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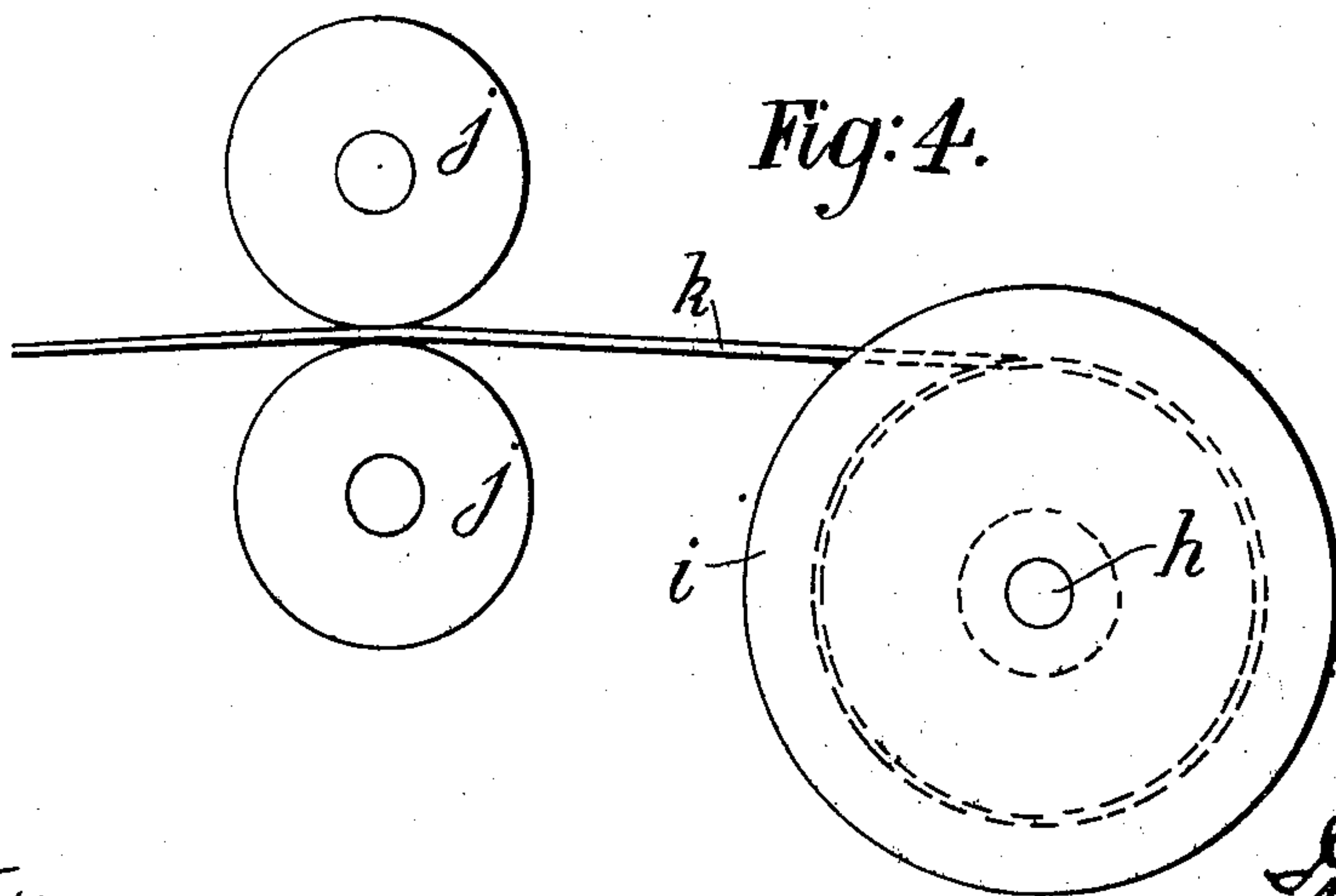
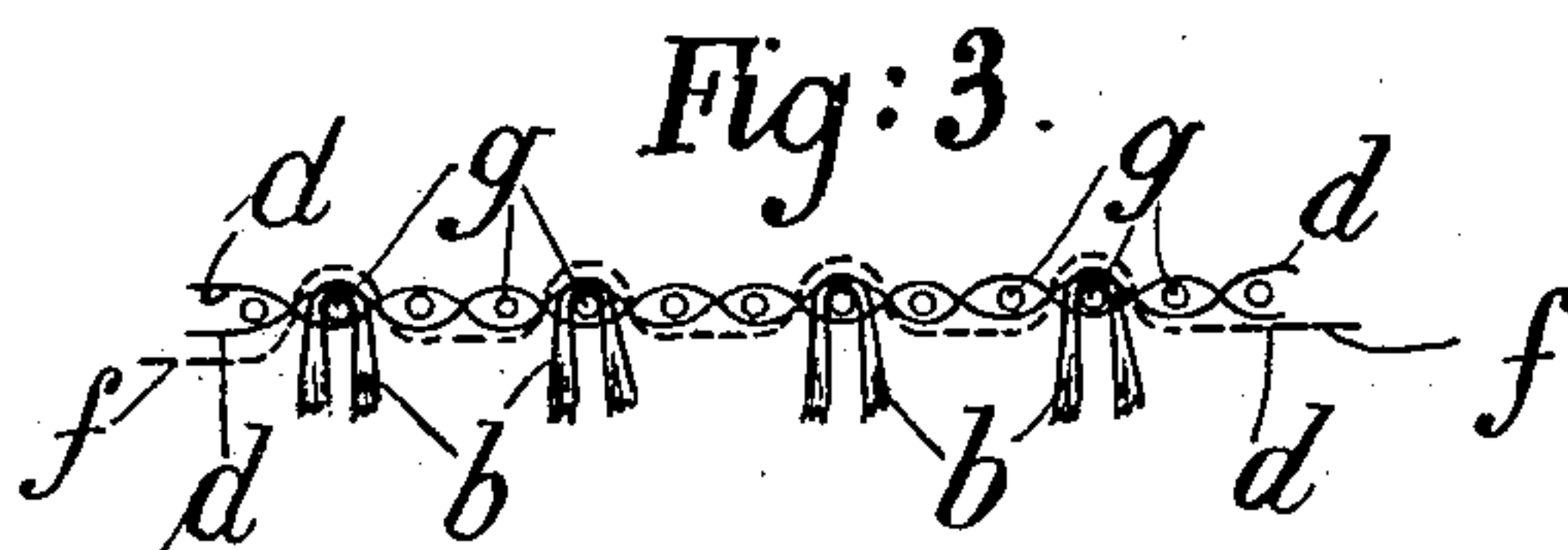
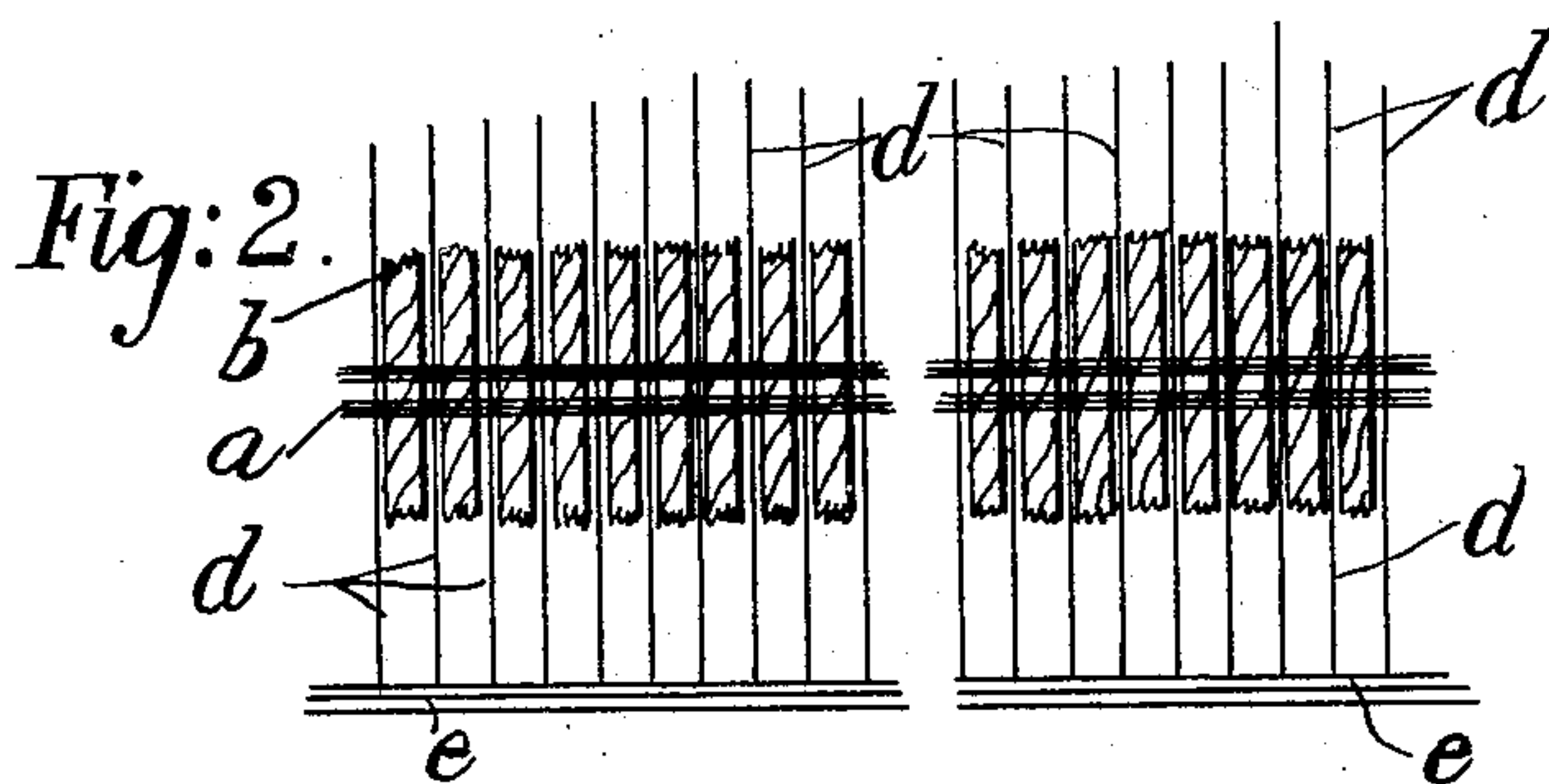
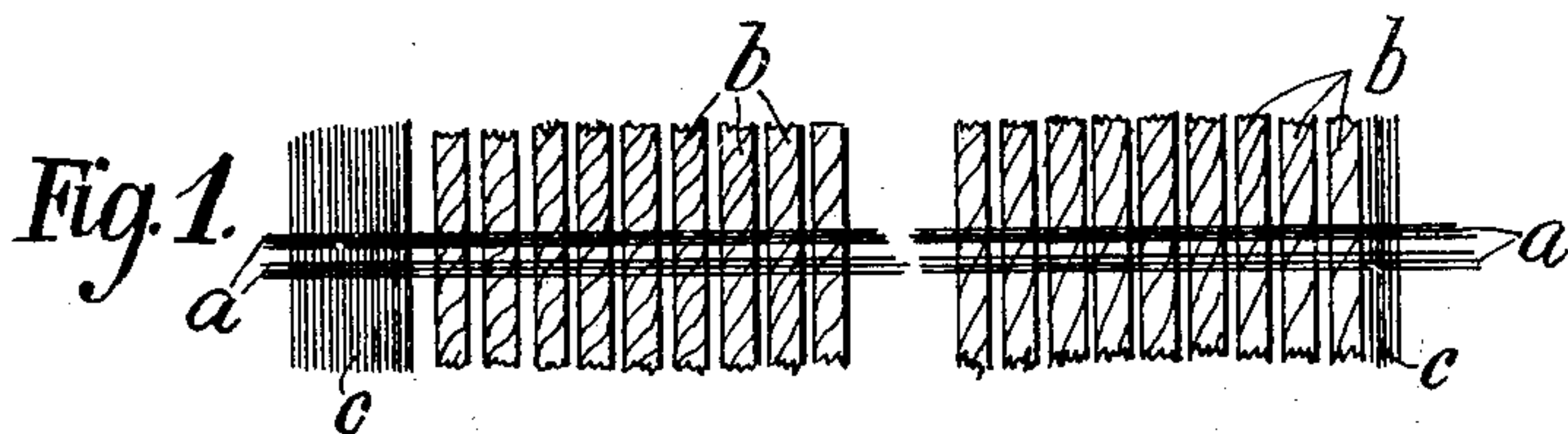
PATENTED SEPT. 3, 1907.

A. G. COWELL.

LOOM FOR WEAVING PILE FABRICS.

APPLICATION FILED DEC. 28, 1906.

2 SHEETS—SHEET 1.



Witnesses
O. Knight
R. P. Tomlin

Inventor
Albert George Cowell
By E. W. Prosser

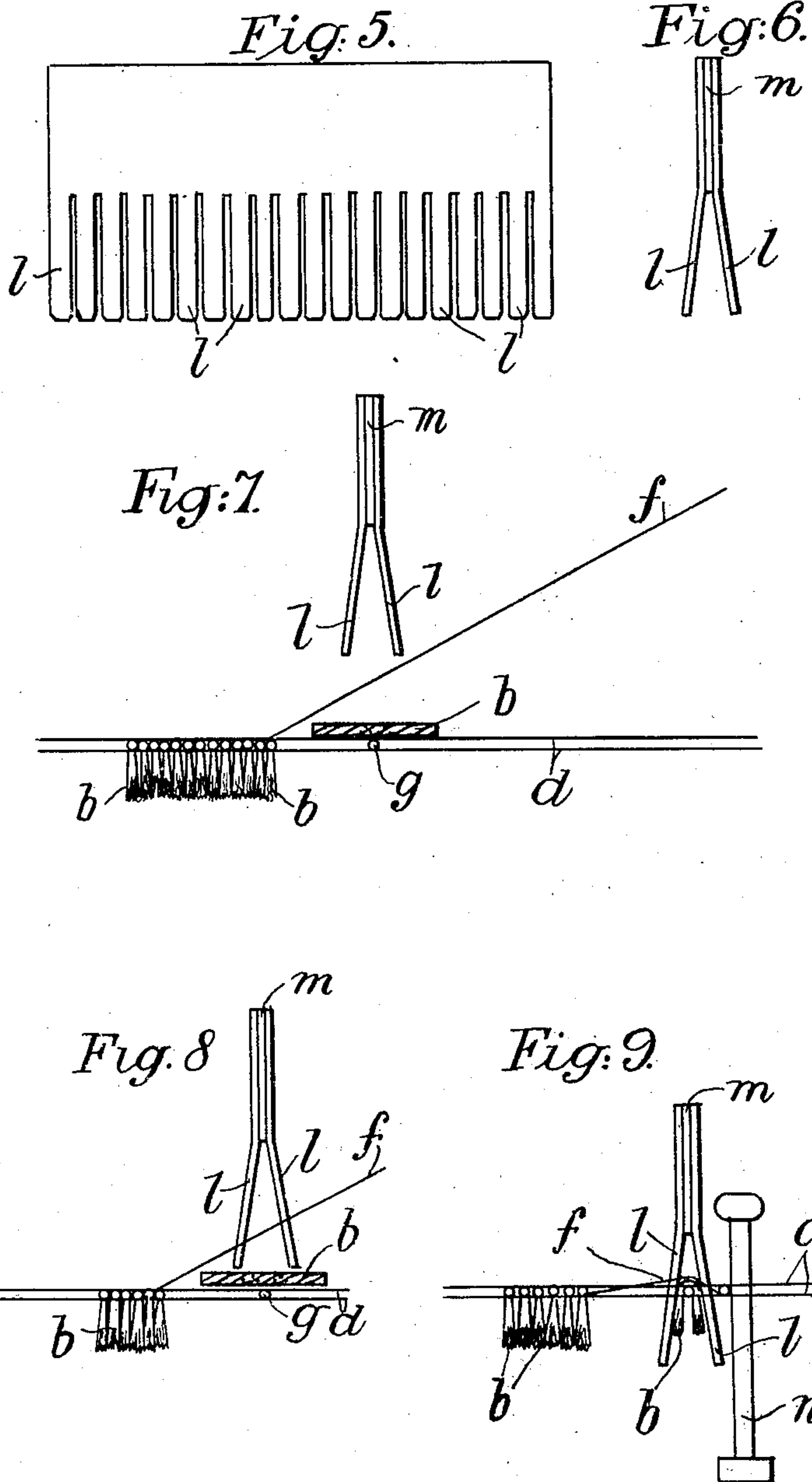
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2 SHEETS—SHEET 2.



Witness:
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R. F. Brush

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UNITED STATES PATENT OFFICE

ALBERT GEORGE COWELL, OF KIDDERMINSTER, ENGLAND.

LOOM FOR WEAVING PILE FABRICS.

No. 865,332.

Specification of Letters Patent.

Patented Sept. 3, 1907.

Application filed December 28, 1906. Serial No. 349,847.

To all whom it may concern:

Be it known that I, ALBERT GEORGE COWELL, a subject of the King of Great Britain, residing at Kidderminster, in the county of Worcester, England, have invented new and useful Improvements in Looms for Weaving Pile Fabrics, of which the following is a specification.

The invention has for its object an improved apparatus for use in weaving pile fabrics whereby a fabric is produced which more nearly resembles hand tied or knotted Turkey and other similar carpets than is the case with chenille fabrics made in the ordinary way.

I will describe my invention with the aid of the accompanying drawings:—

Figure 1 represents a length or strip of chenille fur or weft woven in the ordinary manner. Fig. 2 represents a similar strip of chenille fur lying on the ground warps of the carpet loom with the separate pile yarns over the spaces between the warp threads. Fig. 3 represents a section of a three shot fabric woven as herein described. Fig. 4 is an elevation of means for keeping the strip of chenille fur flat and for applying suitable tension thereto. Fig. 5 is a face view and Fig. 6 an end view of the double comb and Figs. 7, 8 and 9 are sectional views representing different steps in the manufacture of the pile fabrics.

In carrying my invention into effect two distinct looms are employed the first (or "weft" loom) for weaving the pile threads, and the second (or "setting" loom) for inserting and binding the pile threads into the fabric. The first loom is similar in construction to those ordinarily used for weaving chenille weft or "fur" and the reading in of the pile threads (or the changing of the colors in accordance with the ruled design paper) is effected in a similar manner to that employed on such looms, but I preferably regulate the taking-up mechanism of the loom so that the number of pile threads (or shots of weft yarn) in a given length of weft cloth corresponds exactly with the dents in the slay used in the second or setting loom. Also, after each series of strips, representing one row or line in the design paper, I weave a short "droplea" or strip of cloth about $\frac{1}{2}$ inch in length, of closer texture than the rest of the weft cloth.

After the required number of repeats of the pattern has been woven from the design paper in the usual manner, the weft cloth thus formed is cut as heretofore, by means of a cutting machine, into a number of strips of equal depth, corresponding with the number of repeats of the pattern, but instead of turning up such strips into a V shaped chenille or fur, as has generally heretofore been done, I leave them flat after cutting, as has also been proposed. The strips are then reeled separately in repeats, on to bobbins or swifts.

Fig. 1 represents a length or strip of chenille fur or weft woven as above described and cut into lengths;

a a represent the warp threads of the fabric which latter is as stated cut up into lengths to form the chenille fur or weft, *b* is the weft yarn which in the second loom forms the pile, and *c* is the "droplea" or short strip of closely woven cloth.

Fig. 2 represents such a strip of chenille fur as that shown in Fig. 1 lying on the ground warps *d* of the carpet loom and showing the separate weft or pile yarns over the spaces between the warp threads *d* ready for pressing through; *e* represents the fell of the cloth or carpet.

The second, or setting loom, contains two or more ground warps, and a fine catcher or binder warp, the threads of which, in the case of a power loom, may be passed through needles attached to a needle bar and needle frame above the loom, as usual in carpet weaving looms, and the reed may have the dents open at the top, to allow the warp threads to rise above it when required. In the case of a hand loom, the catcher warp threads may be drawn through a heald in the usual manner but in either case the spaces between the dents in the slay are left only just wide enough to allow the warp threads to pass readily through the slay.

Fig. 3 represents a section of a three shot fabric or carpet woven as about to be described and in which *d d* are the ground warps, *f* the catcher warp, *b* the pile and *g* the shoots of weft.

The following is a description of the process of weaving a three shot fabric on this principle, containing two ground warps *d* which may be wound on to one beam, the alternate ends being drawn through two separate healds, and a catcher warp *f* wound on to another beam, the ends being either drawn through needles on a needle bar (as described above) or through the eyes of a third heald. The ground warps *d* are first raised until they are all on a level and in a horizontal position. The catcher warp *f* is raised to a convenient height above the ground warps *d*.

In a suitable position at the side of the loom, and as near as convenient to the selvage of the proposed cloth, as represented at Fig. 4, a spindle *h* is provided parallel to the warp threads, on which spindle a bobbin *i* containing a strip *k* of pile weft (previously described) is placed, and free to revolve. Close up to the selvage of the proposed cloth a pair of friction rollers *j* is provided, between which the strip *k* of pile weft is passed as it comes from the bobbin. These rollers *j* serve the purpose of keeping the strips *k* of pile weft flat, and also of exerting the necessary tension on the pile weft as it is drawn through the shed.

When the reed is back, at a suitable distance from the fell *e* of the cloth, one half of the ground warp *d* is raised, and the other half depressed, the catcher warp *f* still remaining raised entirely above both the ground warps *d*, a shot *g* of filling weft is thrown across, by a shuttle or other means, between the two ground warps, which

are then brought to the same horizontal level and the shot of filling weft is partially beaten up by the slay, so that it remains a short distance from the fell of the cloth, and exactly in line with the friction rollers *j* between which the strip *k* of pile weft passes. A portion of the pile weft (corresponding to the width of the cloth to be woven) is then drawn through the shed over both the ground warps *d* and under the catcher or binder warp *f* and placed in position by the weaver and tensioned in such a manner that the central line of the pile weft exactly coincides with the filling weft already mentioned and that the pile threads lie over the spaces between the ground warp threads. The extreme ends of the pile weft are placed in position so that the pile threads exactly correspond with the cord or line in the design paper represented by this section of pile weft.

The strip of pile weft may be drawn across the shed by any suitable means, for example in the case of a hand loom by a stick with clip attached, or in the case of a power loom by a horizontal arm, fitted with a clip, and actuated to move laterally across the loom (on a similar system to that ordinarily employed for chenille setting looms), the "droplea" *c* at end of strip of pile weft being first fixed in the clip, and the pile weft being drawn across thereby. While in this position the free ends of the pile threads according to the present invention are forced downwards between the ground warp threads by a double comb preferably of the following construction and operation as represented at Figs. 5 to 9. The teeth *l* of this double comb project at the bottom to an equal distance on each side of the center of the pile weft, and are set at an angle to one another so that they are a certain distance apart at the bottom (such distance being determined by the length of the pile threads *b*) and gradually approach one another at the top, where they are fixed on each side of a thin metal plate *m* which is caused to rise and fall in a vertical plane by suitable overhead mechanism as will be well understood. The teeth *l* of this comb are made to correspond exactly with the dents in the reed, and the comb is so placed that, when actuated to descend vertically in order to push the pile threads *b* downwards through the warp *d*, the teeth *l* of the comb pass readily through the spaces between the warp threads *d*. The comb is made to descend until the point where its teeth *l* join at the top just touches the central line of the pile weft on the top of the filling weft *g* thereby doubling the pile threads round said filling weft *g* until the ends are parallel. The catcher warp *f* is also made to descend at the same time until its threads rest on the back of the pile weft over the filling weft *g*. The comb is then raised.

Fig. 7 represents a strip of pile weft *b* laid on the ground warp and the comb *l* some distance above said weft.

Fig. 8 shows the comb *l* in position touching the pile weft *b* and ready for pressing down the pile ends between the ground warps *d*.

Fig. 9 shows the comb *l* pressed down between the ground warps *d* thereby wrapping the pile ends round

the filling weft *g*. This figure also shows the second shot of filling weft *g* beaten up against the comb *l* by the reed *n* as described below.

To prevent the ends of the pile threads from springing up after the comb rises, I employ a clip extending across the loom below the ground warps, and at right angles to them, and so placed when the comb descends that the pile threads *b* are forced between the jaws of the clip, which then close on the pile threads. The reed *n*, see Fig. 9, is then moved forward to beat up the pile threads to the fell of the cloth, and the clip is so actuated that it follows the pile threads the requisite distance towards the fell of the cloth and is at the proper time dropped out of the way of the reed *n*, after having first released the pile threads.

After the pile threads *b* are beaten up, reed *n* is moved back and the catcher warp descends to its full distance, that is sufficiently to allow another shot of filling weft *g* to be passed over it and beaten up by the reed. I may however dispense with the clip, and proceed in the following manner:—I arrange for the comb to be raised and depressed by sliding it up and down in grooves in a frame fitted on each side of the cloth. This frame is pivoted on a bar above the loom, in such a manner that when at rest the grooves are vertical; but the frame may be made to oscillate slightly forward as described below. While the comb is still pressed down over the pile threads *b* I cause the catcher warp *f* to descend to its lowest position, and I raise one of the ground warps *d*. Over the catcher warp *f* and one of the ground warps *d* and under the other ground warp *d* I insert the second shot of filling weft *g*, which is then beaten up close to the comb by the reed *n*, the comb further moving slightly with the reed towards the fell of the cloth to such a position that when the comb is raised the free ends of the pile threads *b* are prevented from rising, on the one side by the fell of the cloth, and on the other side by the second shot of filling weft *g*.

After the comb is raised, the ground warps *d* reverse their positions, and a third shot of filling weft *g* is put in, over one of the ground warps *d* and the catcher warp *f*, and under the other ground warp *d* and is beaten up by the reed.

The above describes the process of weaving a three shot fabric, but a cloth may be made with either two, three, or four shots of filling weft to each row of pile threads, and the treading of the healds varied as desired.

What I claim is:—

1. In a loom for weaving pile fabrics, a double comb constructed and operating as herein described, to force the pile ends of the flat strip of pile weft downwards between the ground warps.

2. In a loom for weaving pile fabrics by means of strips of flat chenille, a double comb the teeth of which project at the bottom and are set at an angle to each other, substantially as herein set forth.

In witness whereof I have hereunto set my hand in presence of two witnesses.

ALBERT GEORGE COWELL.

Witnesses:

EDWIN LLOYD,

SAMUEL WANKLIN.