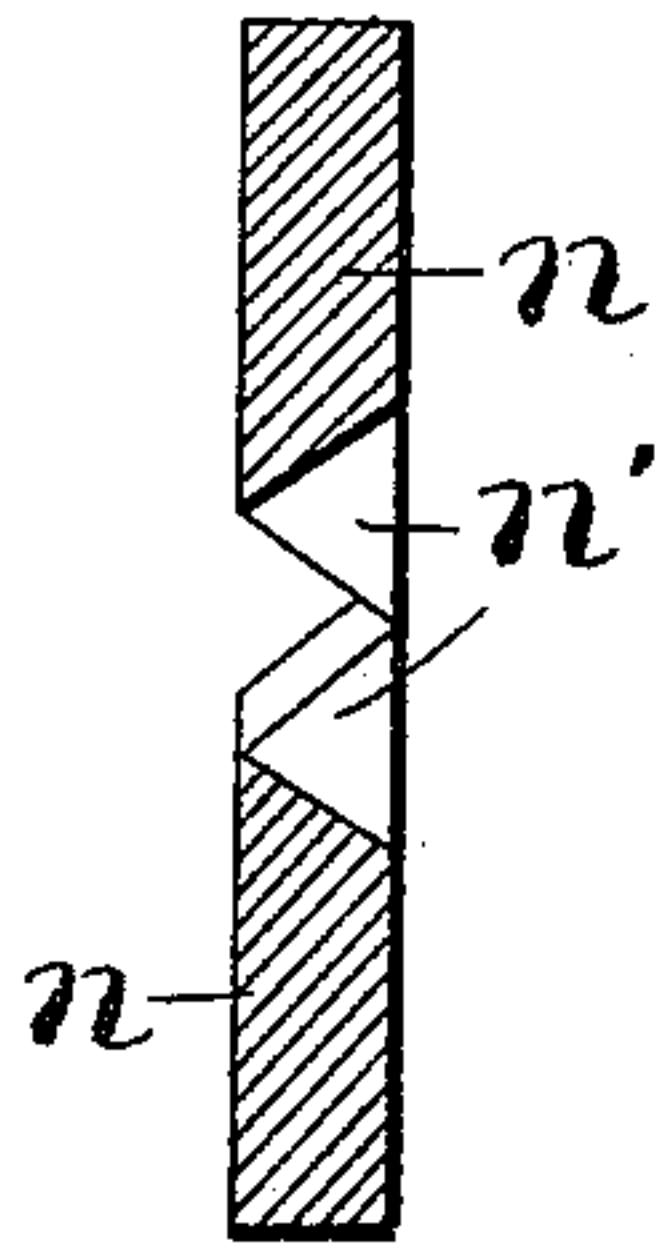


Fig. 12.

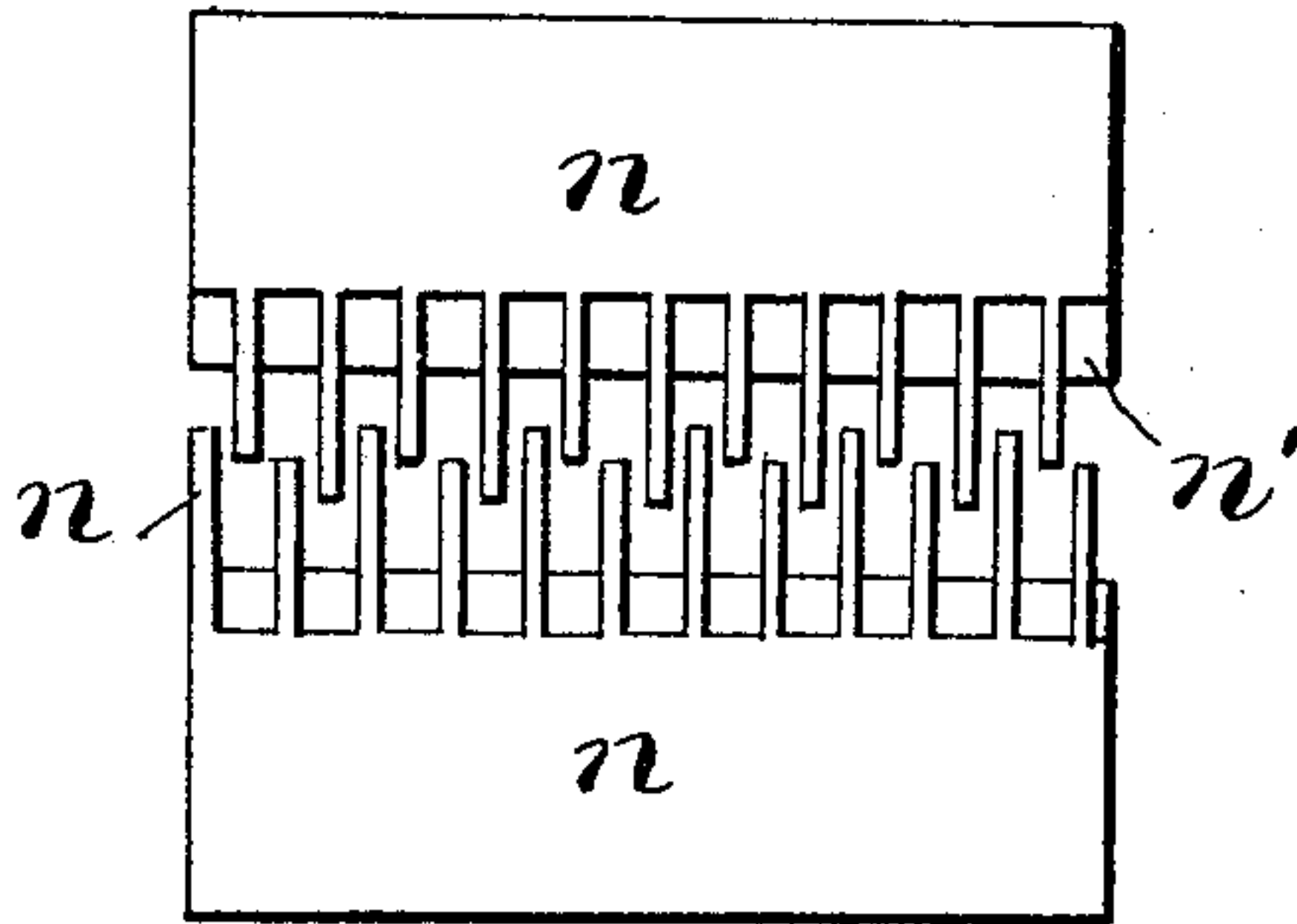


Fig. 10.

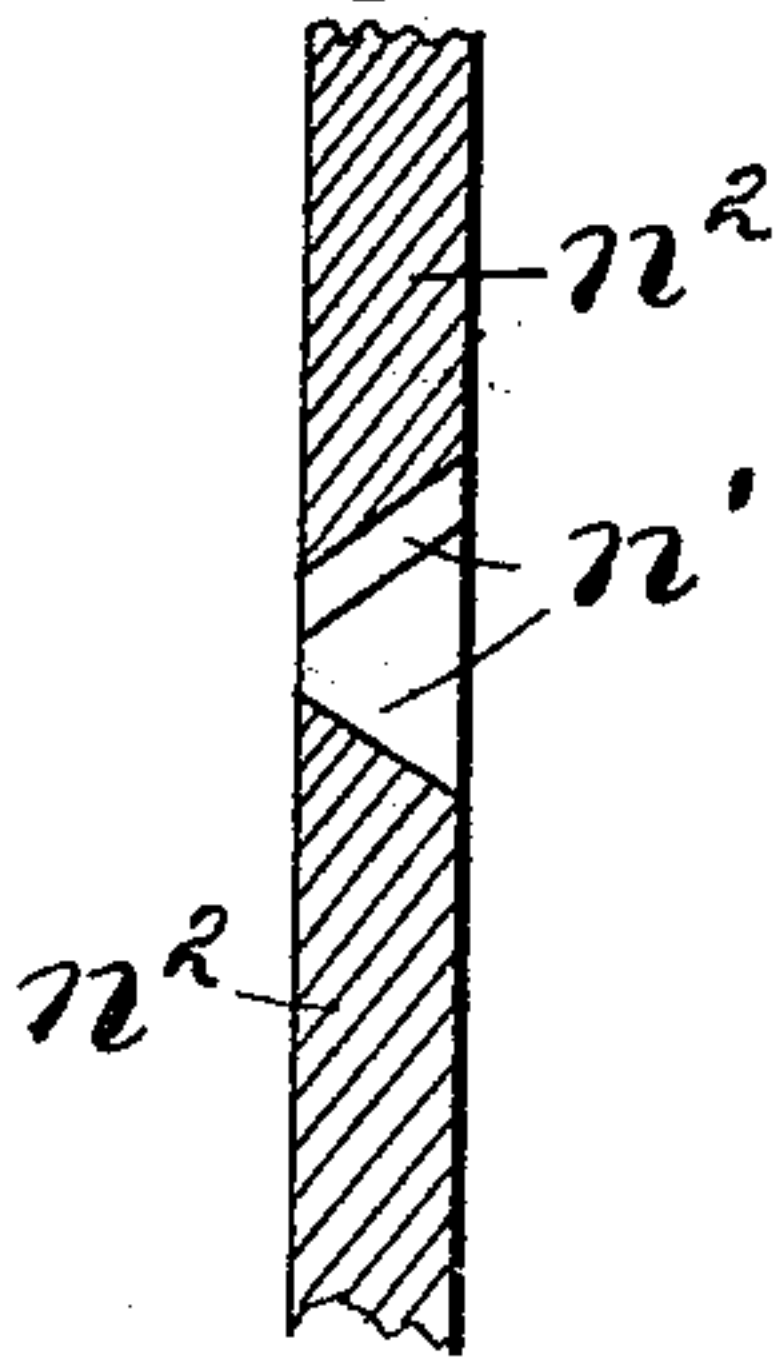
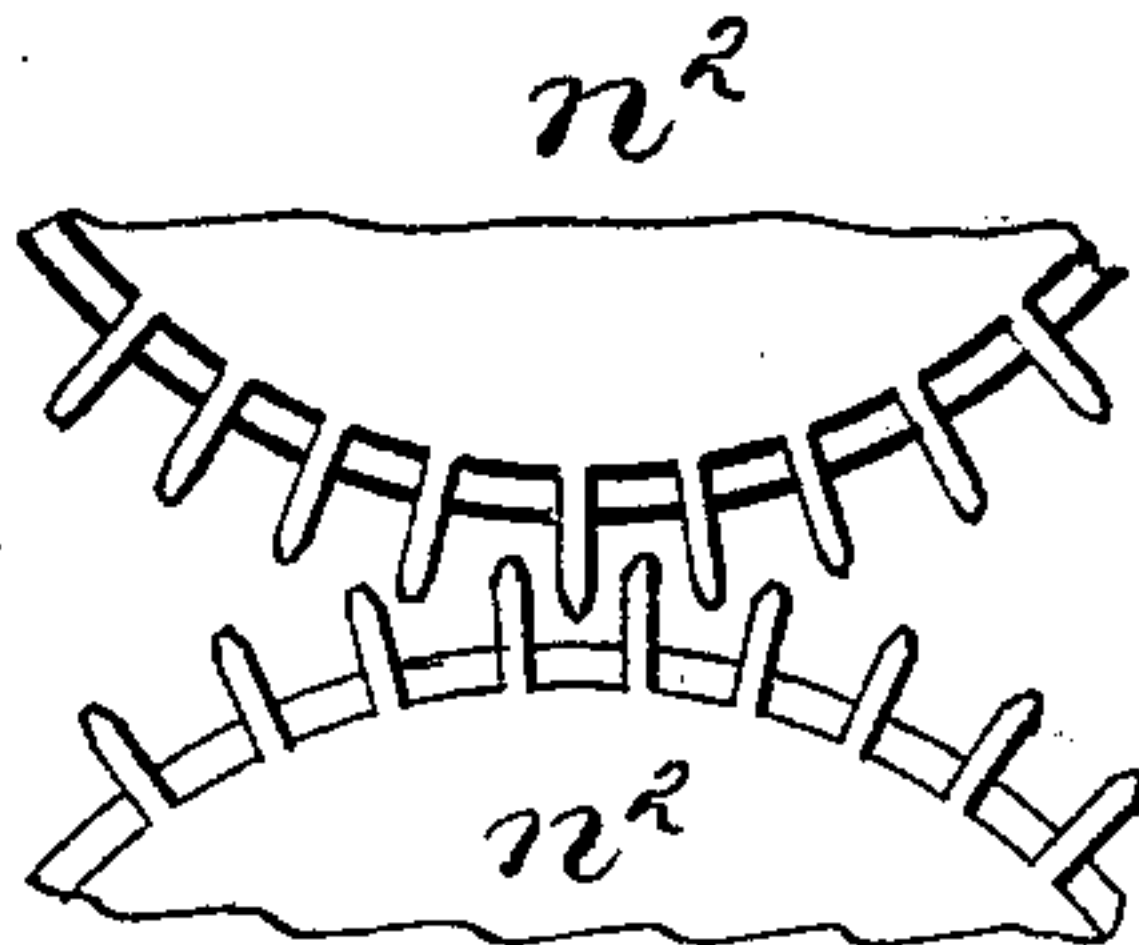


Fig. 13.



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UNITED STATES PATENT OFFICE.

MAX BALS, OF VIENNA, AUSTRIA-HUNGARY, ASSIGNOR TO HERZFELDER & FRÖHLICH, OF SAME PLACE.

MAKING MATCHES FROM PASTEBOARD.

SPECIFICATION forming part of Letters Patent No. 632,087, dated August 29, 1899.

Application filed December 31, 1897. Serial No. 665,147. (No model.)

To all whom it may concern:

Be it known that I, MAX BALS, a subject of the Emperor of Austria-Hungary, residing in the city of Vienna, in the Province of Lower Austria, in the Empire of Austria-Hungary, have invented certain new and useful Improvements in Apparatus for Manufacturing Matches from Pasteboard, (for which I have obtained patents in Germany, No. 88,020, dated May 7, 1895; in Austria, No. 46/2,297, dated June 12, 1896; in Hungary, No. 6,503, dated November 5, 1896; in France, No. 261,203, dated February 16, 1897; in Belgium, No. 124,259, dated November 16, 1896; in Great Britain, No. 28,595, dated December 14, 1896, and in Italy, XXXII, 43,114,) of which the following is a specification.

This invention has for its object the manufacture of matches from pasteboard—that is, from strips of pasteboard which are cut into small splints or sticks by means of suitable devices and which are then provided with the known match-heads. The cutting of the pasteboard into small splints is effected by suitable devices in such a manner that there are formed two comb-like strips, the two strips engaging tooth-like with each other, which are afterward separated. The strips are fed to the dipping device, where, if required, a setting device may be provided, which presses the several small rods alternately to the right and to the left in order to prevent the sticking or adhering of the splints.

The invention is illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation of the rollers provided with knives and cutters by means of which the pasteboard is cut into strips, the upper roller and driving-wheels being shown partly in section. Fig. 2 is a vertical cross-section of the same. Fig. 3 is an enlarged detail view taken through the rollers at any point near their longitudinal centers. Fig. 4 is also a vertical section of the rollers, taken at right angles to Fig. 3. Fig. 5 is a detached view showing the different forms of cutters that may be used. Fig. 6 is a vertical section of a machine embodying my invention and showing the strip passing directly therefrom through the device for separating the splints. Fig. 7 is a perspective view showing

two sets of splints in the act of being separated. Figs. 8 and 9 are vertical sections of a device for setting the splints on leaving the cutting apparatus and before the splints are dipped. Fig. 10 is a vertical section of still another form of setting device. Fig. 11 is a plan view of the setting device shown in section in Fig. 8. Fig. 12 is a plan view of the setting device shown in section in Fig. 9. Fig. 13 is an end view of the rollers shown in section in Fig. 10.

The machine is mounted on a suitable support of any desired construction, and it consists of two cylinders *a b*, mounted on trunnions and rotated by means of toothed wheels *h*, which receive their motive power through any suitable driving mechanism. These cylinders *a b* have cutters *c* of a length corresponding to that of a single match and having at each end a recessed ring *g*, so that the pasteboard strip *f* can slide right across, with the exception of the two edges *f*², as shown in Fig. 6. At the end of every alternate pair of cutters there are provided small cross-cutters *m m*, which separate every alternate splint at its one end from the edge *f*² at the one side, while the other alternate splints are separated from the edge at the other side, thus producing two separate strips, each having a row of alternate splints and spaces, which strips are then drawn apart. The cutters *m* are for this purpose so arranged that, for instance, on the right-hand of the cylinder *a*, they are situated between the cutters 1 and 2, 3 and 4, 5 and 6, &c., while at the left-hand of the roller they are situated between the cutters 2 and 3, 4 and 5, 6 and 7, &c.

Figs. 3 and 4 show on an enlarged scale, in cross and longitudinal sections, a part of the rollers with the cutters *m*, in which the above arrangement of the cutters is more clearly shown.

The cutters *m* are shown in detail in Fig. 5. They may either be flat, pointed, or preferably broad chisel edges, as *A B*, or they may be angular, as at *C*, with the object of causing a better adherence of the priming mass. The cutters of this form might of course also be applied to the previously-described arrangements. Small projections *d* may also be provided between the cutters *m*, being some-

what deeper than these, for pressing a groove *e* in the ends of the splints for the purpose of compressing the ends of the splints, as shown at *c*.

5 In the arrangements described the pasteboard splints produced are situated quite close together on their connecting-strip *f*², so that on dipping into the match composition they will be liable to stick together. In order
10 to prevent this, the strips *f*, after being cut as described, are passed through a setting device (shown in Figs. 7 and 8) which consists of two movable bars *w*, having on their inner or facing edges projections *w'*, so arranged
15 that the projections on the one bar enter the spaces between the projections on the other bar. The front face of the projections and the face of the recesses are sloped in opposite directions, so that the slope of the projection
20 corresponds to the slope of the recess into which it projects. Thus when a strip, with its splints, is introduced between the two blades these two are slid toward each other. The contiguous rods of the strip are bent by
25 the projections in opposite directions, so that the head ends are well separated from each other.

In the modifications shown in Figs. 9 and 10 the projections are made of two different
30 lengths, whereby the rods are bent alternately to different angles.

Instead of employing reciprocating toothed bars I may also use a pair of toothed wheels *w*², Figs. 11 and 12, which in gearing with
35 each other as they rotate bend the rods in opposite directions as the strips are passed through. The teeth may either all be of equal length, as shown, or they may be of unequal length, so as to produce the same effect as de-
40 scribed, or the faces of the spaces may be made with varying inclinations for effecting the same purpose. There may also be two pairs of superposed toothed wheels, one pair having longer teeth at greater inclination on
45 the faces than the other.

Having thus described my invention, I claim—

1. A machine for manufacturing matches from pasteboard, composed of cylinders mounted on trunnions, and rotated by toothed
50 wheels, and provided on their peripheries with cutting-blades arranged parallel to the axis, a smooth ring *g* at one end of the cutters, and small projections *d* arranged between the cutters to compress the ends of the splints, sub-
55 stantially as shown.

2. A machine for manufacturing matches from pasteboard, composed of cylinders mounted on trunnions and rotated by toothed
60 wheels, and provided on their peripheries with cutting-blades arranged parallel to the axis, smooth rings *g* at the ends of the cutters and small projections *d* arranged between the cutting-blades and adjacent to the cutters *m*, combined with the cutters *m* for separating
65 the splints, substantially as described.

3. In a machine for manufacturing matches from pasteboard, composed of cylinders mounted on trunnions and rotated by toothed
70 wheels and provided on their peripheries with longitudinal cutting-blades, arranged parallel to the axis, combined with the devices for separating the head ends of the splints consisting of two movable bars *w*, having on their inner edges projections *w'* so arranged that
75 the projections of one bar enter the spaces between the projections of the other bar, substantially as described.

4. In a machine for manufacturing matches, from pasteboard, cylinders provided on their
80 peripheries with longitudinal cutting-blades arranged parallel to the axis, combined with small tooth-like cutters arranged rectangular at the end and between every alternate pair of cutters, and small projections between the
85 cutters for compressing the sticks, rods, or bars of the splints, substantially as set forth.

In testimony whereof I have signed this specification in presence of two subscribing witnesses.

MAX BALS.

Witnesses:

HENRY C. CARPENTER,
CHAS. E. CARPENTER.