

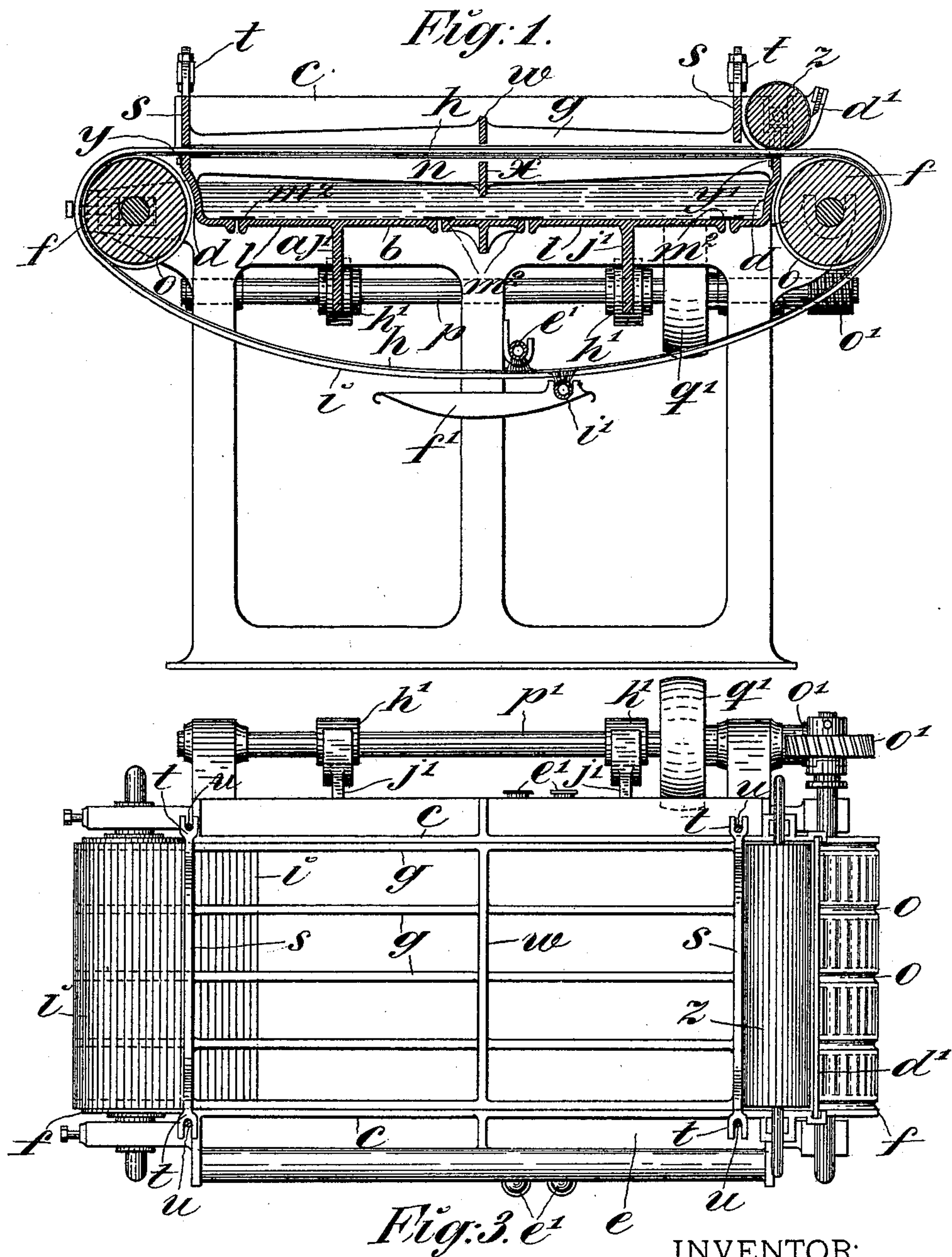
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3 Sheets—Sheet 1.

H. SCHAAF.  
PAPER STOCK REFINING APPARATUS.

No. 583,237.

Patented May 25, 1897.



INVENTOR:

*Henrich Schaaf*

By

*A. P. Thayer*

Attorney.

WITNESSES:

*J. H. Wiman*  
*Chas. Morgan*

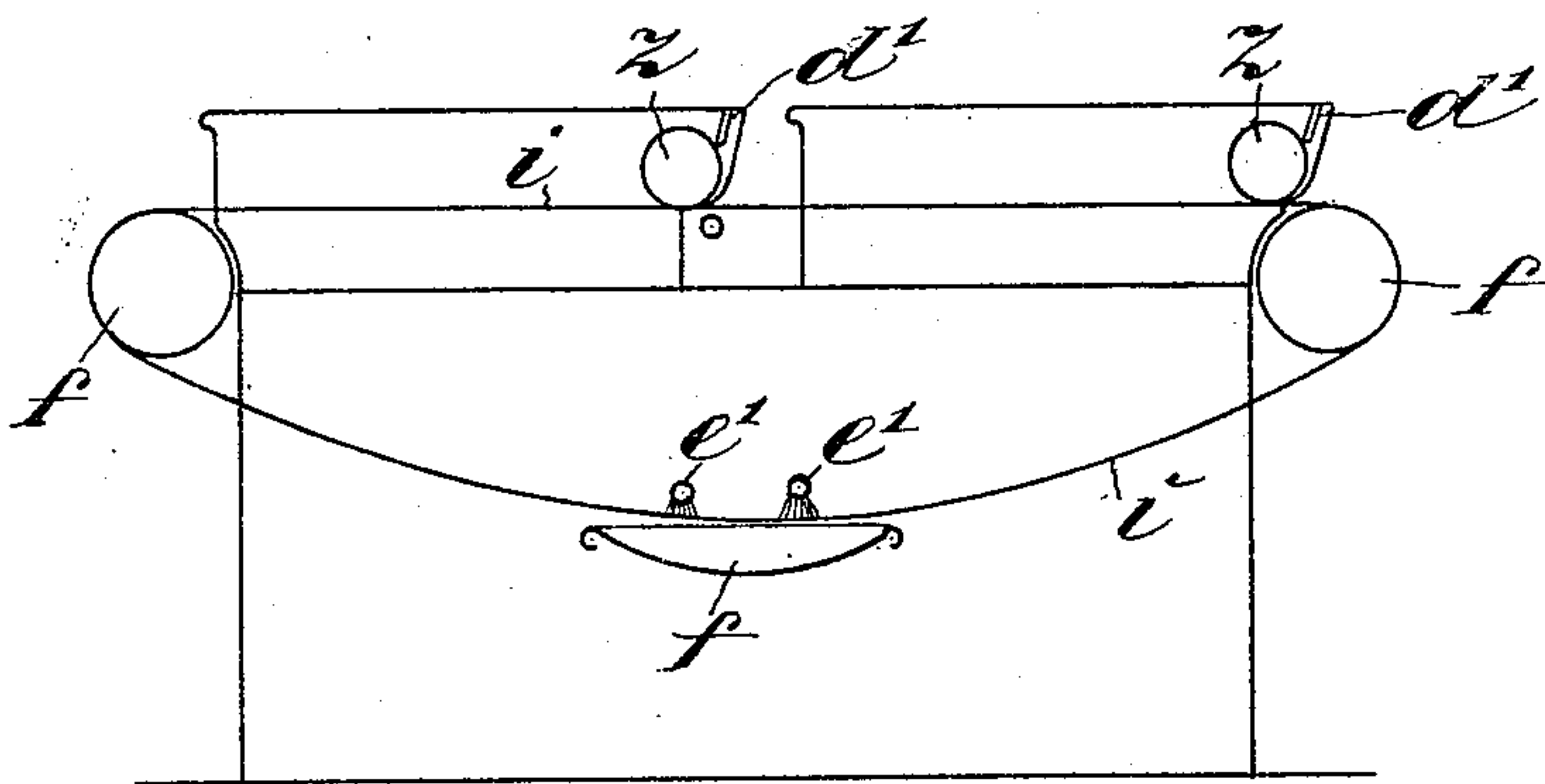
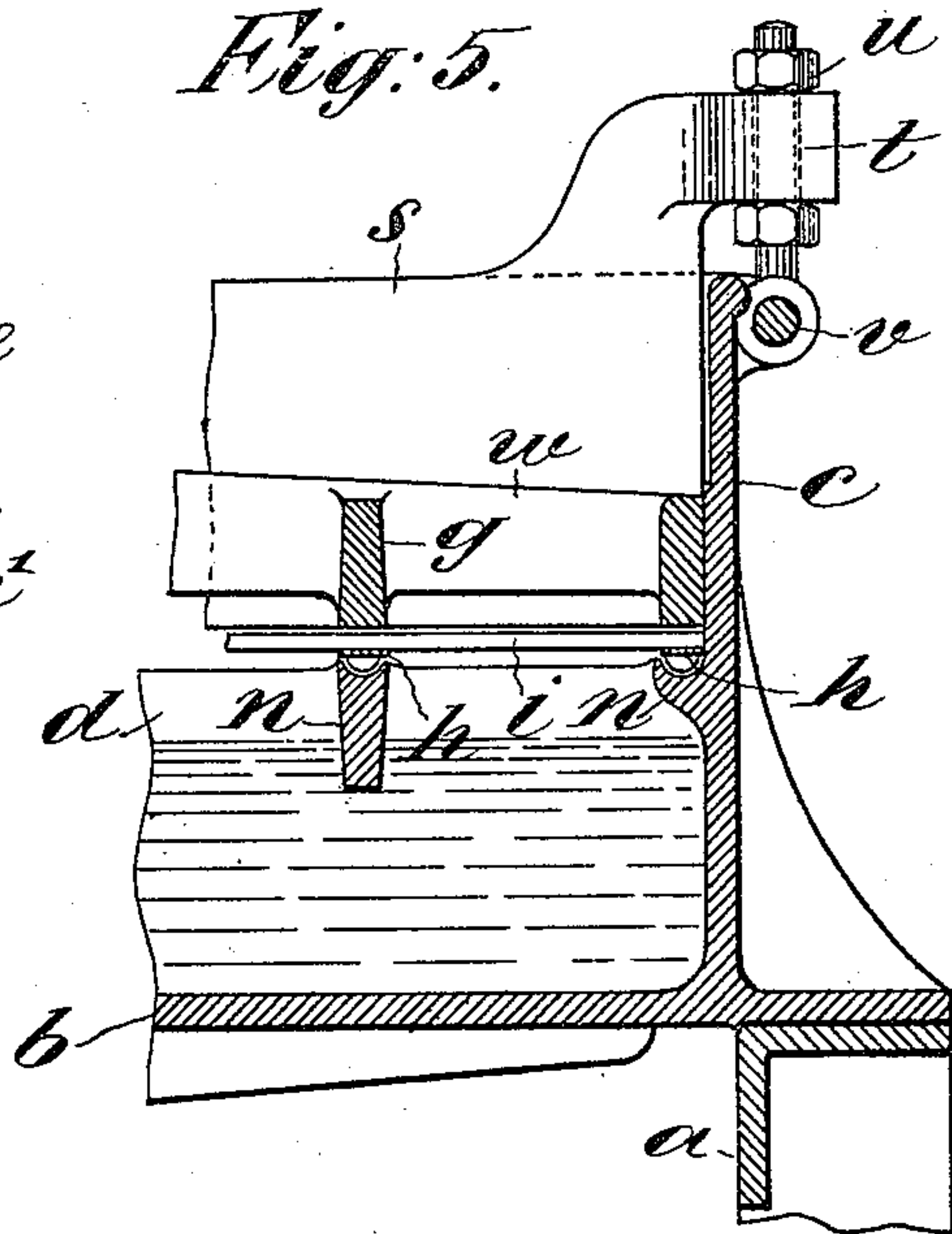
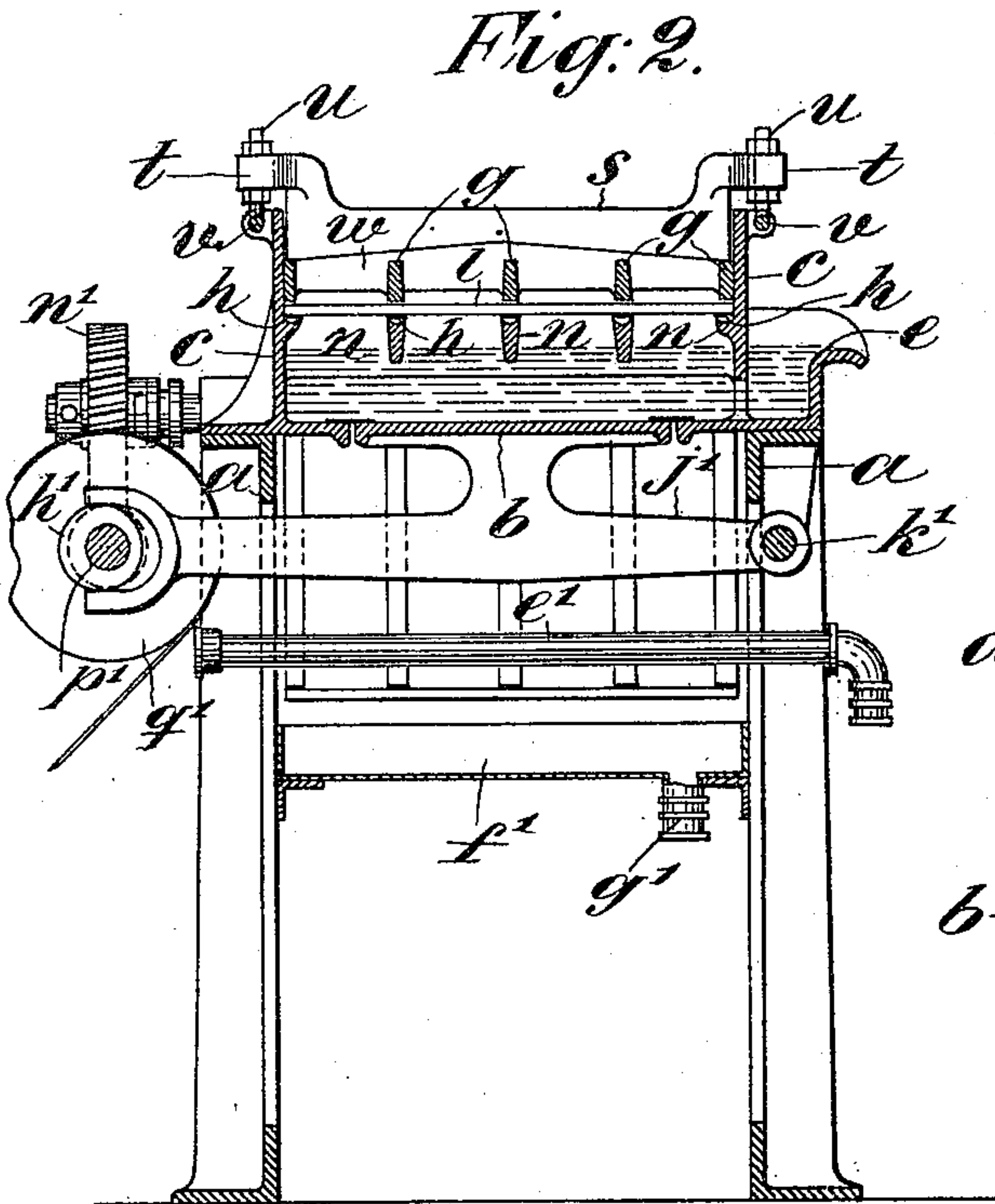
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*Fig. 9.*

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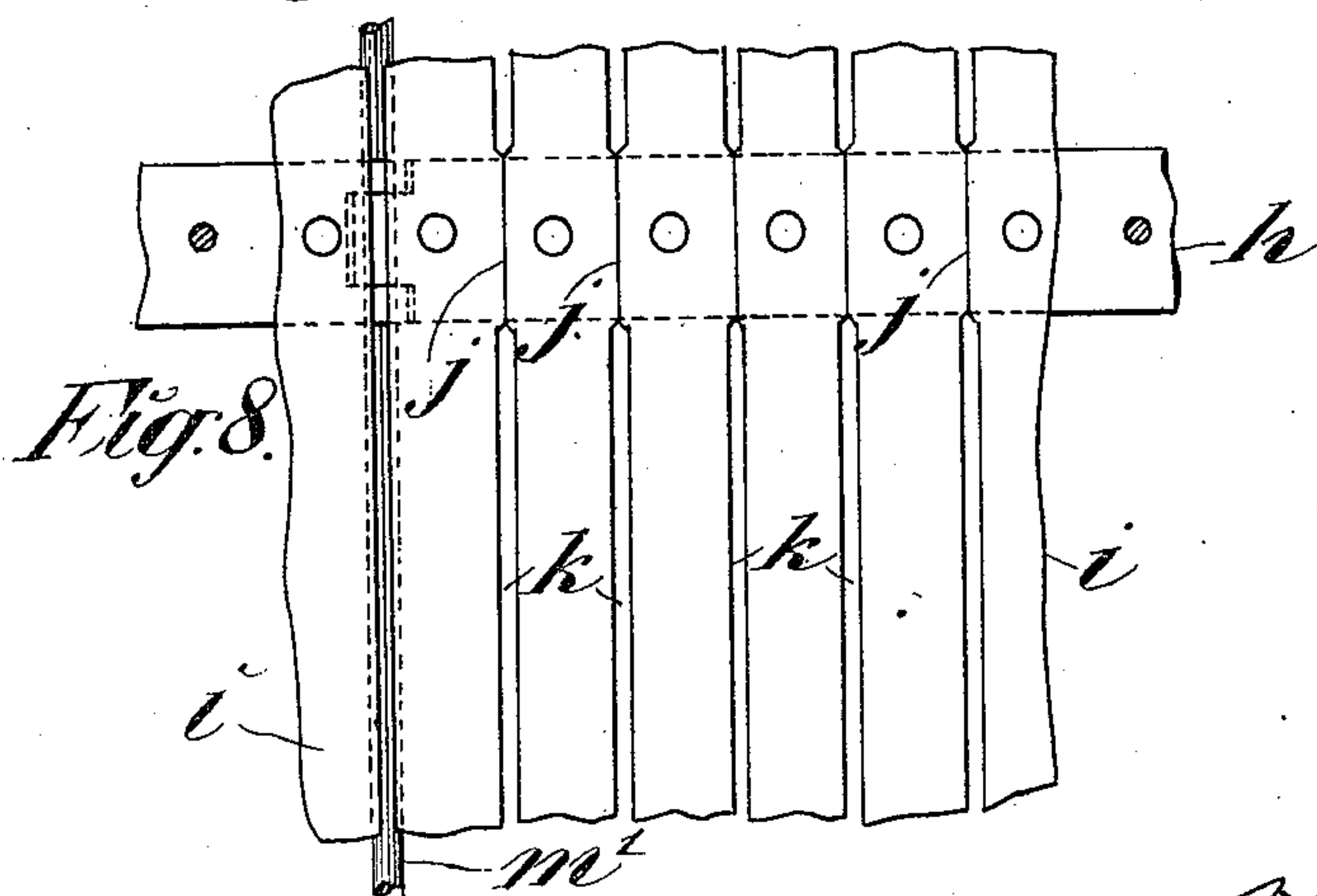
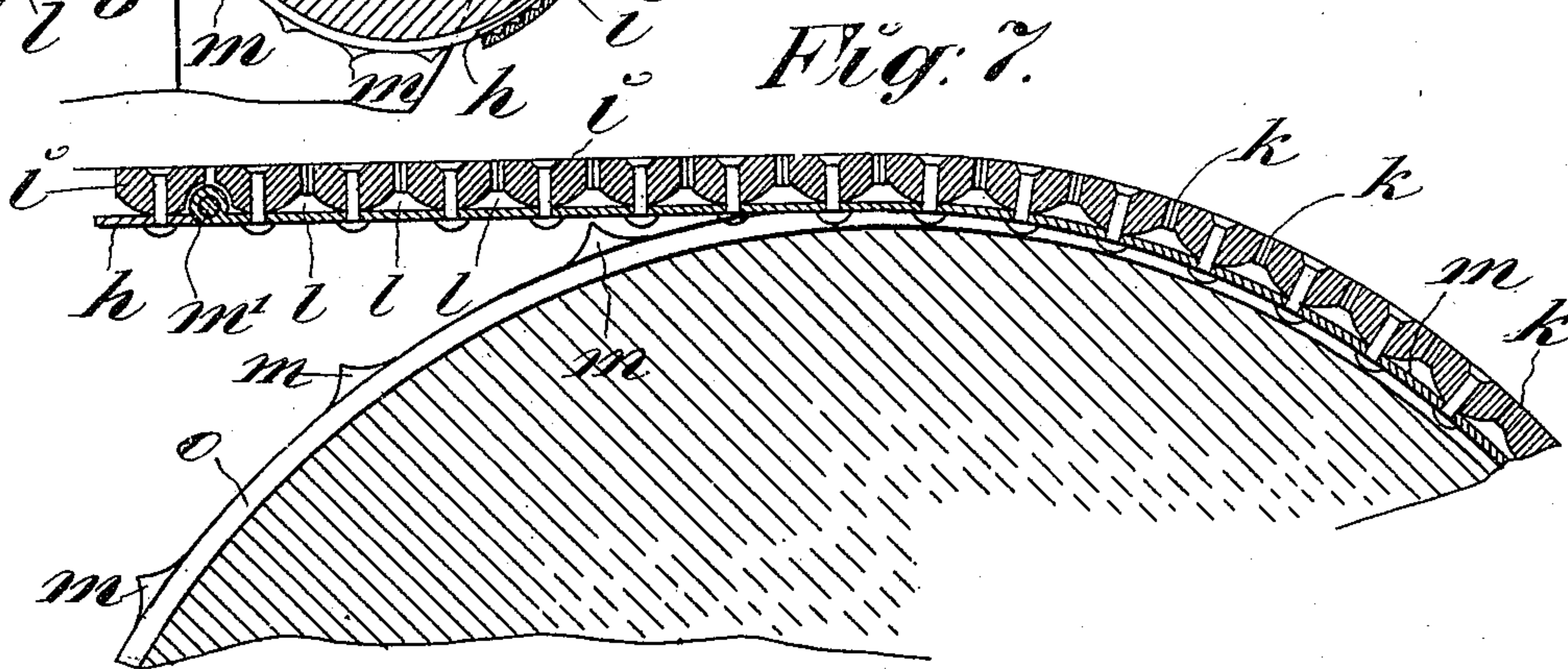
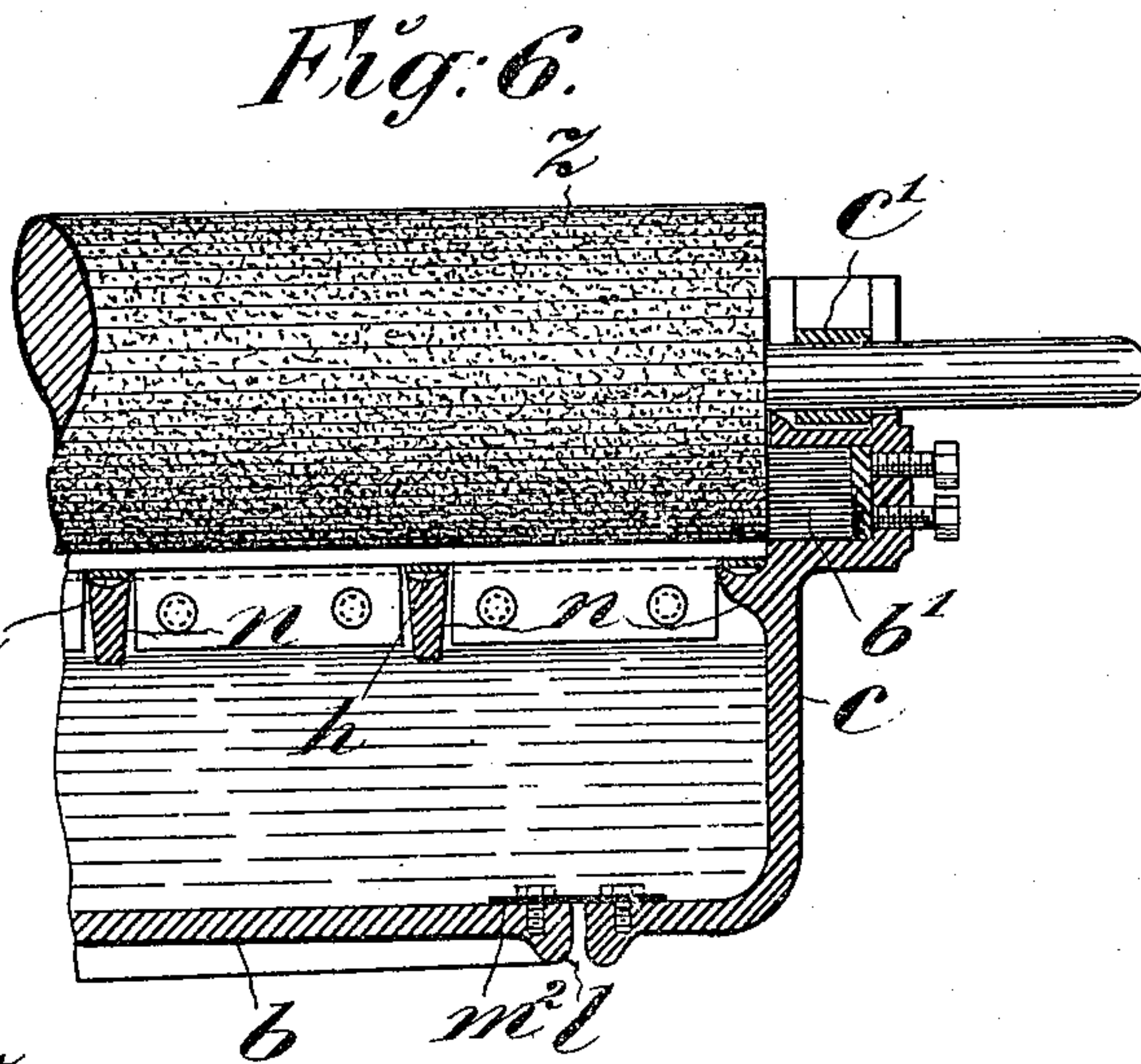
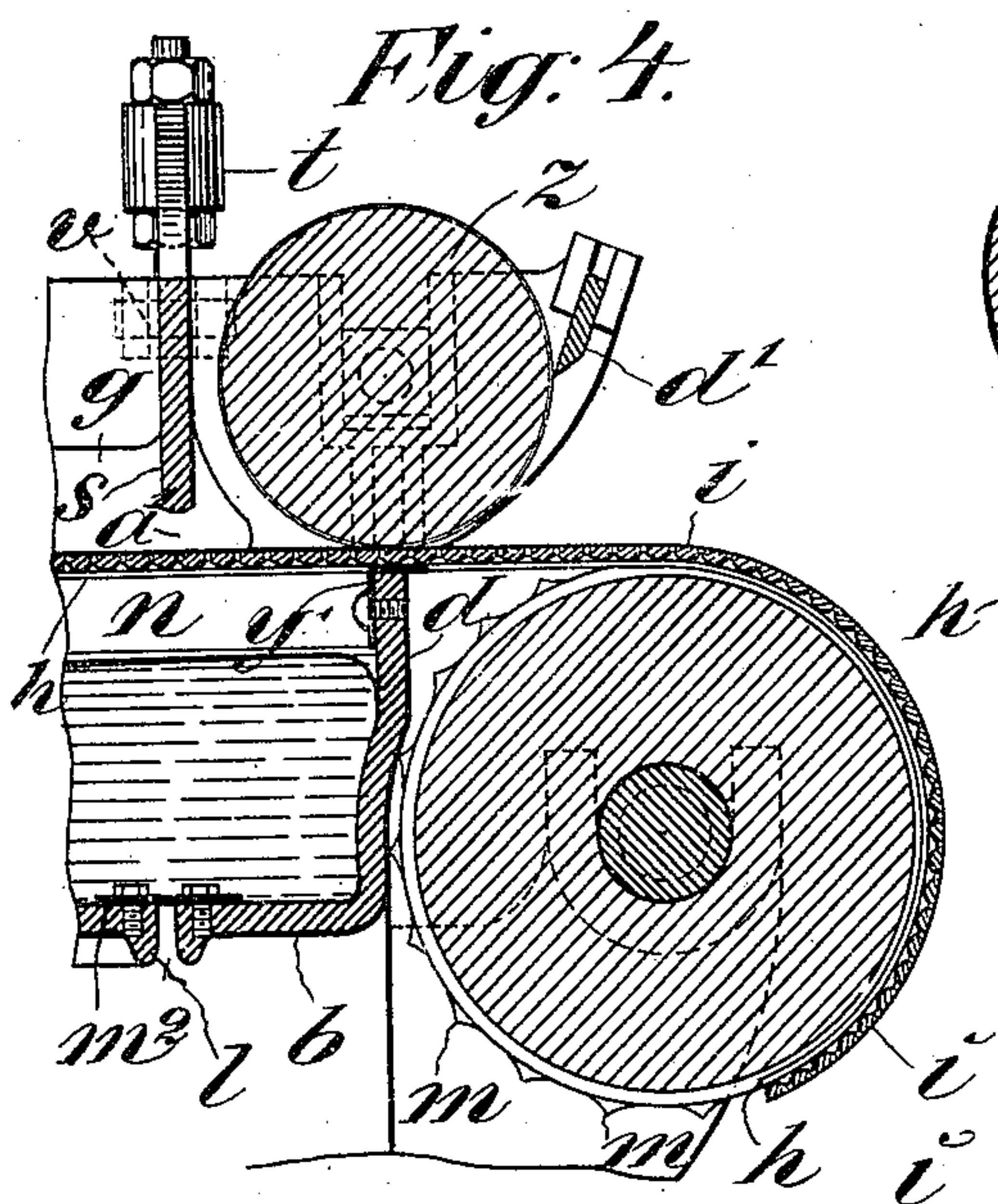
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# UNITED STATES PATENT OFFICE.

HEINRICH SCHAAF, OF DÜREN, GERMANY.

## PAPER-STOCK-REFINING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 583,237, dated May 25, 1897.

Application filed September 8, 1896. Serial No. 605,168. (No model.)

*To all whom it may concern:*

Be it known that I, HEINRICH SCHAAF, a subject of the German Emperor, and a resident of Düren, Rhineland, in the German Empire, have invented certain new and useful Improvements in Paper-Stock-Refining Apparatus, of which the following is a specification.

My invention consists of improvements in apparatus for eliminating coarse lumpy particles from the finer portions of paper-stock in the process of preparing the pulp for being made into paper, as hereinafter described, reference being made to the accompanying drawings, in which—

Figure 1 is a longitudinal sectional elevation of my improved apparatus. Fig. 2 is a transverse sectional elevation. Fig. 3 is a plan view with part of the endless apron detached. Fig. 4 is a detail in longitudinal sectional elevation on an enlarged scale. Fig. 5 is a detail in transverse sectional elevation, also enlarged. Fig. 6 is another detail in transverse sectional elevation. Fig. 7 is a detail in longitudinal sectional elevation enlarged to about full size for practical use. Fig. 8 is a detail in plan view, also about full size; and Fig. 9 is a diagrammatic longitudinal sectional elevation showing on a reduced scale a modified form of the apparatus.

On the upper bars *a* of any approved supporting-frame a suitable tank or pan is mounted, whereof *b* represents the bottom, *c* the sides, *d* the ends, and *e* an overflow or weir at one side. The side plates or walls *c* are about double the height of the end plates or walls *d*. At each end of the pan is a roll *f*, parallel therewith, the upper sides of said rolls being level with the upper edges of the end plates *d* of the pan. An endless apron, consisting of steel or other thin metallic bands *h* and cross-bars *i*, riveted to said bands, is mounted on the said rolls to run forward through the pan and backward under the bottom of it, as shown in Figs. 1 and 9. The slats consist of hardened and polished metallic bars placed close together side by side in places, as *j*, but are reduced in width at other places, as *k*, for allowing the mass of the pulp in a watery mixture to flow through, and the sides running on the rolls are made convex, as shown in Fig. 7, to pro-

vide spaces *l*, with which corresponding ribs *m* on the driving-roll *f* mesh for impelling the apron.

The bands *h* are joined together at the ends by suitable eye-knuckles and a pivot-rod *m'*. The bars are hardened and polished, as above stated, to prevent the pulp from sticking to them.

In the pan and level with the upper surfaces of the rolls are supporting-ways *n*, on which the apron runs, said ways being located coincidently with the bands *h*, which run on them and sustain the wear, and the ways are grooved, as shown in Figs. 5 and 6, for clearance of the heads of the rivets by which the bars are secured to the bands, and the rolls *f* are correspondingly grooved, as at *o*, (see Figs. 3 and 7,) for the same purpose.

Longitudinal bars *g* are located over the apron in the upper part of the pan to guard against its rising and confine it on supports *n*. These guards are connected at their ends to supplementary end plates *s* to close the gaps in the ends of the pan above the apron, being suspended between the side plates *c* by their extended and notched lugs *t* and adjusting-screws *u* and nuts, said screws being pivoted to the side plates *c* at *v* to be conveniently adjusted relatively to the lugs. The guards *g* are stayed at the middle by a cross-bar *w*, and the supporting-bars *n* are similarly stayed by a cross-bar *x*.

The supplementary end plate *s* at the left-hand end of the pan, where the apron enters the pan, is adjusted as closely to the upper surface of the apron as is feasible to prevent escape of the pulp, and a felt liner *y* is fitted on the upper edge of the lower end plate to pack against leakage. A like liner *y'* is placed on the upper edge of the other lower end plate of the pan, also to pack against leakage, but instead of the upper end plate of this end of the pan being placed over the edge of the lower end plate it is located a suitable distance inward thereof, as shown in Fig. 4, and a roll *z*, covered with felt or other like material, is located over the apron directly above the edge of the lower end plate and outside of the end plate *s*, and a free space is left at *a'* between the lower edge of end plate *s* and the apron. This roll *z* is packed with felt at the ends, as shown at *b'*, Fig. 6, to prevent



leak between it and the sides of the pan, and the journals of said roll may also be packed with like or other approved material, as *c'*, for the same purpose.

5 It will now be seen that coarse particles of the stock failing to pass through the spaces between the bars of the apron will be carried along under roll *z*, which, having the felt covering, will collect said particles on it and  
10 remove them from the spaces between the bars of the apron and carry them upward against a scraper *d'*, which being suitably provided therefor discharges them from the surface of the roll onto the apron, from which,  
15 being now lightly borne thereon, they will fall away as the apron descends the roll for return to the entering end of the pan.

Under the pan and between rolls *f* are sprinkling-pipes *e'* for washing the apron and  
20 a pan *f'* for collecting water to be conducted away through a spout *g'*. Brushes may also be employed with or without the sprinklers for more effectually cleaning the apron. The watery mixture of pulp to be treated is to be  
25 fed into the pan above the endless apron in any approved way and preferably near the end through which the apron enters the pan. It flows down through the apron, leaving the particles too large for escaping through the  
30 spaces or meshes, and escapes at the overflow *e*.

It is to be noted that the edges of the apron are so inclosed between the supports *n* for said edges and the guards *g* over the edges  
35 that the pulpy mixture is prevented from escaping past the edges of the apron into the space below.

The level of the outlet *e* is below the level of the apron to provide space for escape of  
40 the mixture to a suitable distance below the apron to avoid flooding it.

The bottom of the pan is provided with the usual vibrating diaphragms *l'* to facilitate the flow of the pulp through the apron by caus-  
45 ing suction thereon, said diaphragms being supported on the levers *j'*, pivoted at *k'*, and resting on the eccentrics *h'*, by which the diaphragms are actuated. The joints between the diaphragm and the stationary parts of the  
50 bottom are closed by flexible packing-rings *m*<sup>2</sup>. In Fig. 9 I represent two shorter pans with one apron, which is a plan that may be adopted, if desired, the operation of which may be in all respects the same as the appa-  
55 ratus of the other figures, except that some means for laterally discharging the matters scraped off from the first roller *z* and falling on the apron, as an air-blast or an endless chain of brushes or the like, may be required.

60 It is obvious that the apron may be differently constructed, if desired—as, for instance, meshwork of wire or perforated metallic sheets and the like.

One of the rolls *f* is geared by the worm-

wheel *n'* and worm *o'* with the driving-shaft  
65 *p'*, on which the power is applied through pulley *q'*, to which a driving-belt is to be applied.

The eccentrics *h'* for actuating the diaphragm-supporting levers *j'* are also mounted on the driving-shaft, but the arrangement of  
70 actuating apparatus may be varied at will.

I claim—

1. The combination with the pan having the overflow at one side, and openings through the  
75 end plates, of the endless apron having passages for the flow of the pulp through it, and arranged to traverse the pan through said openings of the end plates, the roll for removing matters lodged on the apron, and means  
80 for moving the apron through the pan substantially as described.

2. The combination with the pan having the openings through the end plates, and the over-  
85 flow at one side the level of which is lower than the level of said openings, of the endless apron having passages for the flow of the pulp through it and arranged to traverse the pan through said openings, the roll for removing matters lodged on the apron and be-  
90 ing located over the apron, and over the upper edge of the end plate of the pan substantially as described.

3. The combination with the pan having the openings through the end plates, and the over-  
95 flow at one side the level of which is lower than the level of said openings, of the endless apron having passages for the flow of the pulp through it, and arranged to traverse the pan through said openings, the roll for removing  
100 matters lodged on the apron and being located over the apron and over the upper edge of the end plate of the pan, supporting-ways along the pan for the apron, and the guards over the apron, the edges of the apron being in-  
105 closed by the supporting-ways and guards to prevent escape of the pulp mixture over the edges of the apron substantially as described.

4. The combination with the pan having the openings through the end plates, and the over-  
110 flow at one side, the level of which is lower than said openings, of the endless apron having passages for the flow of the pulp through it and arranged to traverse the pan through  
115 said openings, the roll for removing matters lodged on the apron and being located over the apron and over the upper edge of the end plate of the pan, supporting-ways along the pan for the apron, guards over the apron and  
120 supplementary end plates for the pan, said end plates supported on the side plates by the adjusting-screws and the guards supported on the end plates substantially as described.

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

HEINRICH SCHAAF.

Witnesses:

SOPHIE NAGEL,

WILLIAM H. MADDEN.