

2 Sheets—Sheet 1.

## METHOD OF AND APPARATUS FOR TANNING.

Patented May 18, 1897.

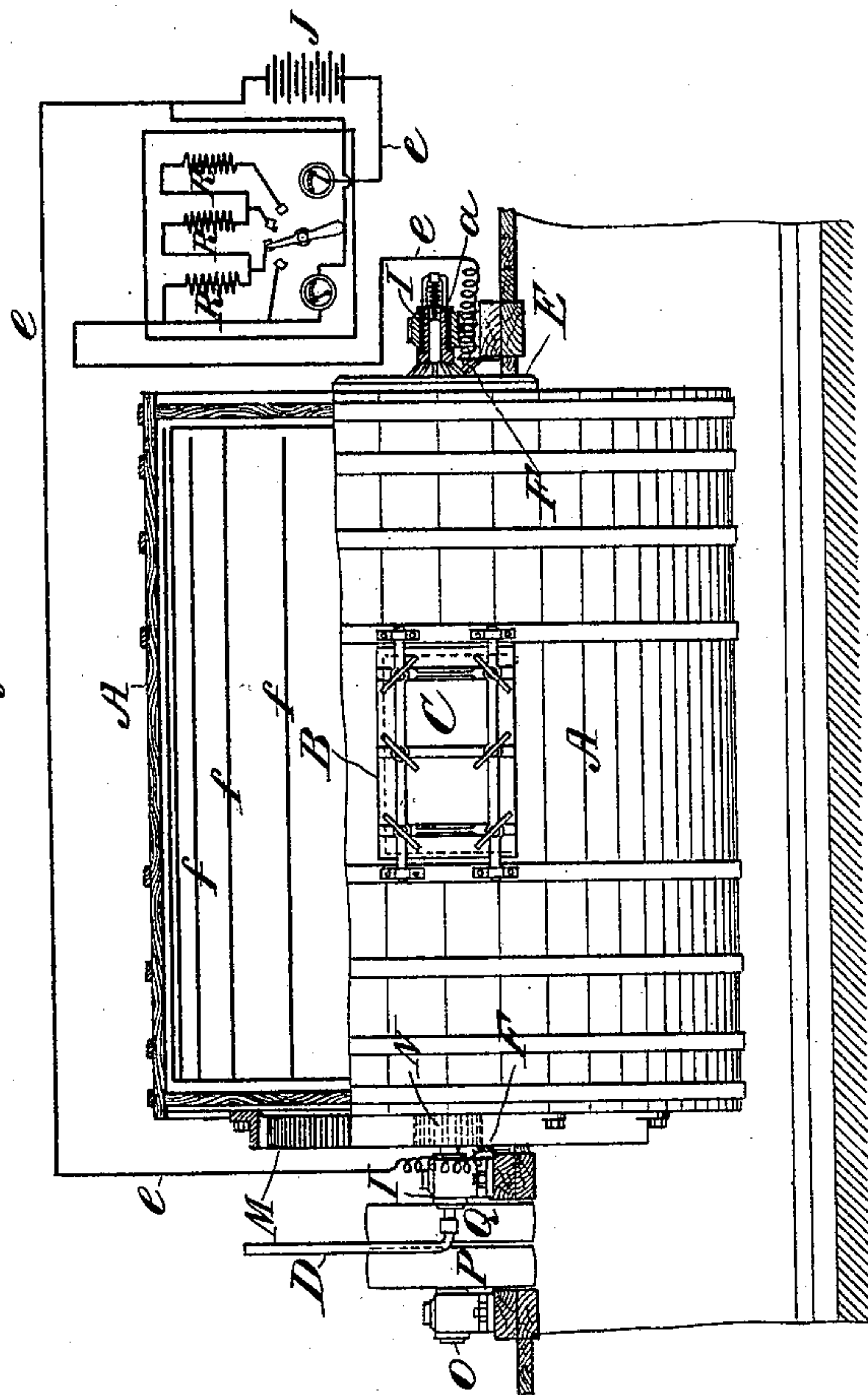
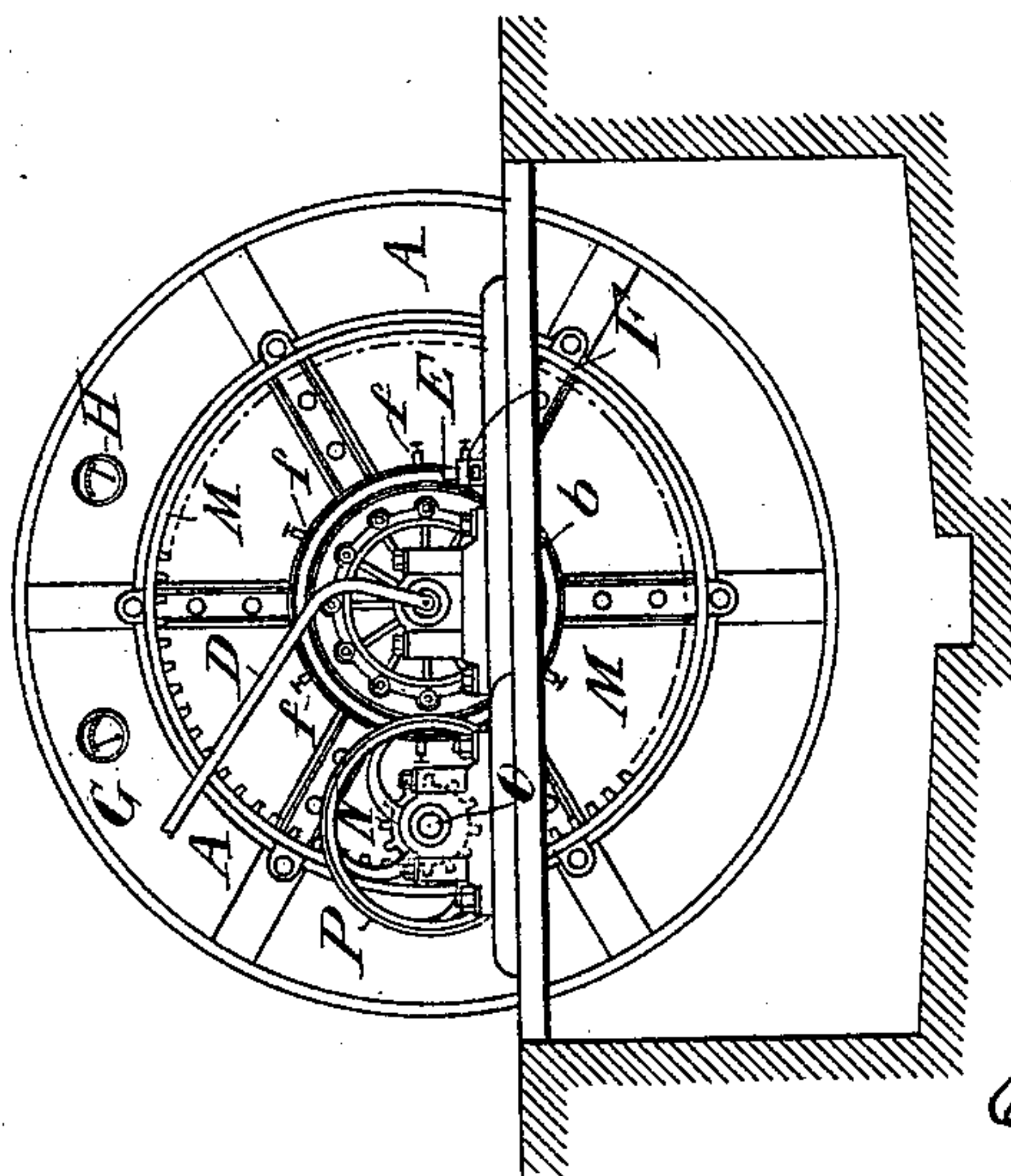


Fig. 1.



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(No Model.)

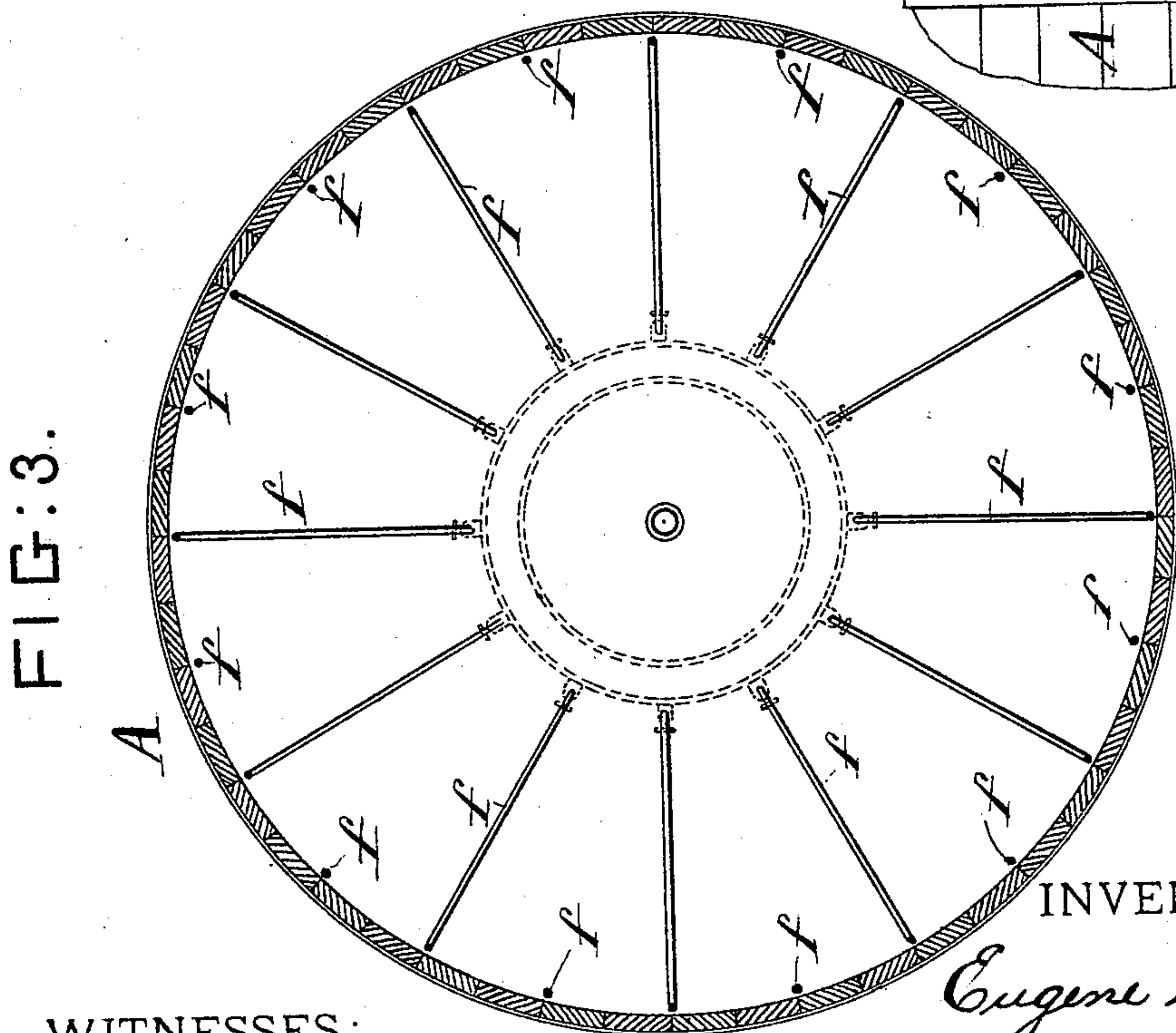
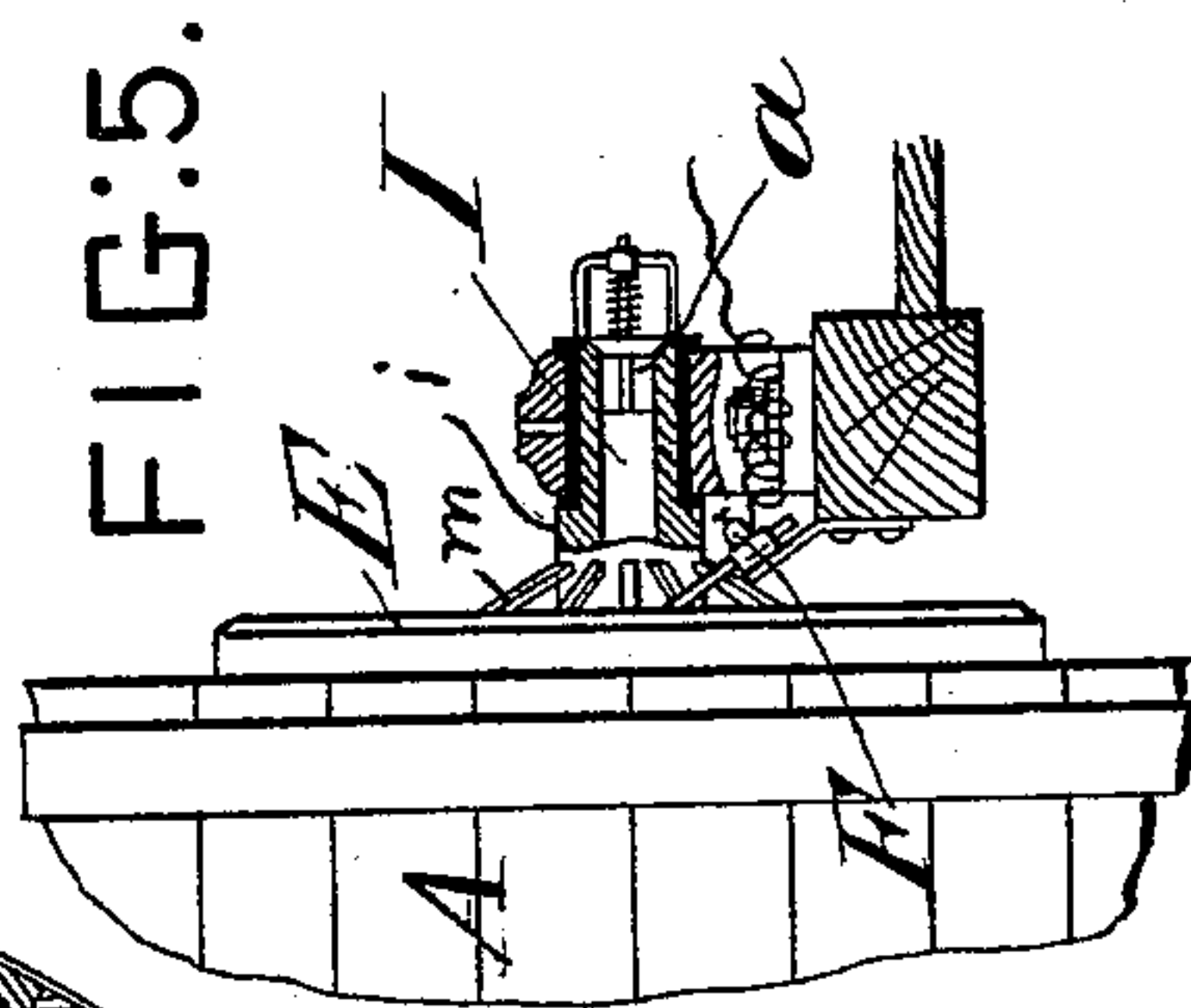
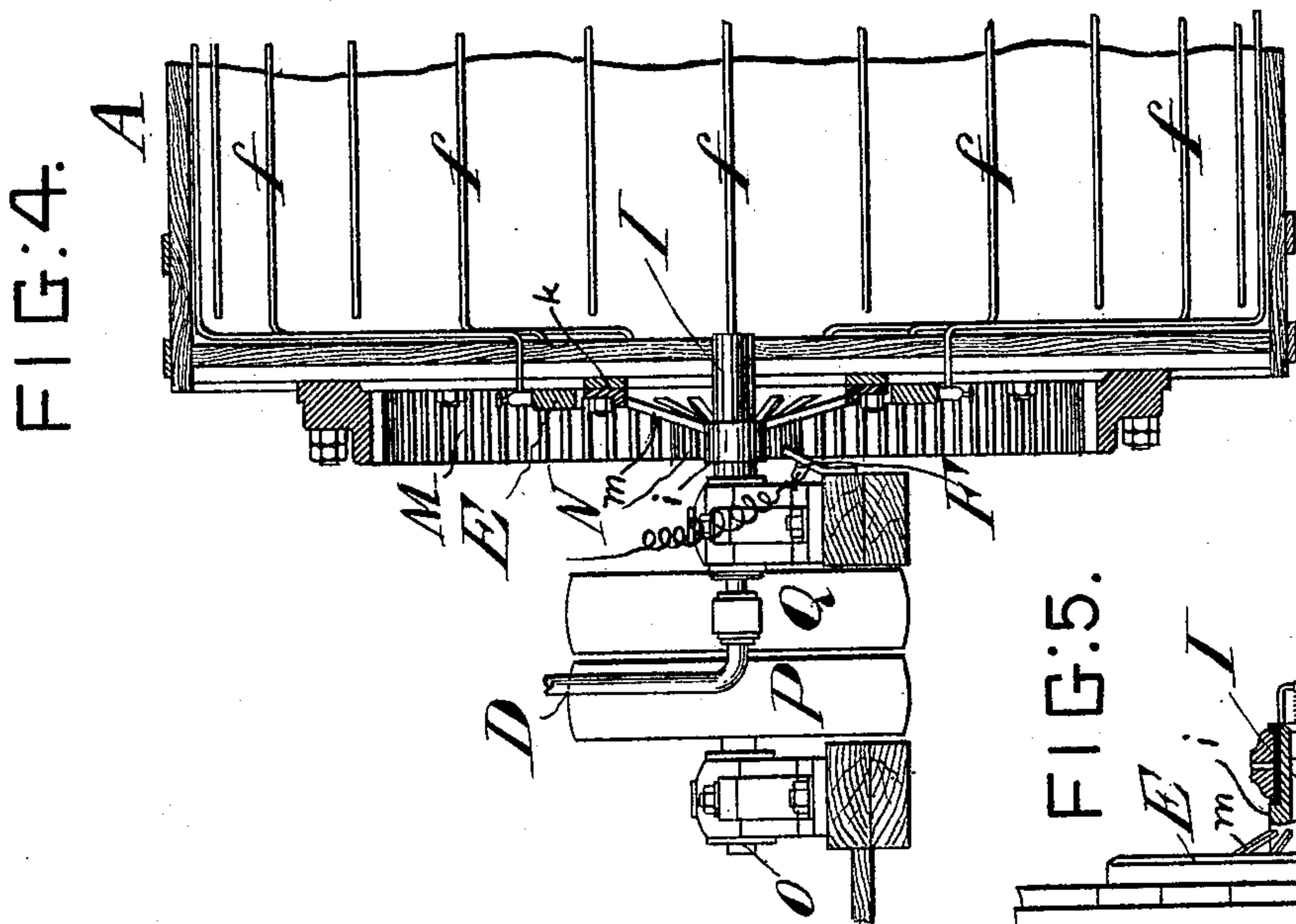
2 Sheets—Sheet 2.

# E. WORMS.

METHOD OF AND APPARATUS FOR TANNING.

No. 582,891.

Patented May 18, 1897.



WITNESSES:

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# UNITED STATES PATENT OFFICE.

EUGÈNE WORMS, OF PARIS, FRANCE.

## METHOD OF AND APPARATUS FOR TANNING.

SPECIFICATION forming part of Letters Patent No. 582,891, dated May 18, 1897.

Application filed October 11, 1895, Serial No. 565,339. (No model.) Patented in France August 7, 1895, No. 249,476; in Belgium August 21, 1895, No. 117,075; in England October 16, 1895, No. 19,428; in Luxemburg November 2, 1895, No. 2,408; in Italy November 14, 1895, XXX, 40,166, LXXVIII, 460; in Switzerland November 18, 1895, No. 11,323; in Norway November 18, 1895, No. 4,636; in Spain November 25, 1895, No. 17,931; in Portugal January 20, 1896, No. 2,065; in Canada January 21, 1896, No. 51,074; in New South Wales January 28, 1896, No. 6,357; in Hungary February 29, 1896, No. 5,740, and in India May 22, 1896, No. 1,537.

*To all whom it may concern:*

Be it known that I, EUGÈNE WORMS, a citizen of the Republic of France, residing at Paris, France, have invented certain new and useful Improvements in Methods of and Apparatus for Tanning, (for which patents have been granted in France, No. 249,476, dated August 7, 1895; in Belgium, No. 117,075, dated August 21, 1895; in Spain, No. 17,931, dated November 25, 1895; in Portugal, No. 2,065, dated January 20, 1896; in Great Britain, No. 19,428, dated October 16, 1895; in Hungary, No. 5,740, dated February 29, 1896; in Luxemburg, No. 2,408, dated November 2, 1895; in Switzerland, No. 11,323, dated November 18, 1895; in Norway, No. 4,636, dated November 18, 1895; in Italy, Vol. XXX, No. 40,166, Vol. LXXVIII, No. 460, dated November 14, 1895; in Canada, No. 51,074, dated January 21, 1896; in India, No. 1,537, dated May 22, 1896, and in New South Wales, No. 6,357, dated January 28, 1896,) of which the following is a specification.

My invention relates to the tanning of hides and skins, and in carrying out my invention I employ a combination of mechanical, physical, and chemical elements to the exclusion of all acids.

Tanning consists in causing a certain quantity of tannin to penetrate the texture of the hide, where it is assimilated or combined with the gelatin of the skin. By the old and common process of tanning the incorporation takes place by slow endosmosis and a long time is required to convert the hide into leather. Methods of tanning have been devised with a view of hastening the process, but up to the present time, so far as I am aware, these methods have been quite imperfect and present numerous inconveniences which have prevented their adoption generally.

In carrying out my invention I submit the hides or skins while immersed in tanning liquid in a close drum or vessel to agitation and to a methodical and gradual heating with a view to opening the pores and ren-

dering the hides thus more readily absorbent of the tanning liquid, such heating being effected by electricity and the internal pressure regulated by a valve-controlled outlet which controls the pressure or gaseous tension in the drum due to the liberation of gases therein.

My object has been to provide a practical means for simultaneously heating the hides and the tanning liquor in which they are immersed, to regulate the pressure in a systematic manner, and to hasten the absorption of the tanning liquor by effecting a decomposition of the liquid in the tissues of the hide, whereby the gases generated thereby tend to expel the liquid not decomposed, and wherein by the phenomena of capillarity the elements of the tanning solution are taken into the tissues of the skin.

In the accompanying drawings I have illustrated an apparatus for carrying out my invention.

In the drawings, Figure 1 is an end elevation of the apparatus on a small scale, and Fig. 2 is a side elevation on the same scale with the drum in longitudinal vertical axial section at its upper part. Fig. 3 is a transverse section of the drum on a larger scale than Figs. 1 and 2, and Fig. 4 is an axial section of one end of the drum on the same scale as Fig. 3. Fig. 5 is a sectional view of the tubular journal of the drum, showing the valve therein.

A represents the vessel or drum, which may be of wooden staves and hooped like a barrel. In the side of the drum is a charging-opening B for the introduction of the skins, &c., and the removal of the same, and C is a door for closing said opening.

At its ends the drum A is furnished with hollow journals I I, one of which receives the pipe D for admitting the tannin material and the other of which (at the right in Fig. 2) is provided with a suitable valve *a*, which is adapted to open outwardly automatically and permit the escape of gas from the drum when the tension rises above a certain point.



The attachment of the head of the drum A to the journal I is braced by a collar *i* on the shaft, a ring *k*, secured to the head of the drum, and radial spoke-like braces *m*, connecting  
5 said collar and ring.

In Figs. 1 and 2 the drum is represented as mounted over and partly in a pit or excavation in the ground, but this pit is not essential. It is merely, or mainly, a convenience  
10 for keeping the apparatus at a low level.

On the respective outer ends of the drum A are secured metallic ring-contacts E, to each of which is connected a series of metallic conductors *f*, arranged inside of the drum and  
15 secured in any suitable manner to the inner surfaces of the heads and staves composing the drum. The conductors *f* from one ring E extend first radially and then longitudinally nearly the full length of the drum, and they  
20 terminate or end without contact, and the conductors *f* from the other ring E also extend first radially and then longitudinally nearly the full length of the drum and alternate with the other set of conductors. This  
25 construction is plainly seen in Figs. 3 and 4, where it will also be noted that there is no metallic connection between the alternately-arranged sets of conductors *f* in the drum, those forming one set being anodes and the  
30 other set cathodes.

In rubbing contact with the ring-contacts E are brushes F, which form terminals of conductors *e* from the respective poles of a dynamo or other generator of electricity J.  
35 In Fig. 4, where the ring-contact E is in section and the front or rear half is not shown, the brush F, which contacts with said front half, is partly broken away. In the electric circuit are placed rheostats R, by which the  
40 intensity of the current may be conveniently regulated.

G is a manometer, and H a thermometer, mounted on the drum A. These instruments permit of ascertaining by indication the conditions of pressure and temperature inside  
45 of the drum A. By regulating the current of electricity the temperature is also regulated, and the pressure may be regulated by varying the pressure tending to hold the valve *a* closed. The internal gaseous pressure will  
50 of course be maintained at the point desired by the escape of the excess of gas at the valve *a*.

For convenience of access I prefer to mount  
55 the drum in the pit or recess seen in Figs. 1 and 2, but this is not essential to my invention.

The drum may be rotated by the ordinary mechanism employed for similar purposes.  
60 As herein shown, on a counter-shaft O are tight and loose pulleys P and Q, adapted to receive a driving-belt, and fixed on the shaft O is a pinion N, which gears with a circular rack or toothed wheel M on the drum.

65 Operation: I introduce into the drum a quantity of water sufficient to completely immerse the skins to be tanned. This I trans-

form into tannin liquor by adding thereto tannin extract at about 20° Baumé in the proportion of about fifty per cent. of the  
70 weight of the skins to be tanned mixed with about five per cent. of the said weight of solvent vegetable essence. The hides are now put into the drum, which is then closed and set in motion. The current of electricity is  
75 turned on, and the agitation of the contents, together with the action of the electric current, causes the temperature of the contents of the drum to gradually rise. The heat produces a dilation of the pores and permits the  
80 decomposing-current to act effectively. After the passage through the drum of an alternating or continuous current of electricity for a time about equal to one-half that required for effecting the tanning said current is in-  
85 terrupted and another quantity of the tannin extract equal to that first put in is introduced at the pipe D, after which the current is again turned on. The internal temperature of the drum is maintained at about 25° to 30°. 90

The time required for tanning light skins will be from twenty-four to forty-eight hours and that for medium and heavy ones from sixty to one hundred and five hours, and after the lapse of the proper time the drum is  
95 stopped and the gas permitted to escape. After this the tanned hides or skins and the waste liquor are removed. The hides will be found perfectly tanned and adapted for further treatment by well-known methods. 100

My method is distinguished from others known to me in that in others one is obliged to have recourse to special means for heating the contents and another separate means for cooling the tanning liquid if the temperature  
105 rises too high. By my mode the temperature rises very slowly and gradually, and the valve in the hollow journal is made to automatically regulate the internal pressure.

It may be proper to state here as a matter  
110 of daily observation in the use of my apparatus that the passage of a current of electricity through it as described does augment both the temperature and the gaseous pressure within the drum, and that when the internal pressure is sufficient the valve *a* opens  
115 and gas escapes. The valve prevents the gaseous pressure from rising above a predetermined limit, and as the temperature increases with such pressure it follows that by  
120 regulating the pressure the temperature is also regulated.

I have stated that the current of electricity passed through the mass of liquid and hides in the drum decomposes the liquid in the tissues of the hides. This I believe to be true.  
125 We know that the liquid contained in the pores or tissues of a green hide is replaced by tannin in the process of tanning, and as by my process this replacement is exceedingly  
130 rapid as compared with that where no decomposing-current is employed I conclude that the development of gas in the tissues by decomposition of the liquid and its escape open



the way for the tannin. This is the view of the rationale accepted by experts.

Having thus described my invention, I claim—

5 1. The herein-described method of tanning hides and skins, which consists in subjecting to agitation the hides and the tanning liquor in which they are immersed, while said liquor and skins are protected from contact with air, simultaneously passing into and through said liquor a current of electricity, whereby the temperature of the liquor is gradually raised to about 30° centigrade, and finally maintaining the temperature at that point, substantially as set forth.

15 2. In an apparatus for tanning hides and skins, the combination with a rotatively-mounted drum, means for rotating said drum, and an automatically-operating valve situ-

ated in the tubular axis of the drum for regulating the internal pressure, of ring-contacts on the respective ends of the drum, a series of anodes in the drum connected with one of said ring-contacts, a series of cathodes in the drum, alternating in position with said anodes and connected with the other ring-contact, a generator, and an electric circuit in which are included said generator, the ring-contacts and said anodes and cathodes, substantially as set forth.

30 In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

EUGÈNE WORMS.

Witnesses:

CLYDE SHROPSHIRE,  
AUGUSTE MATHIEN.