

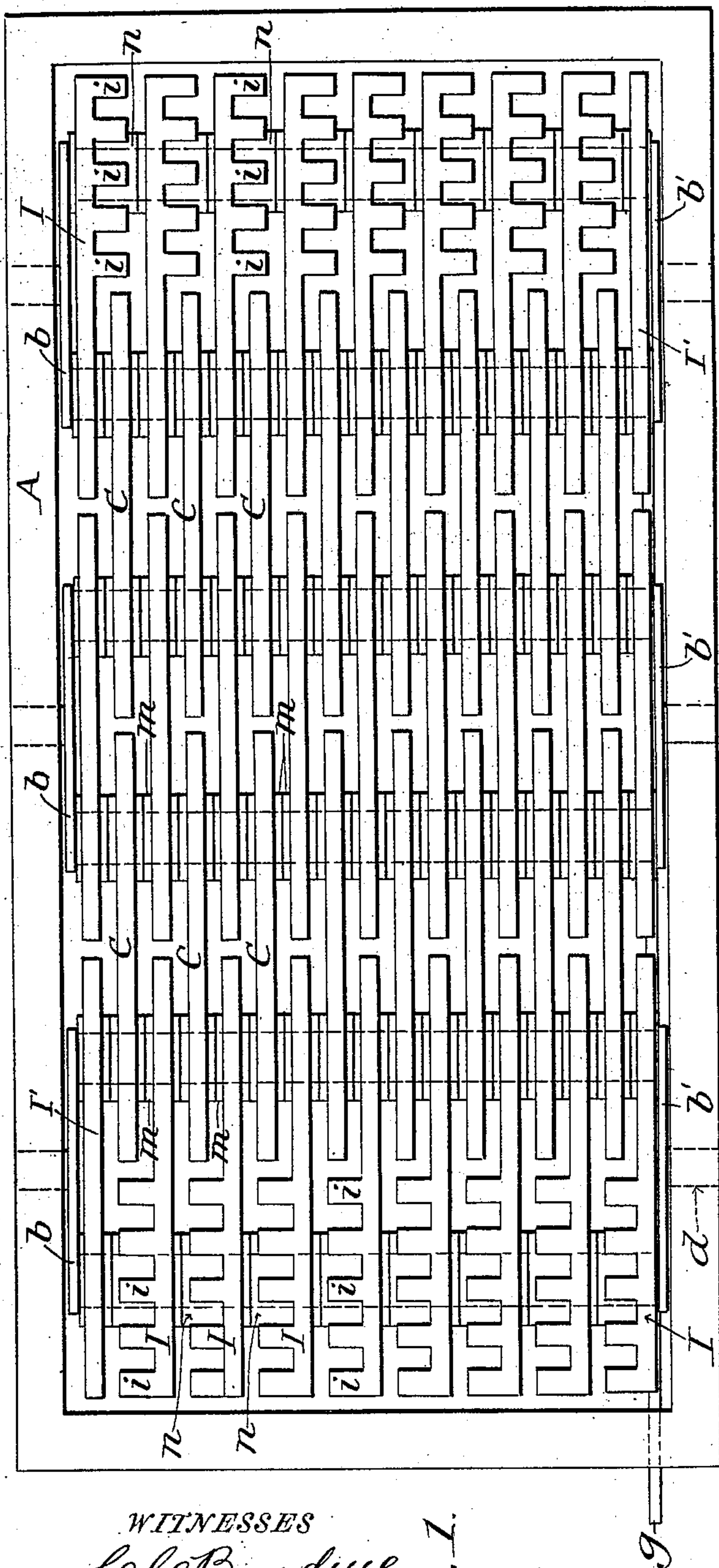
(No Model.)

2 Sheets—Sheet 1.

N. FROST.
SHAKING GRATE.

No. 540,429.

Patented June 4, 1895.



WITNESSES
C. C. Burdine.
C. B. Bull.

Fig. 1.

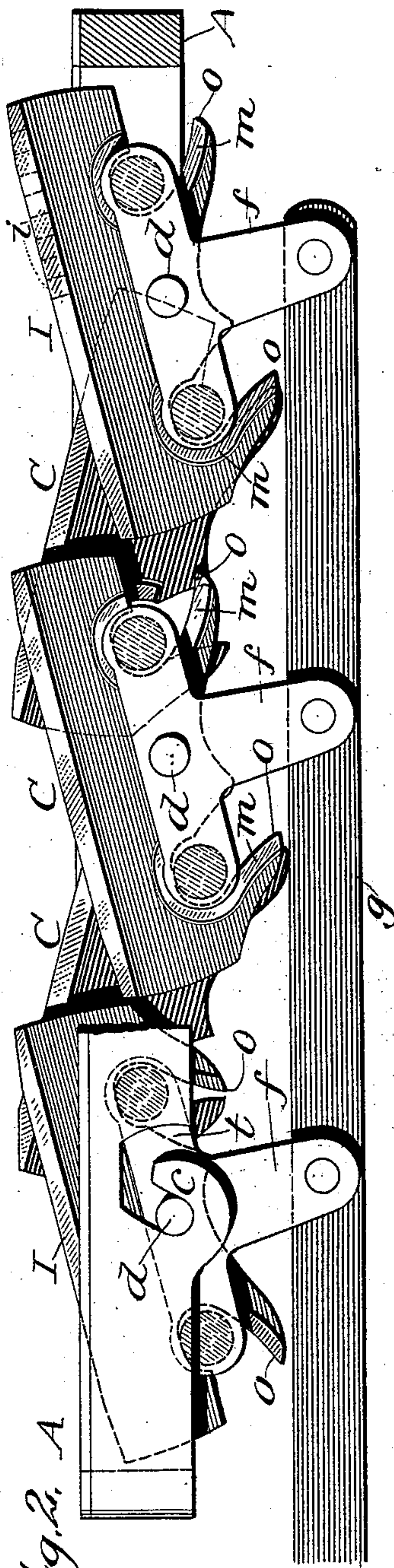


Fig. 2. A
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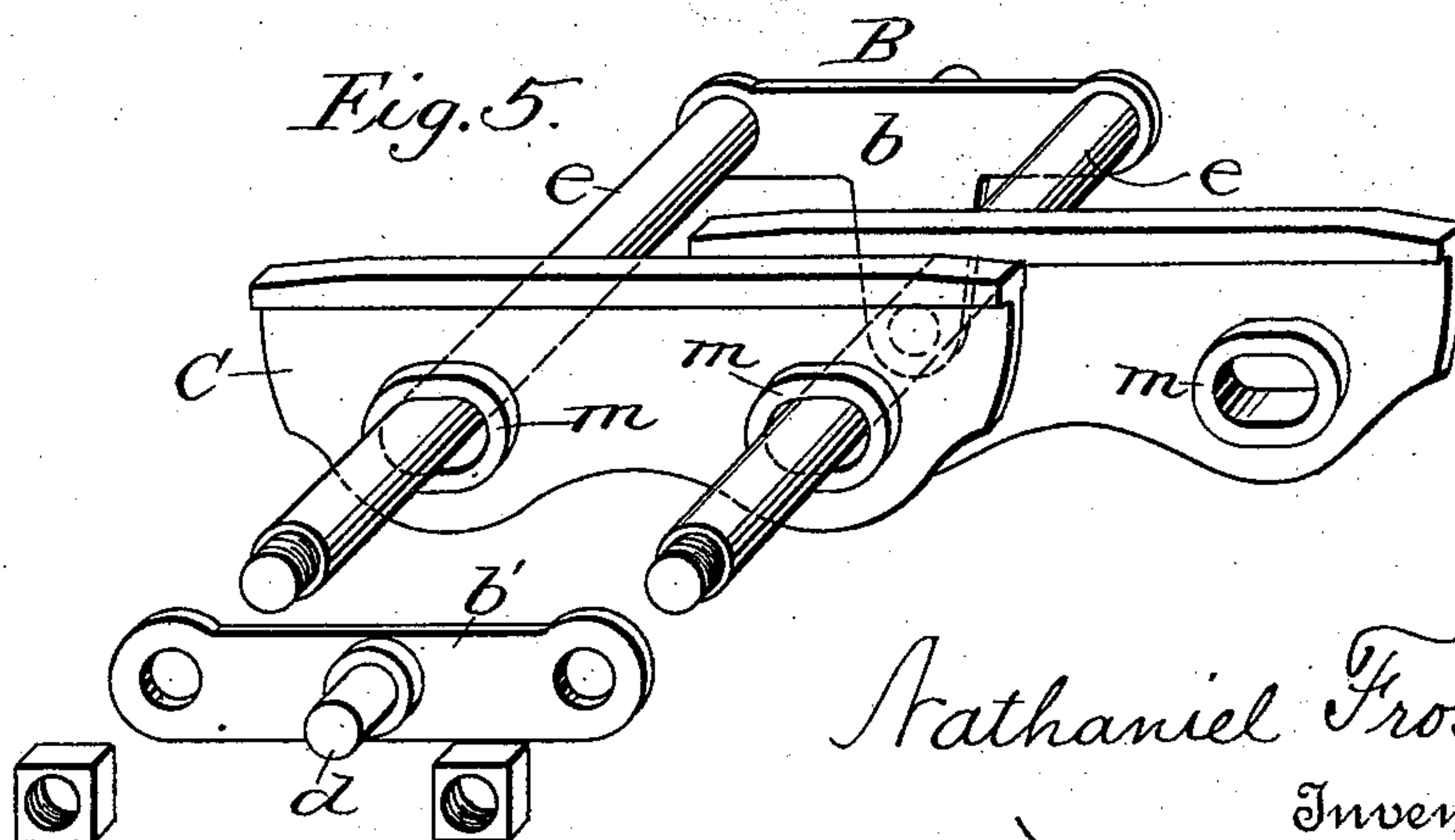
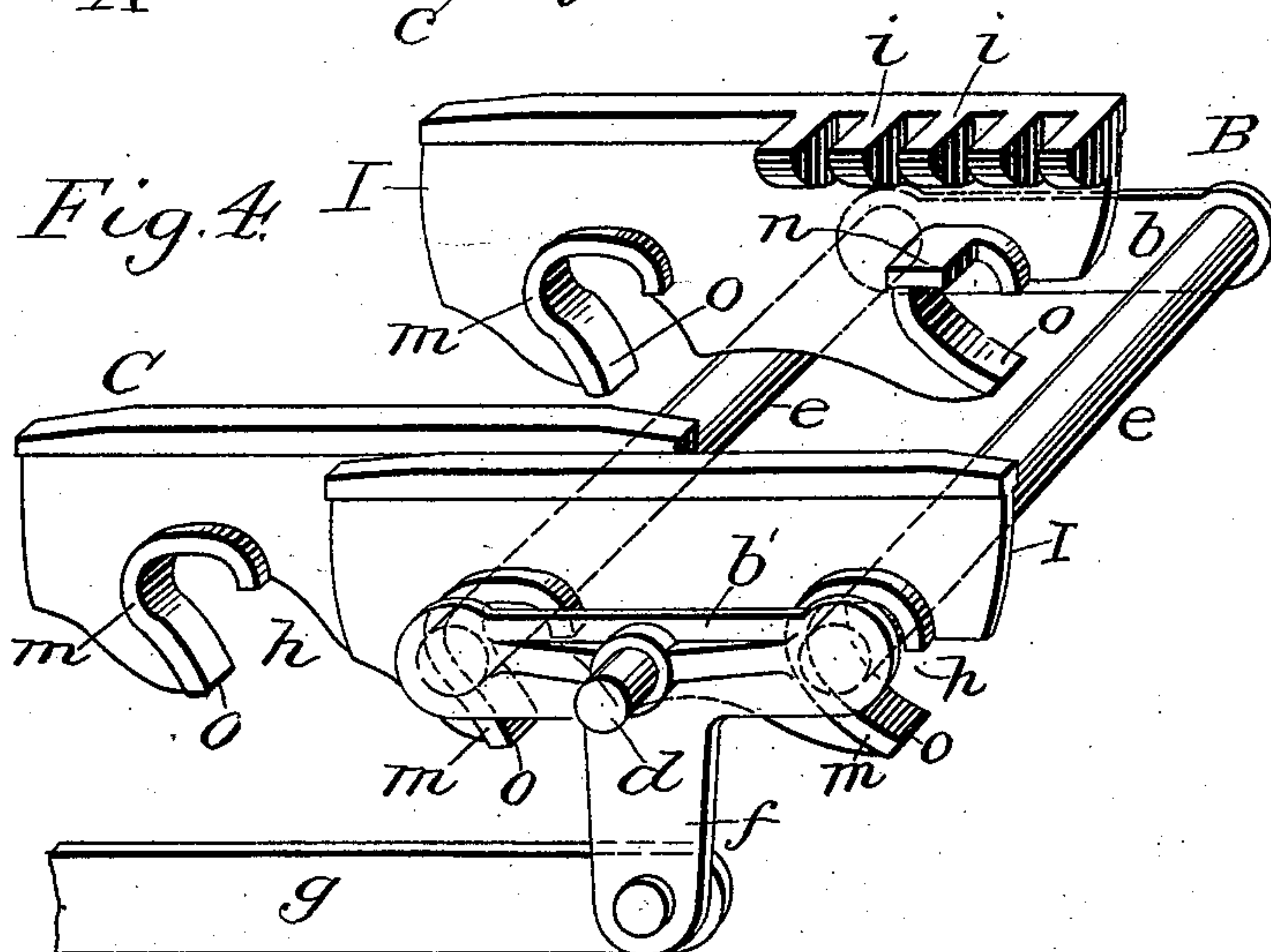
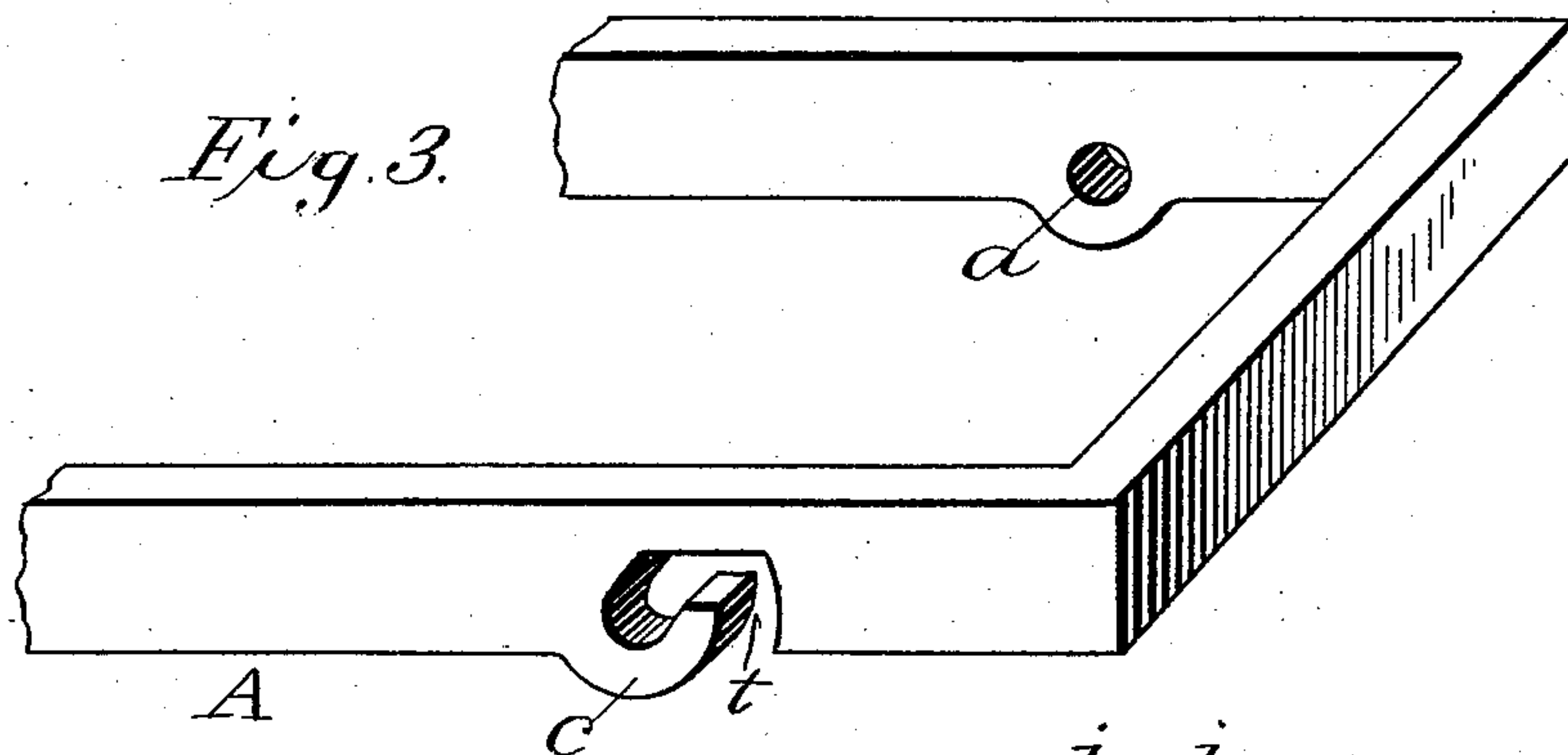
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2 Sheets—Sheet 2.

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UNITED STATES PATENT OFFICE.

NATHANIEL FROST, OF BLOOMINGTON, ILLINOIS.

SHAKING-GRATE.

SPECIFICATION forming part of Letters Patent No. 540,429, dated June 4, 1895.

Application filed February 16, 1895. Serial No. 538,681. (No model.)

To all whom it may concern:

Be it known that I, NATHANIEL FROST, a citizen of the United States, residing at Bloomington, in the county of McLean and State of Illinois, have invented certain new and useful Improvements in Shaking-Grates, of which the following is a specification.

My invention relates to shaking grates for furnaces, and the invention consists in a novel construction of the several parts, as hereinafter more fully set forth.

Figure 1 is a top plan view of a complete grate. Fig. 2 is a side elevation with the frame broken away to more clearly show the other parts. Fig. 3 is a perspective view of a portion of the frame. Fig. 4 is a perspective view of one of the rockers and a portion of the grate-bars to show how the latter are put on and taken off, and Fig. 5 is a perspective view showing a modification of the rocker and grate-bars.

The object of this invention is to produce a grate that shall be effective in breaking up the cinder or clinker and thoroughly sift the ashes, and in which the tipping or shaking bars can be quickly and easily replaced when necessary.

To construct a grate on my plan, I first provide a frame A, of a size adapted to the furnace in which the grate is to be used, and which may be made integral, or in parts fastened together, as is most convenient. The side bars of this furnace are provided with bearings for the journals *d* of a series of rockers B which are mounted therein, and upon which the grate bars C are mounted, as represented in the drawings.

The rockers B, I construct as shown in Fig. 4, they consisting of two round bars *e* connected at their ends by cross bars *b* and *b'*, on the outer face of each of which there is a journal *d*, as shown in Figs. 2 and 4, the cross bar at one end being also provided with a pendent arm *f* by which they are all connected to a shaking bar *g*, as clearly shown in Fig. 2. These rockers B may be cast integral.

In order to readily mount these rockers in the frame A, one of the side bars of the frame is provided at the point where the rocker journal is to rest, with a curved slot *t*, as shown in Figs. 2 and 3, the lower wall of the slot being formed in the shape of a hook *c*, so that

when the journal *d* of the rocker is slipped up and around in the slot *t*, it will rest at the end of the slot on the hook *c*, which will hold it in place, and prevent its being displaced in the operation of shaking the grate. The opposite side bar may be provided with a simple hole *a*, as shown in Fig. 3, for the other journal, and which of course will be slipped into the hole before the opposite journal is slipped into its slot. It is, however, obvious that both side bars may be provided with the curved slots and hooks if desired, in which case both journals can be slipped around in their slots simultaneously, but the hole and slot answer the purpose equally well.

There will be two or more of these rockers in each grate, the number depending on the length of the fire box and frame. In the drawings I have shown a grate having three rockers, but more may be used in larger grates wherever occasion requires.

On these rockers, after they are mounted in the frame as described, I place the grate bars C and I, as shown. These grate bars I make of a length sufficient to extend from near the journal or center of one rocker to the center of the next rocker, as shown in Figs. 1, 2 and 4; and in order that they may be readily set in place on the rockers, and be as readily removed therefrom, I construct them with two inclined slots *h* in their under edges, these slots being at a distance from each other exactly equal to the distance that the side bars *e e* of the rocker are from each other, so that, as shown in Fig. 4, these bars C can be readily slipped on or off. By examining Fig. 4, it will be observed that the lower edge of the bars where the slot *h* is formed, is projected or extended downward at an angle, thereby forming a hook-like projection or toe *o*, which, when the bar is in place on the rocker, engages under the bars *e* of the rocker, and thereby prevents the accidental displacement of the bars by the shaking of the grate, or otherwise; and yet the angle is such that by moving the bar endwise and at the same time upward, the bar can be at once removed from the rocker.

In placing the bars on the rockers to make up a grate, I do not arrange a tier of them side by side on a single rocker, but, as shown in Fig. 1, I first place an end bar I on a sin-

gle rocker, and next to that place another bar C with one end resting on the bar of that same rocker and with its opposite end resting on the adjoining bar of the next rocker, and so on alternately until all the bars are in place.

As by this arrangement of the bars, if all were made of the same thickness, there would be spaces left at the ends of the grate, opposite the ends of the alternate bars, I make the end bars I with side projections *i*, as shown in Figs. 1 and 4, these projections being of the proper size to fill these spaces to the required extent to prevent the fuel from dropping through at those points. One of the bars of each end tier which comes next to the frame where there is no side space to be filled, will necessarily be made plain, without the projections *i*, as shown at I', Fig. 1.

In order to properly space the bars and hold them against moving sidewise on the rocker arm, I form laterally projecting bosses *m* around the curved slots *h* as shown in Fig. 4, so that when placed on the rockers these bosses will hold the bars from lateral movement, as shown in Fig. 1. The end bars I at their outer ends are provided with a projection *n*, Fig. 4, of proper length to reach the next end bar I, for the same purpose.

While I have described the grate bars as being made with the curved or inclined slots or notches, by which they can be readily put on and taken off, and which is the construction I prefer, it is obvious that they may be made with holes as shown in Fig. 5, and still have all the peculiar motion and effect that they would have in the other case; but to use bars with holes, it would be necessary to make one of the end bars of each rocker detachable, as shown in Fig. 5. This would add to the cost, and consume much more time in replacing worn or burned bars; and for these reasons I prefer to make the bars with the slots as above described.

By this arrangement of the bars on the rockers it will readily be seen that when the rockers are tipped or rocked, the ends of the alternate bars which rest on the same arm of the rocker are simultaneously raised or depressed as the case may be, and as clearly represented in Fig. 2; and as they move up and down past each other with a sort of shearing action will at once loosen the clinker from

the bars and break it up. At the same time there is produced a wave-like movement of the surface of the bars as a whole, from end to end of the grate. These movements of the bars quickly break up any crust or clinker that may have formed in the fire, and at the same time effectually sift out the ashes, thus making a most efficient grate.

I am aware that many forms of shaking grates have been patented, and therefore I do not claim a grate having a series of single rocking bars with laterally projecting arms or head pieces either permanent or detachable; but I am not aware that a grate constructed on my plan has ever before been devised; and therefore

What I claim as my invention is—

1. A shaking grate consisting of a series of rockers composed of two cross bars united by end pieces journaled at their center to a supporting frame, with a series of grate bars mounted thereon as shown, that is, one bar being mounted on the two arms of a single rocker, and the next bar of the series being mounted on the adjoining arms of two separate rockers, and so on alternately across the entire grate, substantially as shown and described.

2. In combination with the double armed rockers B, the grate bars C provided with the inclined slots *h* and the projections *o* to engage under the arms of the rockers substantially as shown and described, whereby the grate bars are held from being displaced by the shaking of the grate, and are rendered capable of being removed or replaced at will without loosening any fastening device, or detaching any of the other parts of the grate.

3. A horizontal grate frame A provided on its under side with a series of hooks *c* and entering slots *t* substantially as shown and described, whereby the rockers are prevented from being displaced when in use, and yet are capable of being detached and replaced at will, as set forth.

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

NATHANIEL FROST.

Witnesses:

CLINTON P. SOPER,
WILLIAM ORENDORFF.