

(No Model.)

3 Sheets—Sheet 1.

L. W. PRUSS.

FLOUR DRESSER.

No. 271,360.

Patented Jan. 30, 1883.

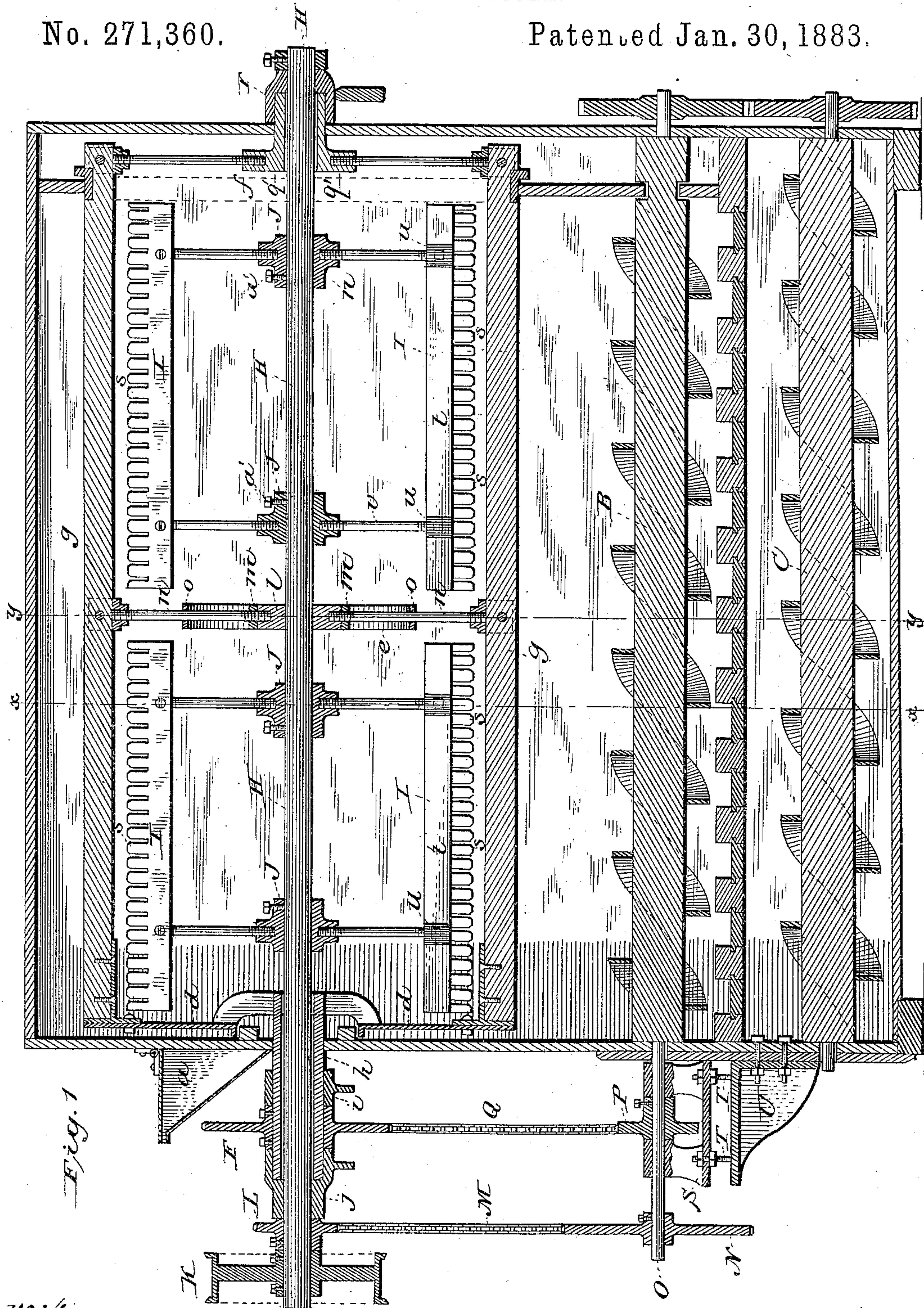


Fig. 1

Witnesses:

A. M. Long
Newton Wyckoff

Inventor.
L. W. Pruss.
By Philip T. Dodge
Atty.

(No Model.)

3 Sheets—Sheet 2.

L. W. PRUSS.
FLOUR DRESSER.

No. 271,360.

Patented Jan. 30, 1883.

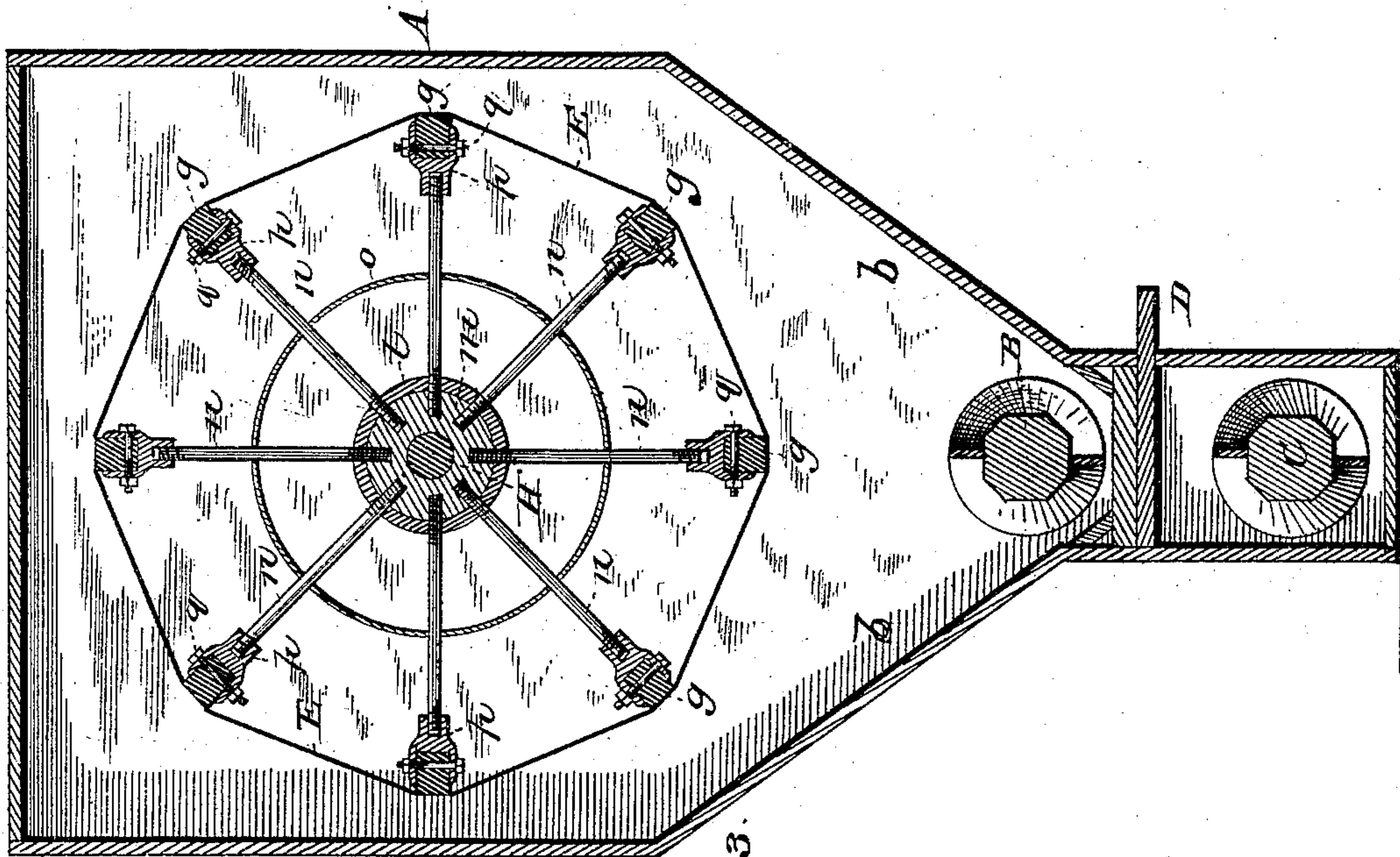
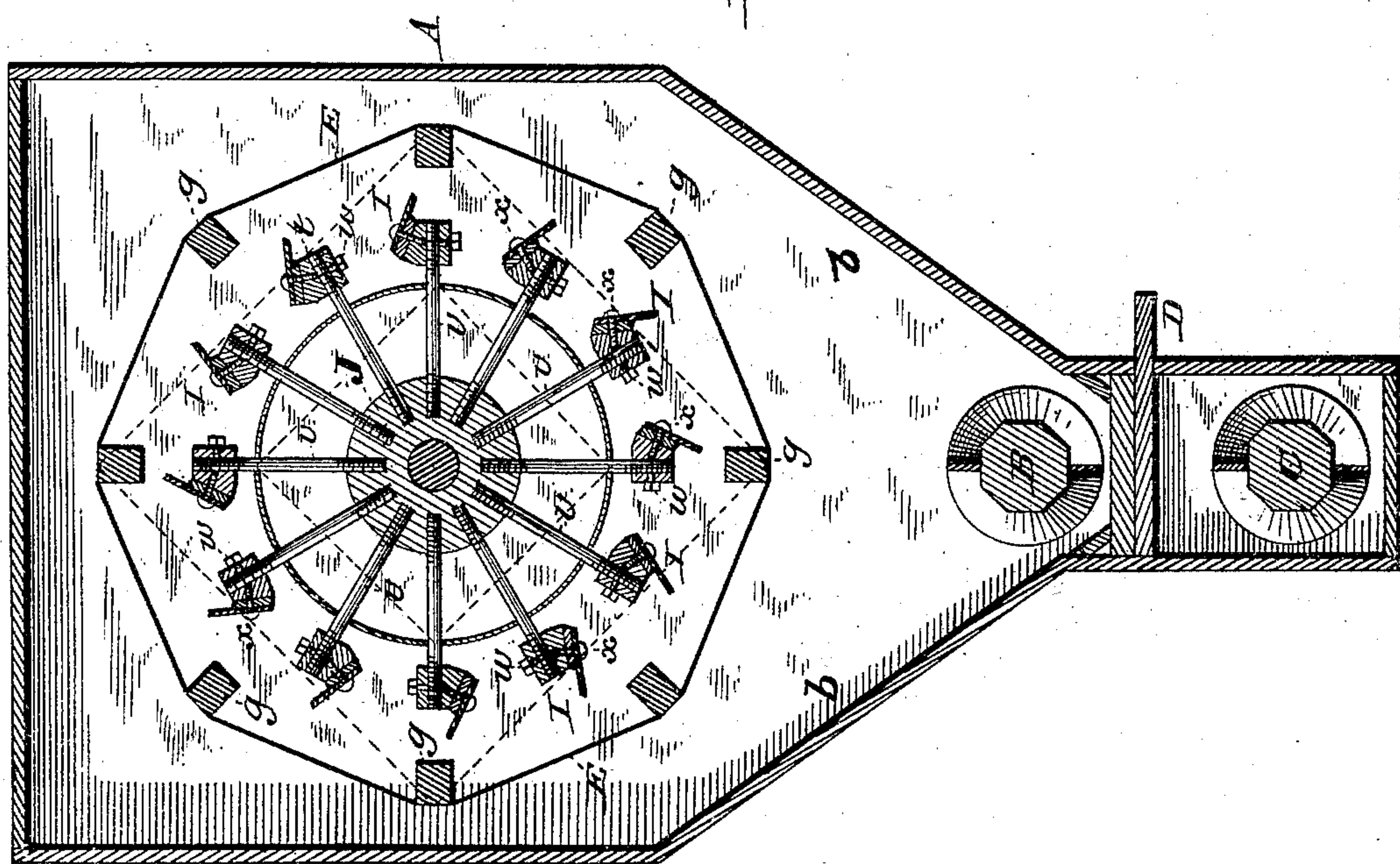


Fig. 3.



Witnesses:

A. M. Long.
Newton Wyckoff.

Fig. 2.

Twentor:
L. W. Pruss
By D. T. Dodge
Att'y.

(No Model.)

3 Sheets—Sheet 3.

L. W. PRUSS.

FLOUR DRESSER.

No. 271,360.

Patented Jan. 30, 1883.

Fig. 4.

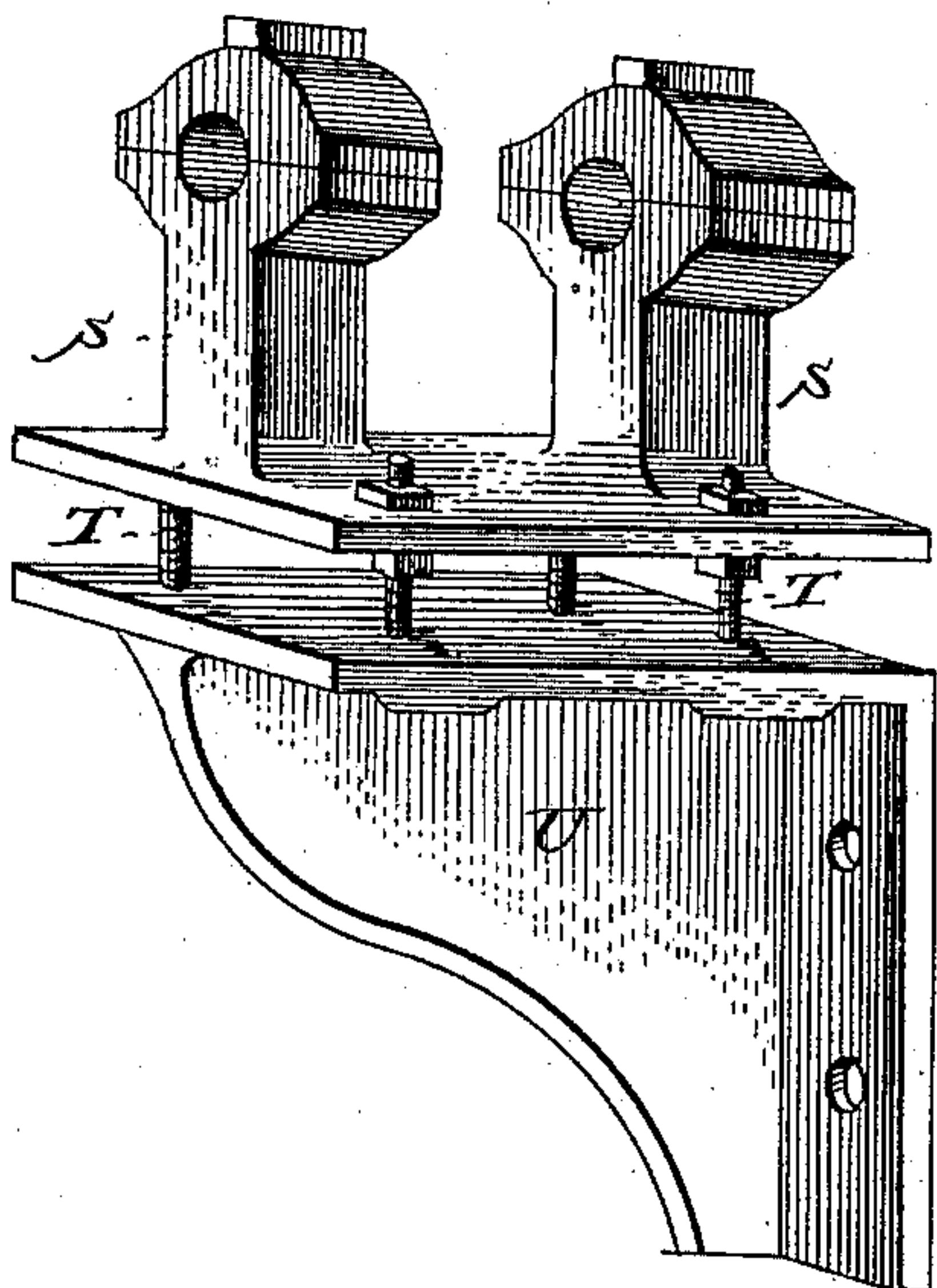


Fig. 5.

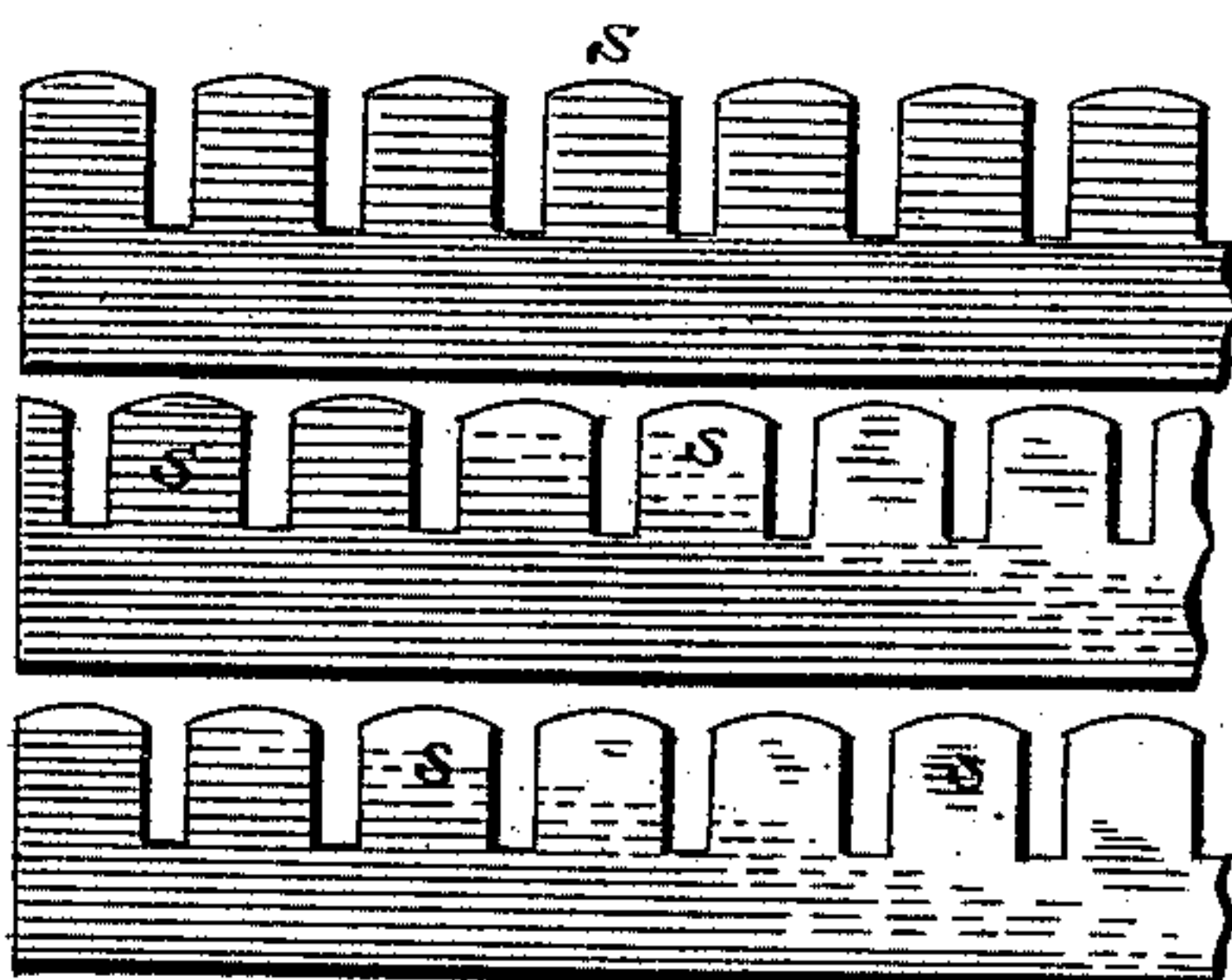


Fig. 6.

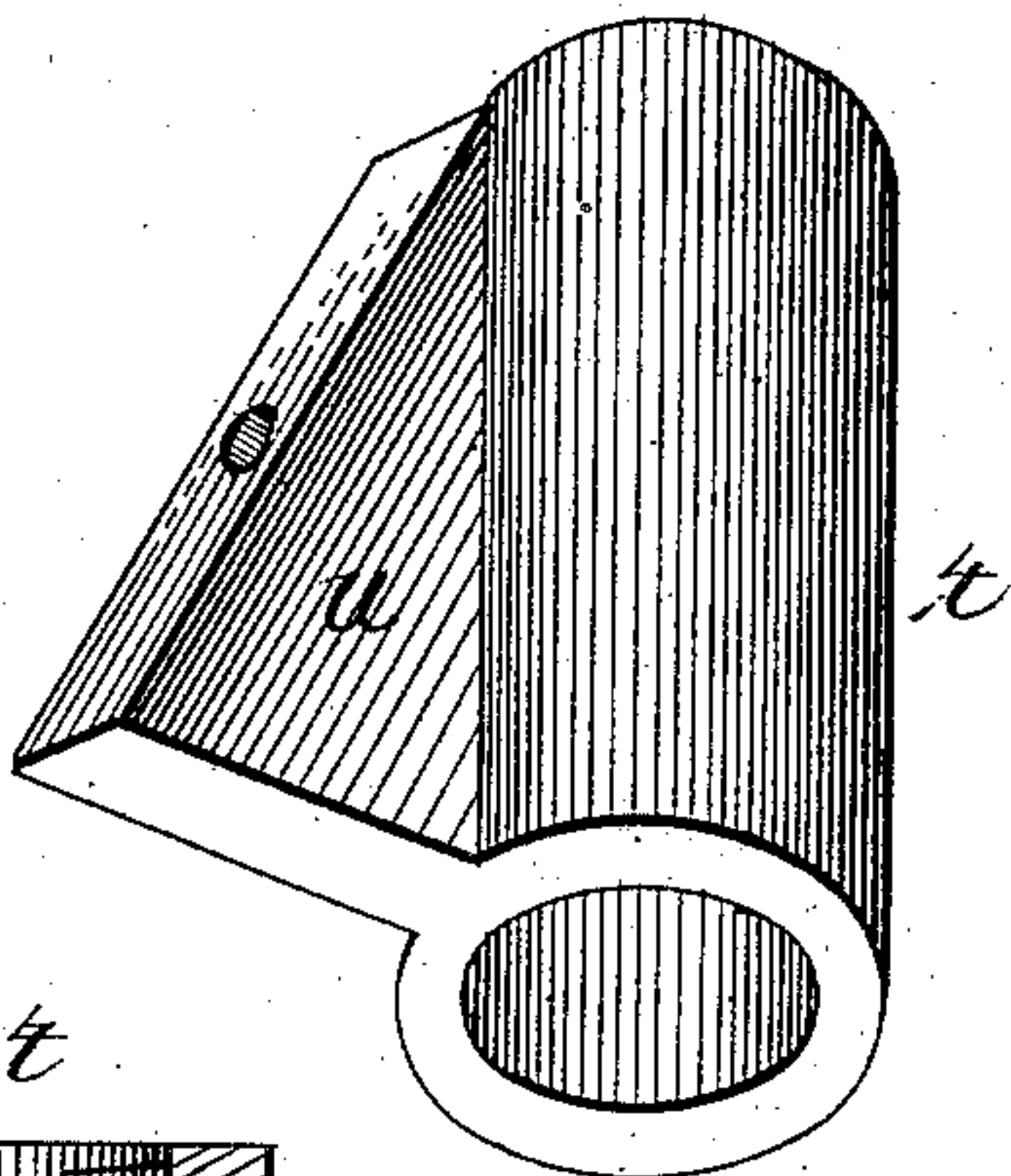


Fig. 7.

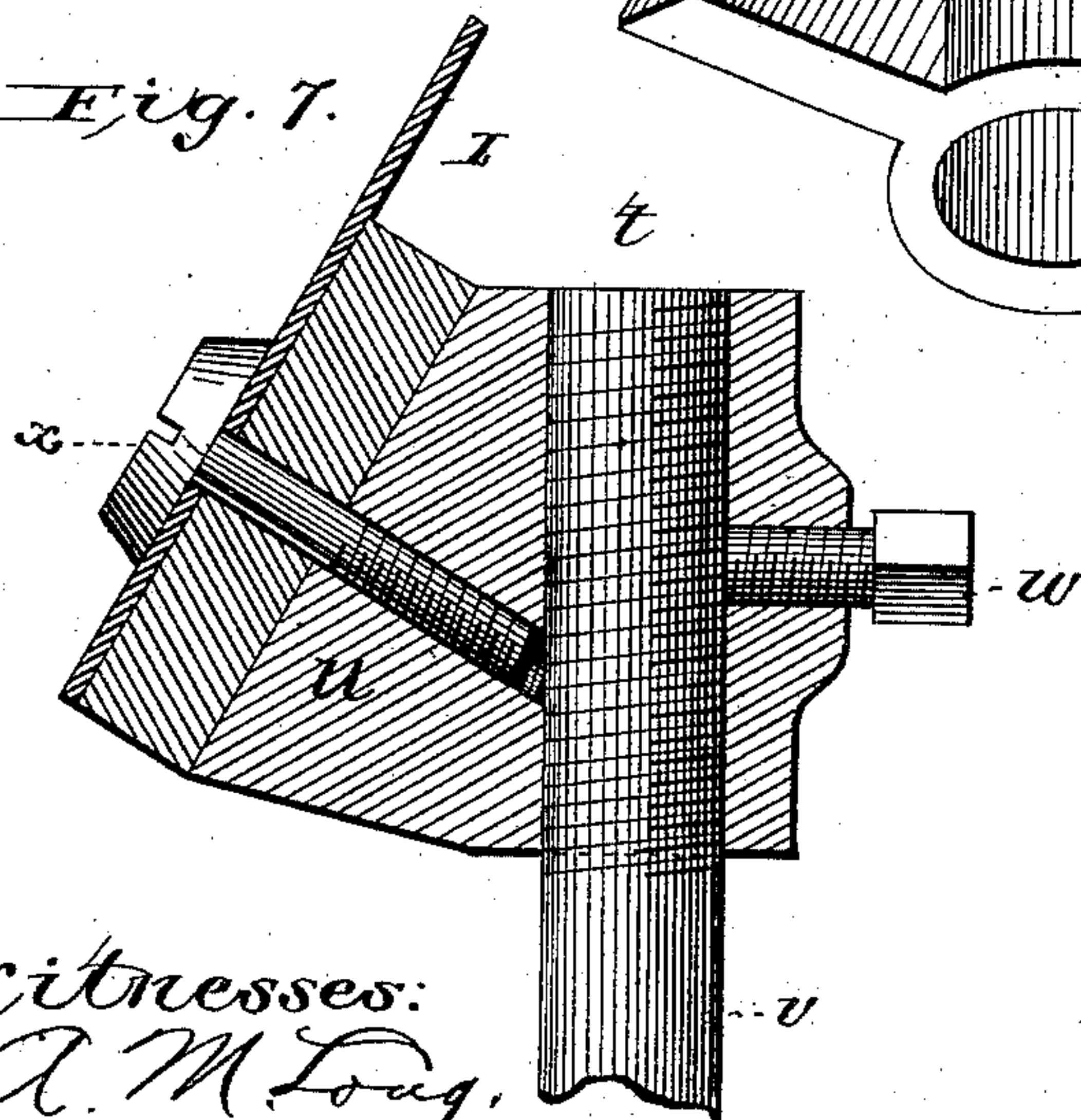
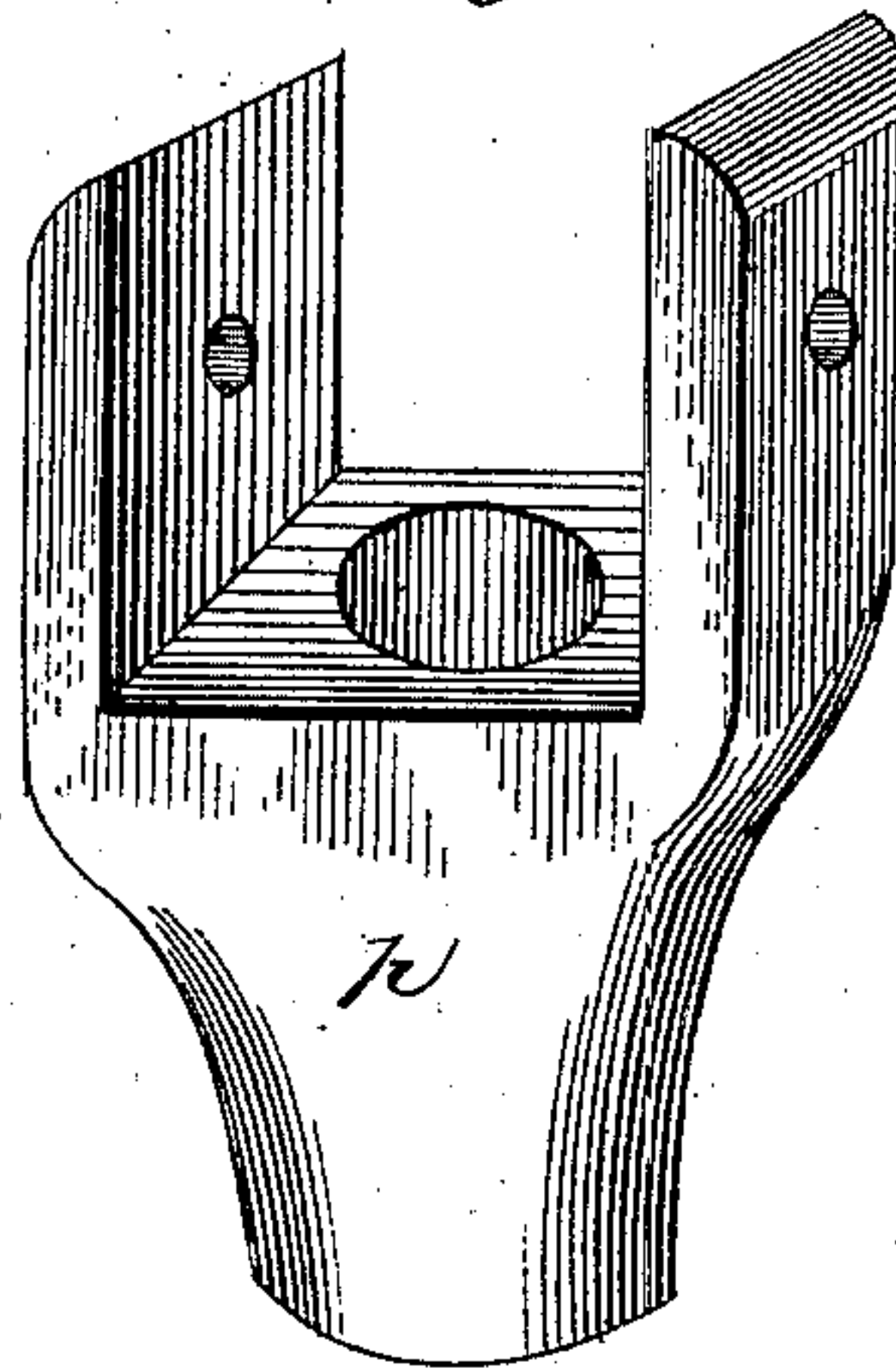


Fig. 8.



Witnesses:
A. M. Long,
Newton Wyckoff

Inventor
L. W. Pruss
By Philip T. Dodge
Atty

UNITED STATES PATENT OFFICE.

LOUIS W. PRUSS, OF MINNEAPOLIS, MINNESOTA.

FLOUR-DRESSER.

SPECIFICATION forming part of Letters Patent No. 271,360, dated January 30, 1883.

Application filed July 12, 1882. (No model.)

To all whom it may concern:

Be it known that I, LOUIS W. PRUSS, of Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain Improvements in Flour-Dressers, of which the following is a specification.

This invention relates to that class of centrifugal bolting-reels otherwise known as "bran-dusters" or "flour-dressers," which consist essentially of an external bolting-reel, ordinarily arranged to revolve, and a series of internal blades or beaters, by which the chop is agitated, disintegrated, and thrown outward against the inner surface of the bolting material.

The object of my invention is to provide an improved machine for the rapid and efficient bolting of the various grades of materials produced in flour-mills.

My improvements relate principally to the peculiar means for connecting the beaters or blades with the central shaft to admit of their longitudinal obliquity to the axis being changed, and also to admit of their being adjusted bodily toward and from the bolting-surface, and to admit of such adjustment without changing their facial inclination, and to a peculiar arrangement of driving gears and chains, together with other features, as hereinafter described in detail.

Referring to the accompanying drawings, Figure 1 represents a longitudinal vertical section of my improved reel in a plane passing through the center of the reel. Fig. 2 is a vertical cross-section of the same on the line *x x*, Fig. 1. Fig. 3 is a vertical cross-section on the line *y y*, Fig. 1. Fig. 4 is a perspective view of the combined bracket-box and belt-tightener. Fig. 5 is a longitudinal view illustrating the relative position of the blades upon the successive beaters. Fig. 6 is a perspective view of one of the heads or supports by which the beaters are attached to the outer ends of the carrying-arms. Fig. 7 is a cross-section through a beater and its support. Fig. 8 is a perspective view of one of the rib-supporting sockets.

Referring to the drawings, A represents a bolting-chest of ordinary form and construction, provided at one end, near the top, with a feed-spout, *a*, and at the base with the sloping sides or gathering-boards *b*, as shown in

Figs. 2 and 3, and also with the conveyers B and C, placed one above the other and arranged to communicate through the medium of slides D, which permit the different products to be conveyed to and discharged at any desired point.

E represents the dressing or bolting reel, made of octagonal form, consisting of the head *d*, the center support, *e*, and the tail-spider *f*, connected together by the longitudinal ribs *g*, upon which the bolting-cloth, gauze, or other screening material is stretched and secured in the usual manner. The reel-head *d* has formed upon and secured to it the tubular shaft or sleeve *h*, which is supported in bearings *i* and *j*, which will be sustained by a bridge tree hung in brackets at the sides of the frame in the usual manner. Between the bearings *i* and *j* the tubular journal *h* of the reel has secured upon it a sprocket-wheel, F, by which motion is communicated to the reel. The reel-head *d* is provided with a central opening to admit the chop from the hopper or spout *a* into the interior, and has its central shaft or sleeve connected to the outer or peripheral portion by means of skeleton arms, which span the inlet-opening in the usual manner. The ribs *g* of the reel are secured to the outer edge of the reel-head through the medium of angle-plates screwed or bolted to the respective parts in the manner shown.

The center support, E, of the reel consists of a wooden center, *l*, closely surrounded by a metallic ring, *m*. A series of radial wrought-iron spokes or arms, *n*, threaded at both ends, have their inner ends screwed through the ring *m* into the wooden center, as shown. These spokes are sustained and held in their proper relative positions by means of a metallic ring, *o*, in which they bear midway of their length. At their outer ends each spoke is provided with a forked head or rib-supporting socket, *p*, such as clearly represented in Fig. 8. One end of this socket is threaded and screwed upon the supporting-spoke, while its outer end closely embraces the rib, to which it is secured by means of a transverse bolt, *q*. The wooden center or hub *l* is provided with a central hole of sufficient size to permit a free rotation of the reel-shaft H, which passes through the same, as shown. The center support, constructed as above, is exceedingly light and

rigid, and gives a firm support to the center of the reel, at the same time offering but little interference with the movement and circulation of the material within the reel. While in ordinary cases a single support at the center of the reel is sufficient, in reels of great length there may be two or more supports of like character arranged at any suitable points between the ends, the object being to keep the ribs of the reel at their proper distance from the beaters, which is particularly important when heavy material is being handled. The ring serves to give firm support to the spokes or arms and prevent them from springing or changing their relative positions, thus permitting the spokes to be made much lighter than would otherwise be admissible.

The tail-spider *f*, by which the tail of the reel is sustained, consists of a series of radial arms bearing rib-supporting sockets at their outer ends in the same manner as in the central support. The arms of this device, however, are supported at the center by being screwed into a cast-metal hub or flange formed upon a tubular shaft or journal, *q'*, which gives support to the tail end of the reel. This tubular shaft *q'* is sustained in a rigid box or bearing, *r*, which will be sustained by a bridge-tree or bracket attached to the main frame in any ordinary manner.

I represents the internal revolving beaters; of which there are twelve in each section, the beaters being divided in the present instance transversely through the center into two sets or sections, each extending one-half the length of the reel. Each beater consists of a narrow strip of sheet metal secured to a wooden supporting-strip. Each of the metal strips or blades has a series of notches or openings cut into its outer edge at uniform distances apart, thereby dividing said outer edge into a series of small blades or fingers, *s*. The inner solid unbroken edges of the metal strips are laid upon and secured firmly against the longitudinal supporting strips or ribs *t*, which are in turn secured, through the intervention of supporting plates or hubs *u*, to the outer ends of radial supporting arms or spokes *v*. The beaters are arranged in relation to each other in such manner that the spaces or openings between the blades of one beater will be opposite the centers of the blades of the next succeeding beater, as indicated in Fig. 5; or, in other words, the blades of one beater move in the same plane of rotation as the openings of the next succeeding beater. The object of this arrangement is to effect a thorough disintegration and separation of the material, which is accomplished in the manner which will be hereinafter described.

The heads *u*, by which the wooden beater-strips are supported and connected to the spokes, are clearly represented in Figs. 6 and 7, each head consisting of a tubular body adapted to slide over and around the outer end of the spoke, and provided on one side with an inclined surface, against which the wooden

strip is seated and supported, as clearly shown in Fig. 7. Each head is provided with a set-screw, *w*, arranged to bear at its inner end against the spoke, whereby the head is secured firmly but adjustably in position. By loosening the screw *w* the heads may be moved inward and outward upon the spokes, so as to move the beaters to and from the center. In this manner the blades of the interior system of beaters may be adjusted a greater or less distance from the bolting-surface of the reel as the quality of the material under treatment may require. The sheet-metal blades and their supporting-strips are secured to the heads by means of a bolt, *x*, as shown in Fig. 7. While it is preferred to construct the supporting-heads in the peculiar form shown, and to employ the fastening-screws to unite them to the blades and spokes, they may be varied in form, if preferred, and used in connection with keys or other fastening devices such as will readily suggest themselves to the skilled mechanic.

The spokes by which the beaters are carried are screwed at their inner ends into or otherwise secured to metal hubs *J*, seated upon the main central shaft and secured thereto by set-screws *a'*. By loosening the screws *a'* the hubs *J* may be released, so that they may be rotated upon the shaft independently of each other. Each beater is sustained by spokes or arms at its two ends, so that by turning one of the hubs and its arms upon the shaft the beaters may be thrown out of line with the axis of rotation, or, in other words, may be given an oblique or spiral pitch, in which position they will serve to assist in working the material endwise through the reel. By tightening the screws *a'* the ribs may be secured at any pitch or obliquity required, or secured in line with the shaft at will. This capability of adjustment is an important feature of my invention, as I find in practice that it enables me to adapt the machine for successfully treating different materials which it would be otherwise impossible to treat effectually in one machine. The main shaft *H*, by which the beaters are carried, is extended outward at its ends through the tubular journals of the reel, and is supported independently of said tubular shaft in the bearings *j* and *r*, which support the former.

If preferred, the central shaft and the tubular journals may bear directly against each other; but it is preferred to support them independently.

For the purpose of imparting the proper motions to the reel and the beaters, permitting the requisite adjustment of the driving-belts, and allowing a change in the relative speeds at which the beaters and the reel revolve, I make use of the peculiar arrangement of driving devices represented in Fig. 1. The main or beater shaft is provided on one end with a driving-pulley, *K*, and sprocket-wheel *L*, both secured rigidly thereto. From the sprocket-wheel *L* a driving-chain, *M*, is extended downward to a second and larger sprocket-wheel, *N*, secured on a horizontal shaft, *O*, which is

ordinarily used to drive the upper conveyer. The shaft O is provided with a second sprocket-wheel, P, from which a driving-chain, Q, extends upward to the sprocket-wheel F, secured firmly upon the hollow journal of the reel, as before described. It will be seen that under the above arrangement motion is communicated from the pulley K directly through the main shaft to the beaters, which receive a rapid rotary motion; also, that motion is communicated from the pulley, through the four sprocket-wheels and connecting-chains, to the hollow journal of the reel, which receives a comparatively slow rotation.

In order that the driving-chains may be kept at the proper tension, the lower shaft, O, is mounted in bearings formed upon the upper side of a horizontal plate, S, which is secured at each corner between two nuts mounted on vertical bolts T, which latter are cast in or otherwise rigidly secured to a bracket, U, which is bolted firmly to the main frame. The vertical bolts and nuts serve to support the bearing-plate S firmly in position, but admit of its being raised, lowered, and tipped edgewise, as may be required to secure the proper tension of the chains and the proper alignment of the shaft.

In order that the vertical adjustment of the two sprocket-wheels N and P, of different diameters, may have an equal effect upon the tension of the two driving-chains, the latter are made of equal length, to permit which care is taken that the mean diameter of the two sprocket-wheels connecting with one belt is the same as the mean diameter of the two wheels acting in connection with the other belt. It will be perceived that this may be secured without regard to the relative size of those wheels which are mounted on the same shaft. This arrangement is particularly advantageous also, in that it permits the application of sprocket-wheels of different relative diameters, as may be desired, in order to vary the relative speed of the reel and the beaters.

It is manifest that the pulleys L and N may be removed and replaced by others of different relative diameters, and that the same change may be made with respect to the pulleys F and P, provided only that the mean diameters of the two pairs are equal.

In practice the frame A is provided with an elongated opening or slit, through which the shaft O passes to permit the vertical adjustment of said shaft.

For the purpose of producing a uniform and continuous action of the air and meal driven outward by the beaters upon the ribs and gauze of the dressing-cylinder, I employ a set of twelve beaters, forming at their peripheries the angles of a dodecagon, as shown in Fig. 2, with an octagonal reel, as shown in both Figs. 2 and 3. This combination is a feature of the highest importance in the construction of my machine, inasmuch as no more than four beaters are at any one time in juxtaposition to the same number of ribs. Hence the remaining eight beaters are at such time

opposite to and acting in connection with the gauze. The juxtaposition of the four beaters and the four ribs is always in the form of a quadrangle, as indicated by the dotted lines V', Fig. 2. This relation produces uniformity in the centrifugal pressure caused by the beaters upon the opposing ribs of the dressing-cylinder, and the pressure occurs, at regular intervals and in regular succession, as often as any one of the beaters reaches the center line between two adjacent ribs. In practice it is found that in the peculiar relation described a smoother, easier, and much more uniform action of the beaters is secured than when they are arranged in any other manner.

The flour or chop passes through the feed-spout *a* into the reel, where it is acted upon by the rapidly-revolving beaters and their blades, which throw the material, by centrifugal force, against the ribs and the cloth of the reel, the fine flour passing through the cloth, while the bran and other coarse material pass out at the tail of the reel, which is left open for the purpose. Portions of the material pass through the slits or openings between the blades of the beater, and in so doing will come in violent contact with the sharp edges of the blades, whereby any particles of fine flour adhering to the coarse bran will be dropped therefrom, and, being caught upon the faces of the next succeeding blades, will be thrown by the latter against the ribs and cloth, as before, when the separation will be completed by the passage of the flour through the gauze. This separation may be repeated many times, as each time that the coarse particles rebound from the cloth or gauze and drop to the bottom of the hollow rotating reel they are again carried up by the ribs *g*, which at the proper elevation discharge them upon the beaters, to be acted upon as before until a thorough disintegration and separation have been effected and the coarse material finally passed out at the open end of the reel.

Having thus described my invention, what I claim is—

1. The combination of the driving-shaft, the hubs adapted for independent rotary adjustment on the shaft, the radial arms or spokes, the sockets or heads seated and arranged to turn upon the outer ends of the spokes, and the blades or beaters secured to said sockets.

2. In a flour-dressing machine, the combination of a bolting-reel, a series of internal rotating beaters out of contact with the bolting-surface, and means, substantially as described, whereby said beaters may be moved bodily to and from said surface.

3. The external bolting-reel, in combination with the internal shaft, and the series of blades or beaters having a facial inclination, and means for adjusting said beaters radially without changing the inclination of their faces.

4. In combination with the shaft and the radiating arms thereon, the beaters, the heads or sockets secured to said beaters and movably seated on the outer ends of the arms, and means,

substantially as shown, for fastening the heads in position.

5. In a flour-dresser, the combination of the radial spokes, the beaters, and the intermediate connecting heads or sockets, *u*, constructed, as described, to fit upon the outer ends of the spokes, and provided with the inclined surface to support the beaters.

6. In a flour-dressing machine, the combination of a reel, a series of internal beaters, a central shaft, and means, substantially as described, connecting the beaters with the shaft, and adapted to permit said beaters to be adjusted radially, and also as to their longitudinal obliquity with respect to the shaft.

7. The combination of the shaft, the wooden hubs *l*, metallic band *m*, intermediate supporting-ring, *o*, and spokes *n*, provided at their outer ends with the rib-supporting heads or sockets *p*.

8. The combination of the ribs, the radial supporting-arms *n*, the hub, and the brace-ring *o*, encircling the spokes midway of their length, whereby the spokes are given a firm support, and a free passage of the material endwise through the reel permitted.

9. The reel, its shaft, and the pulley *F* on said shaft, in combination with the beaters, their shaft, and the pulley *L* on said shaft, the two concentric pulleys *N* and *P*, and the two connecting-chains *M* and *Q*, of equal length, applied as shown.

10. In a flour-dressing machine, the reel and the beaters and their respective shafts, in combination with the companion pulleys *L* and *N* and their connecting-chain, and the companion pulleys *F* and *P* and their connecting-chain, the two pairs of pulleys being of equal mean diameter, as and for the purpose described and shown.

11. In combination with the reel and the in-

ternal beaters, the concentric reel and beater shafts and the pulleys applied thereto, the vertically-adjustable shaft *O*, provided with the pulleys *N* and *P*, and the two connecting-chains, arranged as described, the pulleys *L* and *M*, having the mean diameter equal to the mean diameter of the pulleys *F* and *P*, whereby equal tension and adjustment of the two belts are secured, notwithstanding the difference in the size of the concentric and driving pulleys.

12. In a flour-dresser, the concentric pulleys *L* and *F*, the driving-chains *M* and *R*, and the pulleys *N* and *P*, mounted upon shaft *O*, in combination with the stationary bracket *U*, the shaft-supporting plate *S*, and the adjusting-bolts *T*, arranged in the manner described and shown.

13. In a flour-dressing machine, a bolting reel or cylinder, in combination with a series of internal revolving beaters, each armed with a series of narrow blades separated by intermediate spaces, the spaces of one beater being in line with the solid portions of the next succeeding beater, as and for the purpose described.

14. In a flour-dressing machine, the combination of an external bolting reel or cylinder and internal revolving blades or beaters having at their outer edges narrow blades separated by intermediate spaces, the blades of one beater being located in the same plane of rotation as the spaces in the succeeding beater, whereby the material is caused to act alternately against the solid surface of one blade and between the edges of the one following.

LOUIS W. PRUSS.

Witnesses:

E. D. HARTLEY,
P. T. DODGE.