No. 788,008. PATENTED APR. 25, 1905.

A. B. WILLOUGHBY.

ROCKING OR SHAKING GRATE BAR.

APPLICATION FILED JULY 9, 1902.

2 SHEETS—SHEET 1.

Fig. 1.

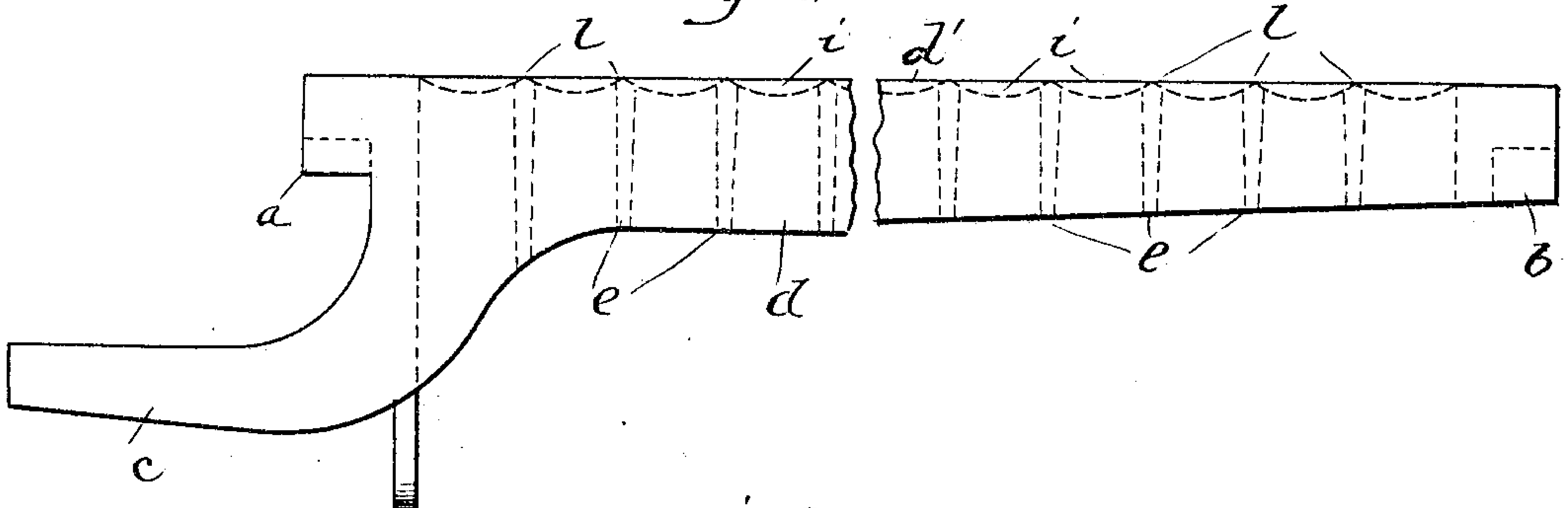


Fig. 2.

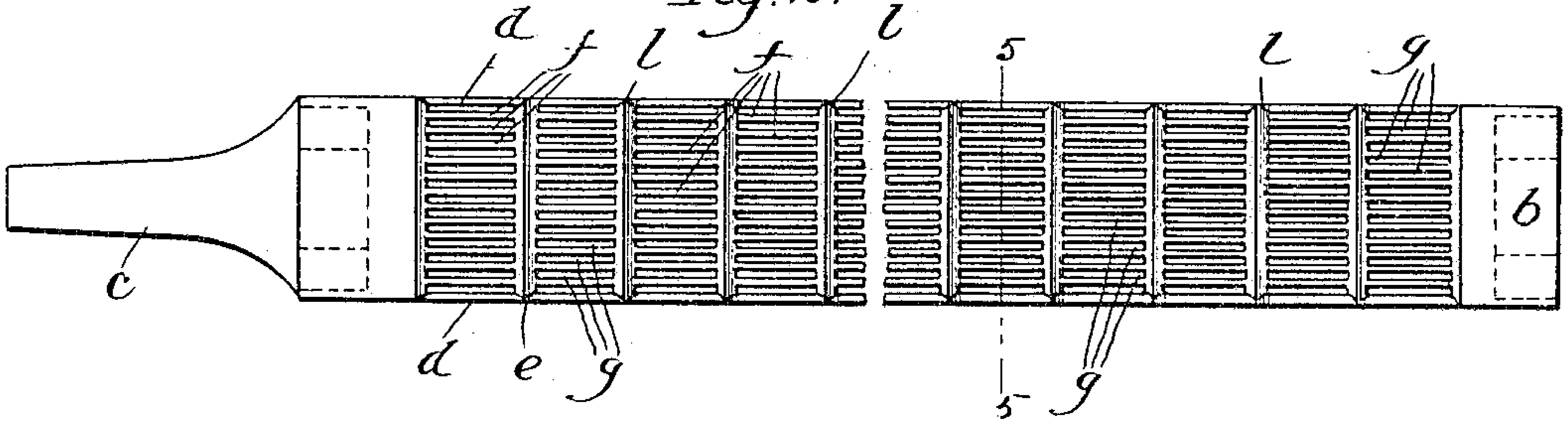


Fig. 3.

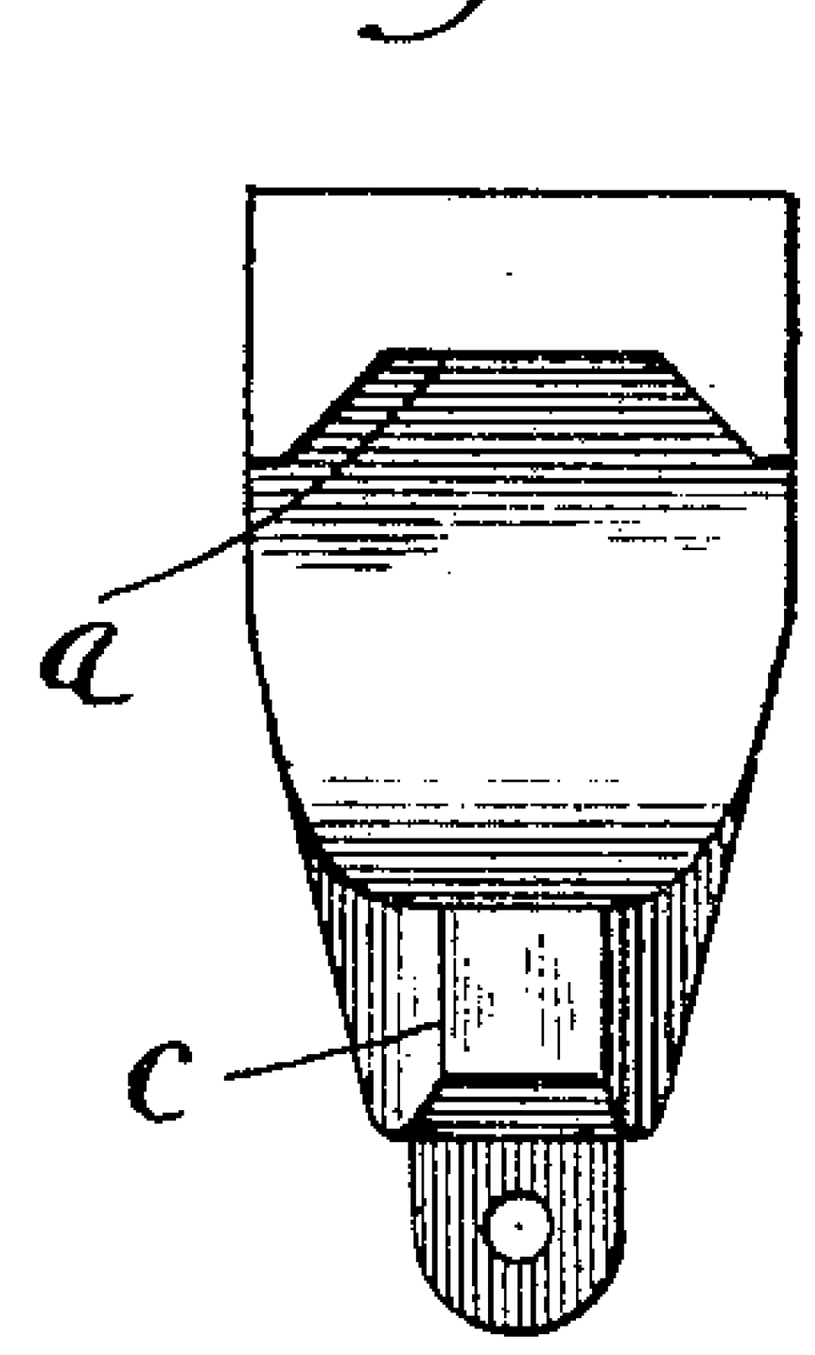


Fig. 4.

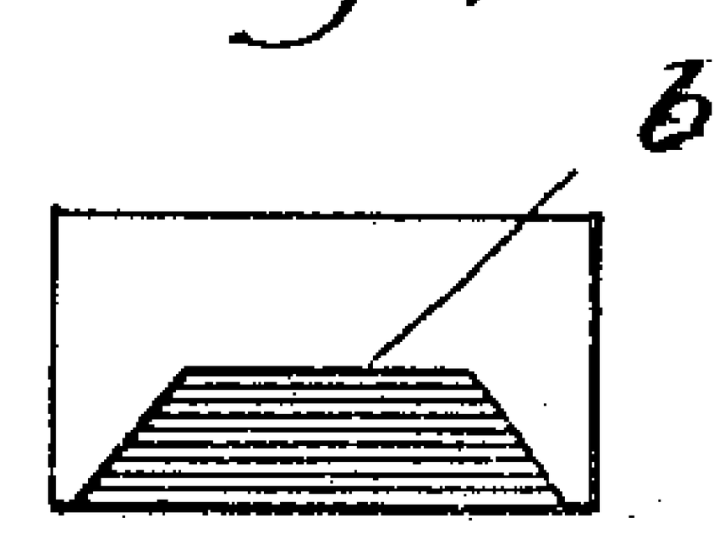
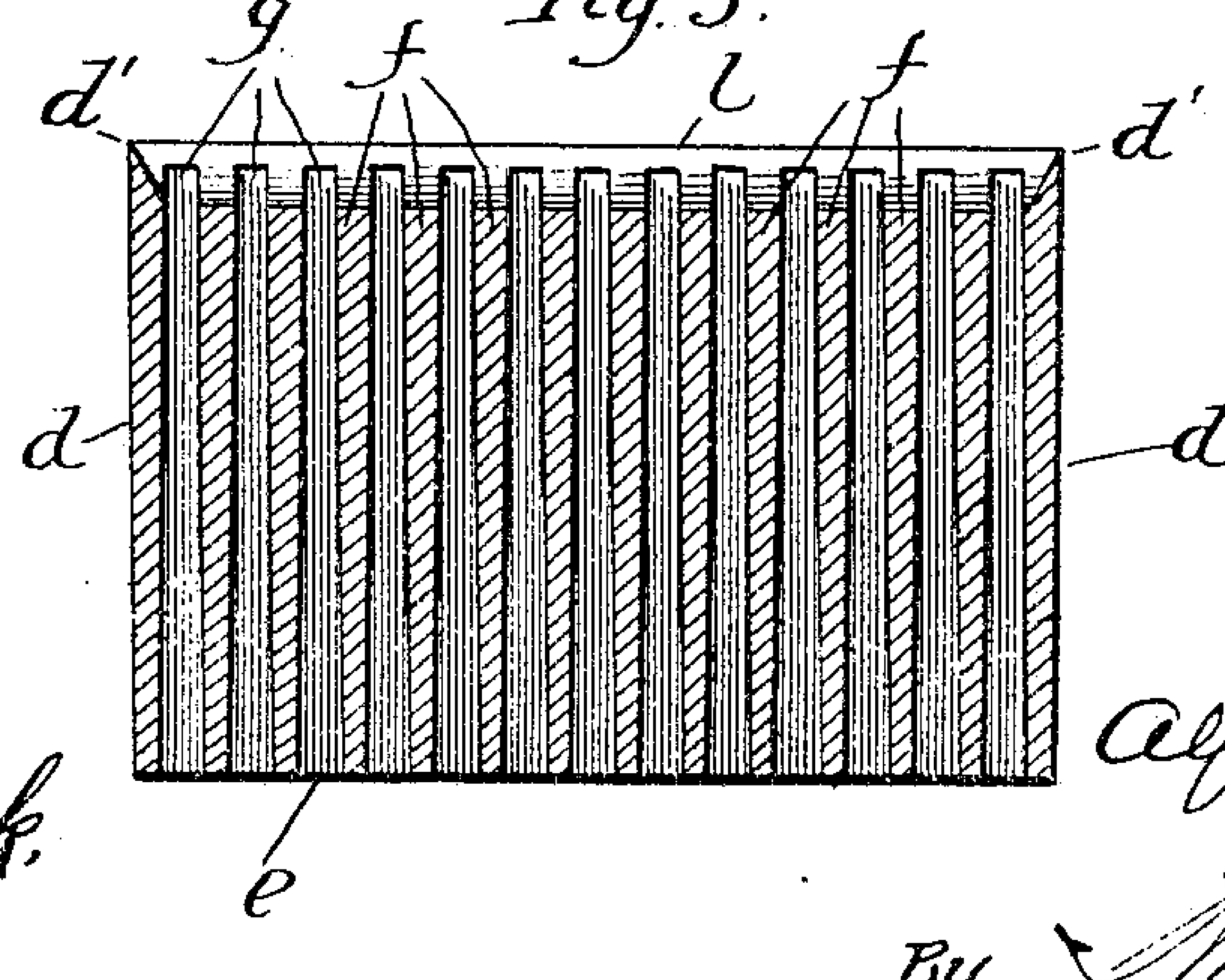


Fig. 5.



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Inventor:
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By [signature] Atty.

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ROCKING OR SHAKING GRATE BAR.

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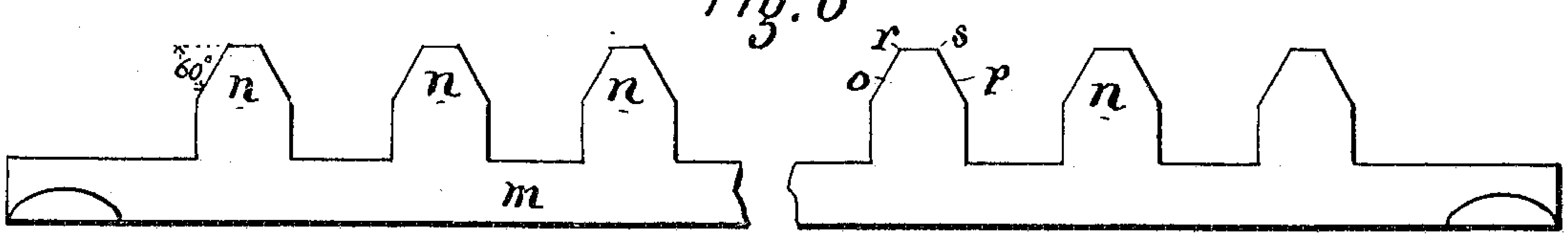
2 SHEETS—SHEET 2.

Fig. 6



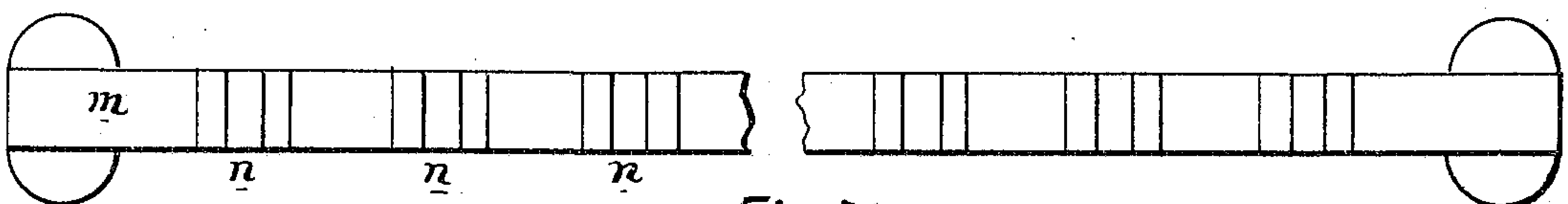


Fig. 7

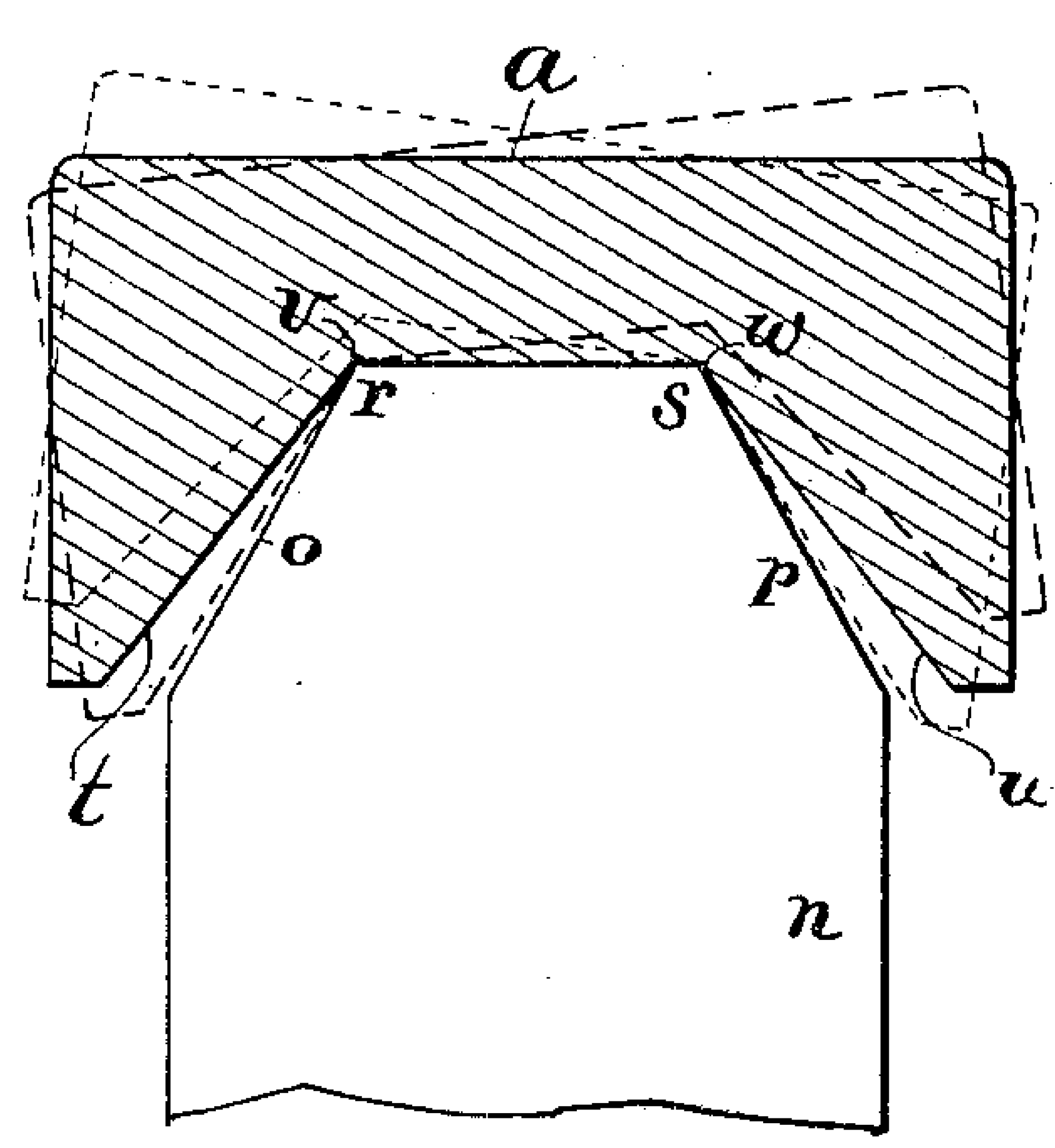


Fig. 8

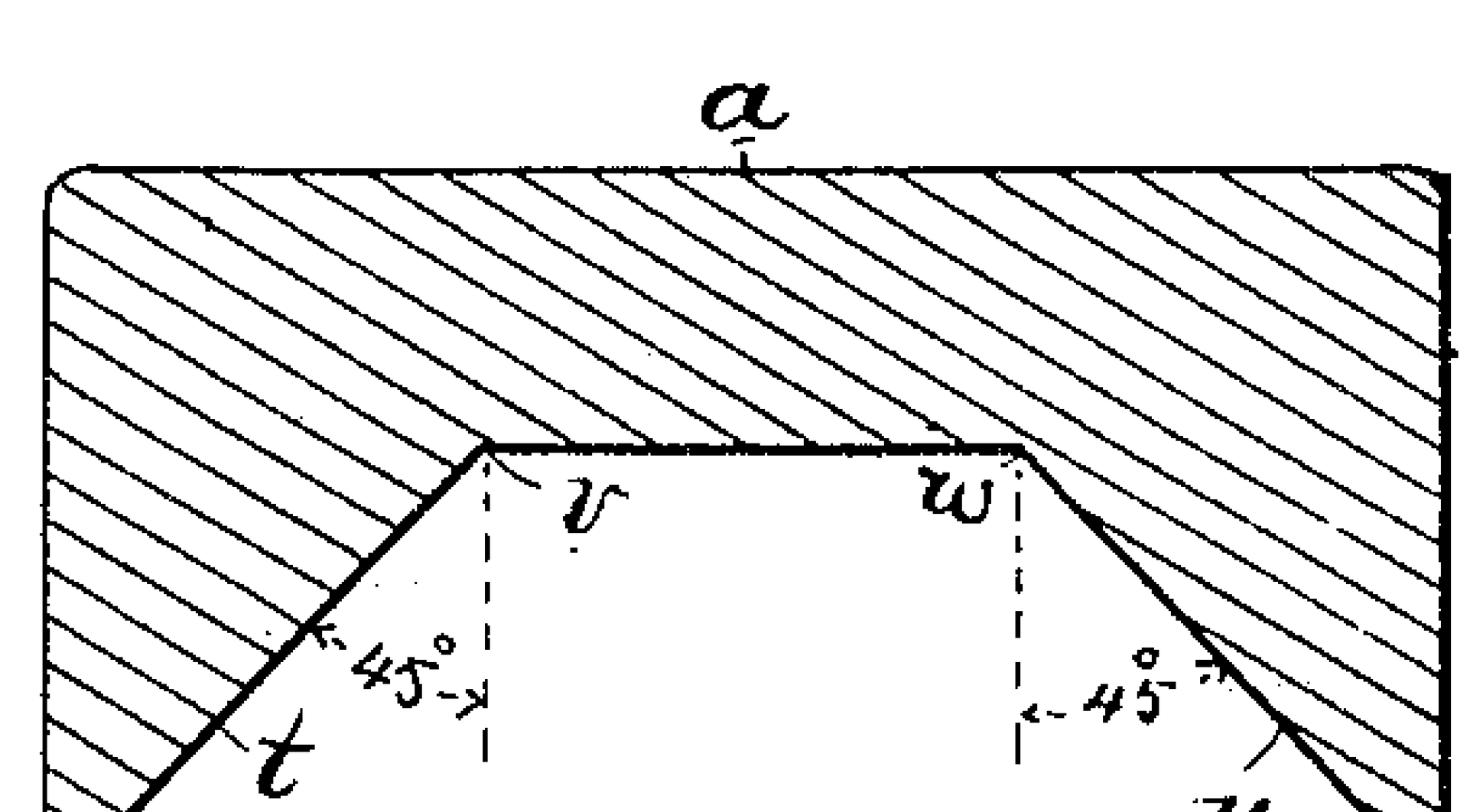


Fig. 9

Attest
R. M. Kelly
E. Gall

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By [illegible]
Atty.

No. 788,008. Patented April 25, 1905.

UNITED STATES PATENT OFFICE.

ALFRED B. WILLOUGHBY, OF PHILADELPHIA, PENNSYLVANIA.

ROCKING OR SHAKING GRATE-BAR.

SPECIFICATION forming part of Letters Patent No. 788,008, dated April 25, 1905.

Application filed July 9, 1902. Serial No. 114,869.

To all whom it may concern:

Be it known that I, ALFRED B. WILLOUGHBY, a citizen of the United States, residing in the city of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Rocking or Shaking Grate-Bars, of which the following is a specification.

My invention has relation to rocking or shaking grate-bars, and in such connection it relates more particularly to improvements on grate-bars as described and shown in United States Letters Patent No. 515,847, dated March 6, 1894, and granted to Frank Jay St. John.

The principal objects of my present invention are, first, to prevent lateral movement or shifting and displacement of the grate-bar on its bearers when it is rocked or shaken, as occurs in the grate-bars shown and described in Letters Patent No. 515,847, while preserving the rising motion of the bar, which is most effective in precipitating ash and other extraneous matter, and, second, to provide the upper face of the grate-bar with cutting edges or ribs arranged transversely and at either side to facilitate breaking of cinder or other extraneous matter by the grate-bars.

The nature and scope of my invention will be more fully understood from the following description, taken in connection with the accompanying drawings, forming part hereof, in which—

Figure 1 is a side elevational view of a grate-bar embodying main features of my invention. Fig. 2 is a top or plan view of the same. Fig. 3 is an elevational view of the front end of the bar. Fig. 4 is a similar view of the rear end. Fig. 5 is a sectional view, enlarged, taken on the line 5 5 of Fig. 2. Fig. 6 is a front elevational view of one of the bearer-bars. Fig. 7 is a plan view of the same. Fig. 8 is an enlarged diagram of a section of the grate-bar and the supporting-bearer, illustrating the movement of the grate-bar when it is rocked or shaken; and Fig. 9 is a view showing the preferred section of the grate-bar.

Referring to the drawings, the grate-bar consists of a longitudinal body provided at the ends with angular-shaped bearing-faces *a* and *b*, which engage the bearer-bars *m* in the usual manner. At one end of the bar is arranged the usual shaking-horn *c*, by which the bar is rocked on its supports. The side walls *d d* of the grate-bar are united at intervals by transverse connecting-webs *e*, and between the same and the side walls *d* are arranged webs *f*, tapering toward their lower edges and forming, in conjunction with the walls and webs, longitudinal apertures *g*. By extending the webs *f* to a depth equal to the side walls and transverse web *e* all portions of the bar are subjected to equal temperature, since the cold air will uniformly reach all parts of the grate-bar and will be heated by the same in its passage therethrough. Furthermore, in the particular form of grate-bar shown the longitudinal webs *f* form a multiplicity of very narrow apertures *g*, which render the grate-bar especially applicable for use with fuel of very small size, such as anthracite screenings. However, coal of larger size may be used, in which instance less webs and larger apertures would be employed, according to the character of the fuel. In order to effectually separate the fuel and break up the clinker, the webs *e* and the side walls *d* are provided with sharp ribs or cutting edges *d'* and *l*, respectively, and the upper faces of the webs *f* are lowered, forming concave depressions between the webs *e* and walls *d*, so as not to interfere with the action of the cutting edges thereof. A series of these bars placed side by side parallel to each other and supported at their ends by the bearer-bars *m* form a grate in which each bearer-bar is provided with a series of bearing projections *n*, adapted to receive the bearing-faces *a b* of the bars. The projections *n* are formed with two inclined side faces *o* and *p*, each of which is at an angle of substantially one hundred and twenty degrees with the horizontal bearing-faces of the said projections. At the top of the bearing projection *n* is formed a central horizontal bearing-surface between two corners *r* and *s*, which corners when the bar is rocked form auxiliary bearings upon which the bar is adapted alternately to be rotated. The bearing-supports of the grate-bar are formed with two inclined faces *t* and *u*, each

of which is arranged at an angle of substantially one hundred and thirty-five degrees with the horizontal bearing-surface of the bar and each of substantially the same length as the bearing-faces *o* and *p* of the bearing projections *n*. The inclined faces *t* and *u* of the grate-bar terminate in corners *v* and *w*, between which a central horizontal bearing-face is formed of the same length as the central bearing-surface of the bearing projections *n*. When the bar is in its normally operative position on the bearing projection *n*, as shown in Fig. 8, the corners *v* and *w* of said bar engage alternately with the supporting-corners *r* and *s* of the projections *n*, and by reason of difference in inclination of the faces *t* and *u* of the bar with respect to that of the faces *o* and *p* of the bearer projections *n* there is provided a substantial clearance between adjacent faces near to their ends. This enables the grate-bar to be rocked on the corner *r* or *s* as a fulcrum without changing this fulcrum or of shifting the bar transversely in the rocking action on its bearing projection.

By the foregoing construction and arrangement is insured the required degree of rocking motion of the grate-bar and of contact of the faces *t o* or *u p* of the grate-bar with the bearing projection to prevent excessive movement of said bar, since adjacent inclined faces of the bar with the projection are such that when they are brought in contact with each other further movement of the bar is positively prevented and lifting of the bar from the fulcrum-point *r* or *s* avoided, thus confining the grate-bar to a certain defined angular position in action and preventing thereby shifting of the bar on its bearing projections and avoiding displacement.

Having thus described the nature and objects of my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination of a grate, consisting of a series of bars, each having a horizontal and two downwardly-inclined bearing-surfaces with bearing projections each having horizontal and downwardly-inclined bearing-surfaces, the angles between the horizontal and inclined bearing-surfaces of the grate-bars being greater than the angles between the horizontal and inclined bearing-surfaces of said projections, said elements and features being so related as to provide bearings at the points of junction between the horizontal and inclined bearing-surfaces of said bars and projections upon which the bars alternately rotate, when rocked, and to limit the movement and prevent the shifting of said bars on said projections by the alternate contact between their inclined bearing-surfaces, substantially as and for the purposes described.

2. The combination of a grate, consisting of a series of bars, each having a horizontal and two downwardly-inclined bearing-surfaces with bearing projections each having a horizontal and two downwardly-inclined bearing-surfaces, the angles between the horizontal and inclined bearing-surfaces of the grate-bars being greater than the angles between the horizontal and inclined bearing-surfaces of said projections, said elements and features being so related as to provide normal bearing-surfaces of the horizontal portions of said bars and projections and bearings at the points of junction between the horizontal and inclined bearing-surfaces of said bars and projections upon which the bars alternately rotate, when rocked, and to limit the movement and prevent the shifting of said bars on said projections by the alternate contact between their inclined bearing-surfaces, substantially as and for the purposes described.

3. The combination of a grate, consisting of a series of bars, each having a horizontal and two downwardly-inclined bearing-surfaces and parallel and transverse cutting edges at their upper surfaces, with bearing projections each having a horizontal and two downwardly-inclined bearing-surfaces, the angles between the horizontal and inclined bearing-surfaces of the grate-bars being greater than the angles between the horizontal and inclined bearing-surfaces of said projections, said elements and features being so related as to provide normal bearing-surfaces of the horizontal portions of said bars and projections and auxiliary bearing-surfaces at the points of junction between the horizontal and inclined bearing-surfaces of said bars and projections upon which the bars alternately rotate, when rocked, and to limit the movement and prevent the shifting of said bars on said projections by the alternate contact between their inclined bearing-surfaces, substantially as and for the purposes described.

In testimony of which invention I have hereunto set my hand.

ALFRED B. WILLOUGHBY.

Witnesses:

R. M. KELLY,

WM. L. ROONEY.