

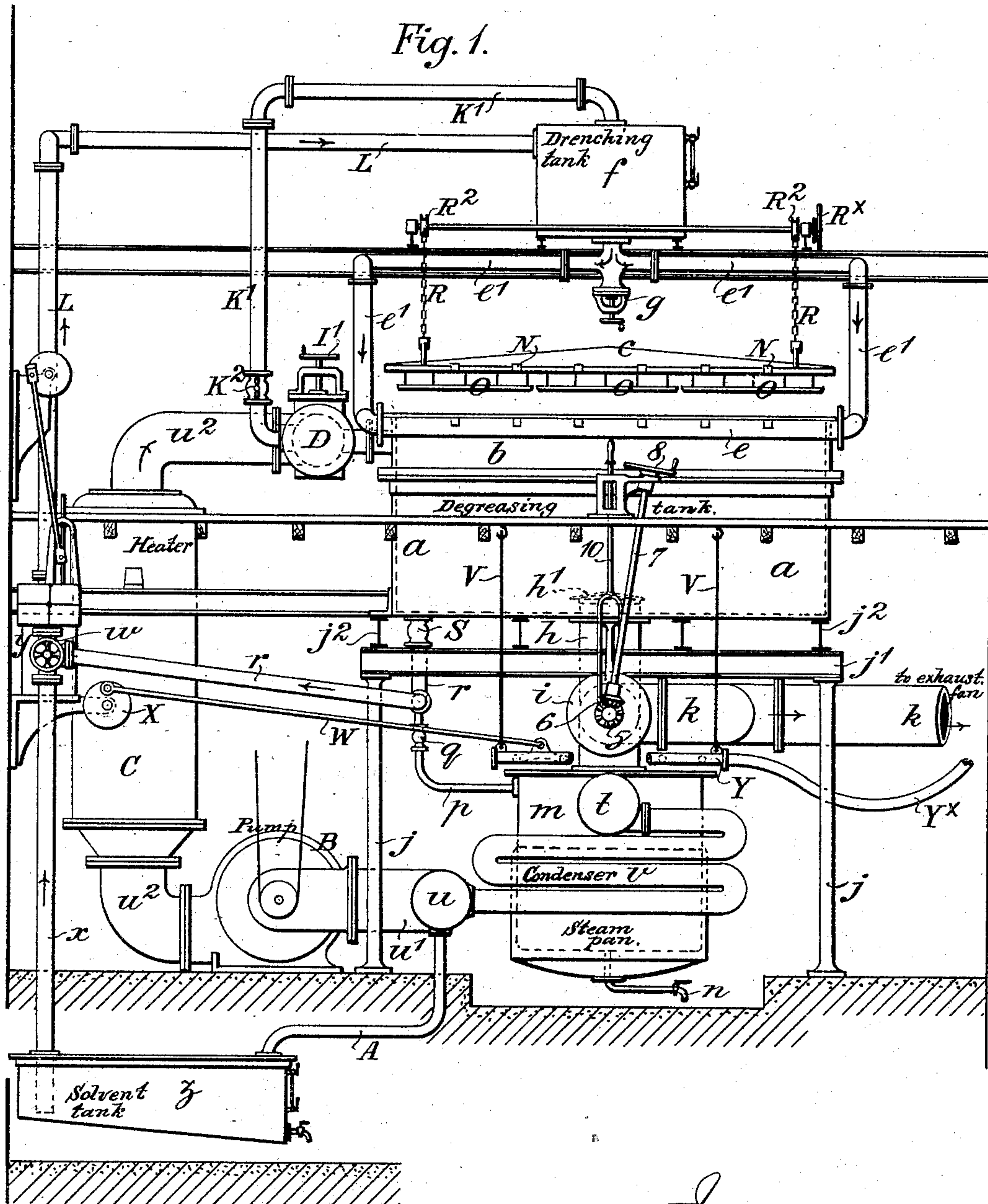
F. N. TURNEY.

PROCESS OF AND APPARATUS FOR DEGREASING LEATHER.

No. 482,661.

Patented Sept. 13, 1892.

Fig. 1.



Witnesses:
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Inventor:
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 Attorney.

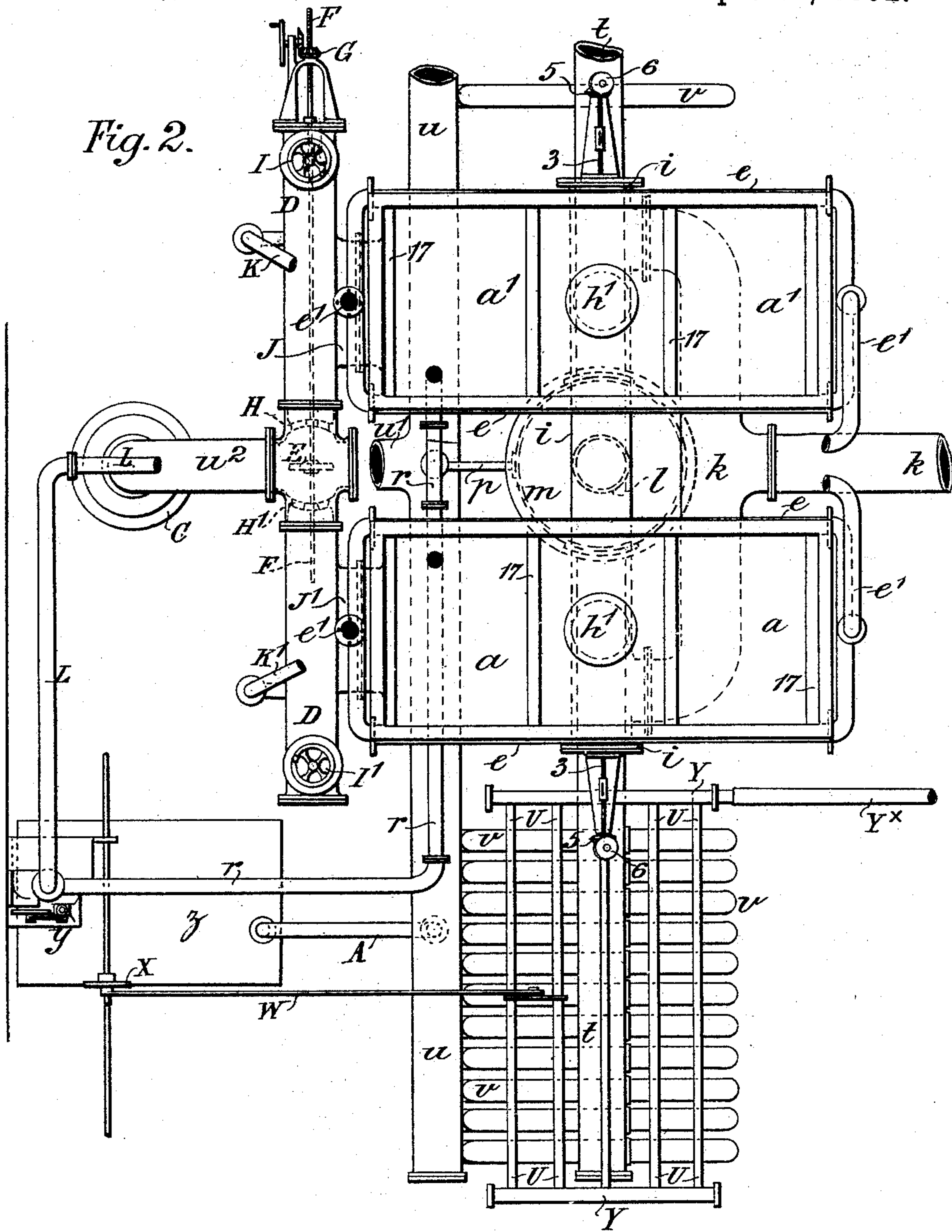
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Fig. 2.



Witnesses:
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Fig. 5.

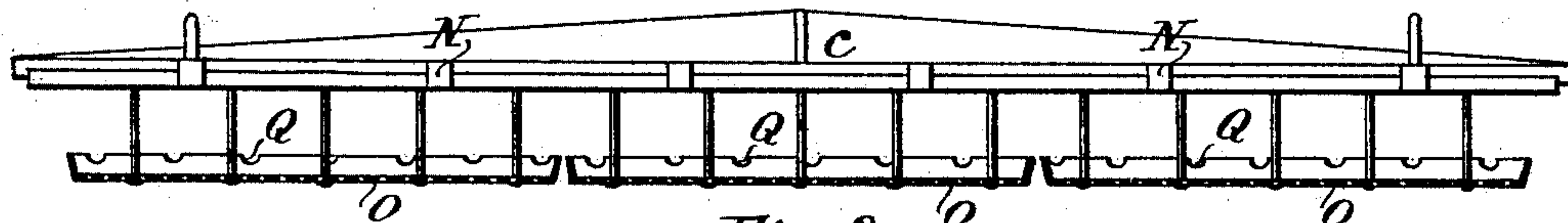


Fig. 3.

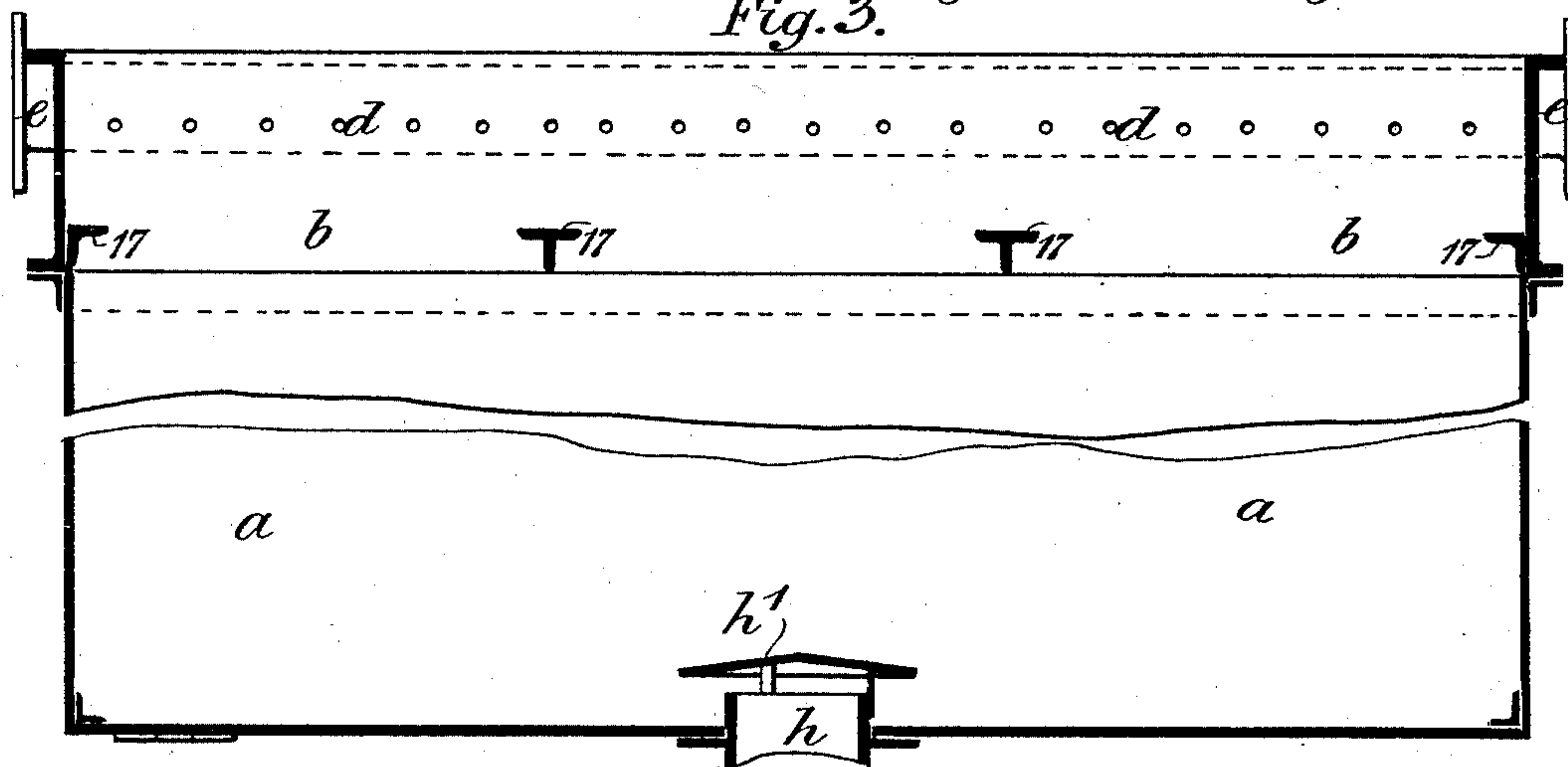


Fig. 4.

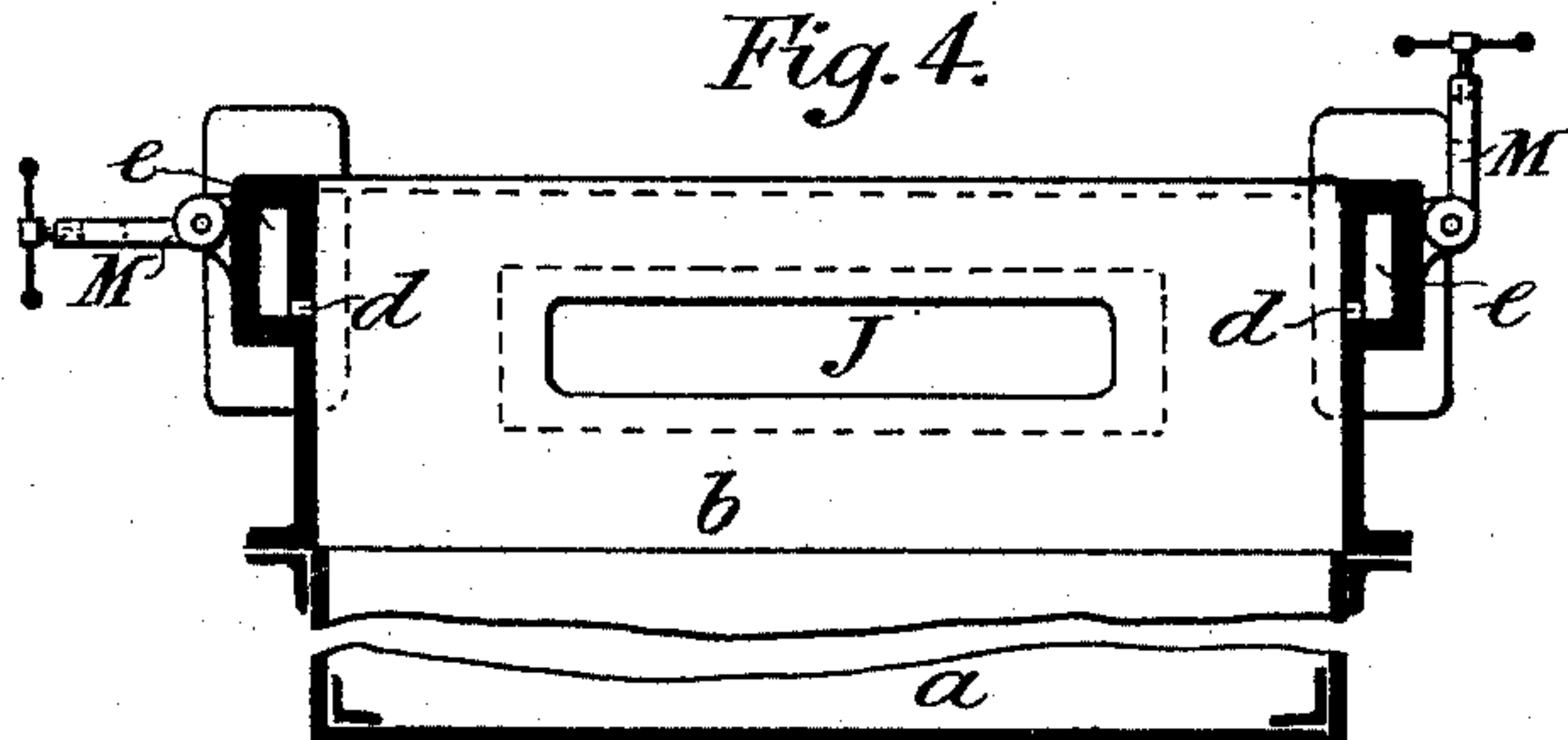


Fig. 7.

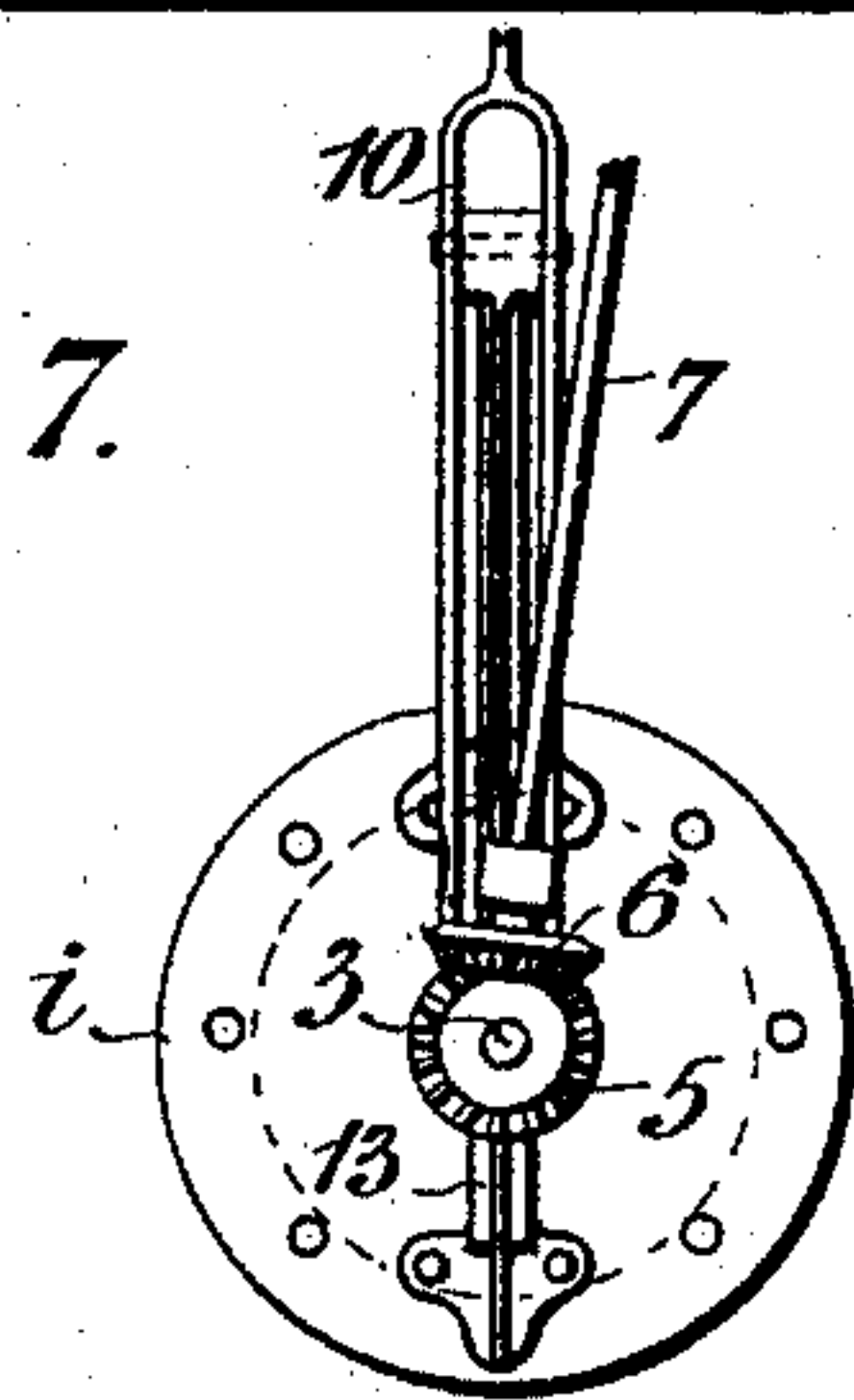
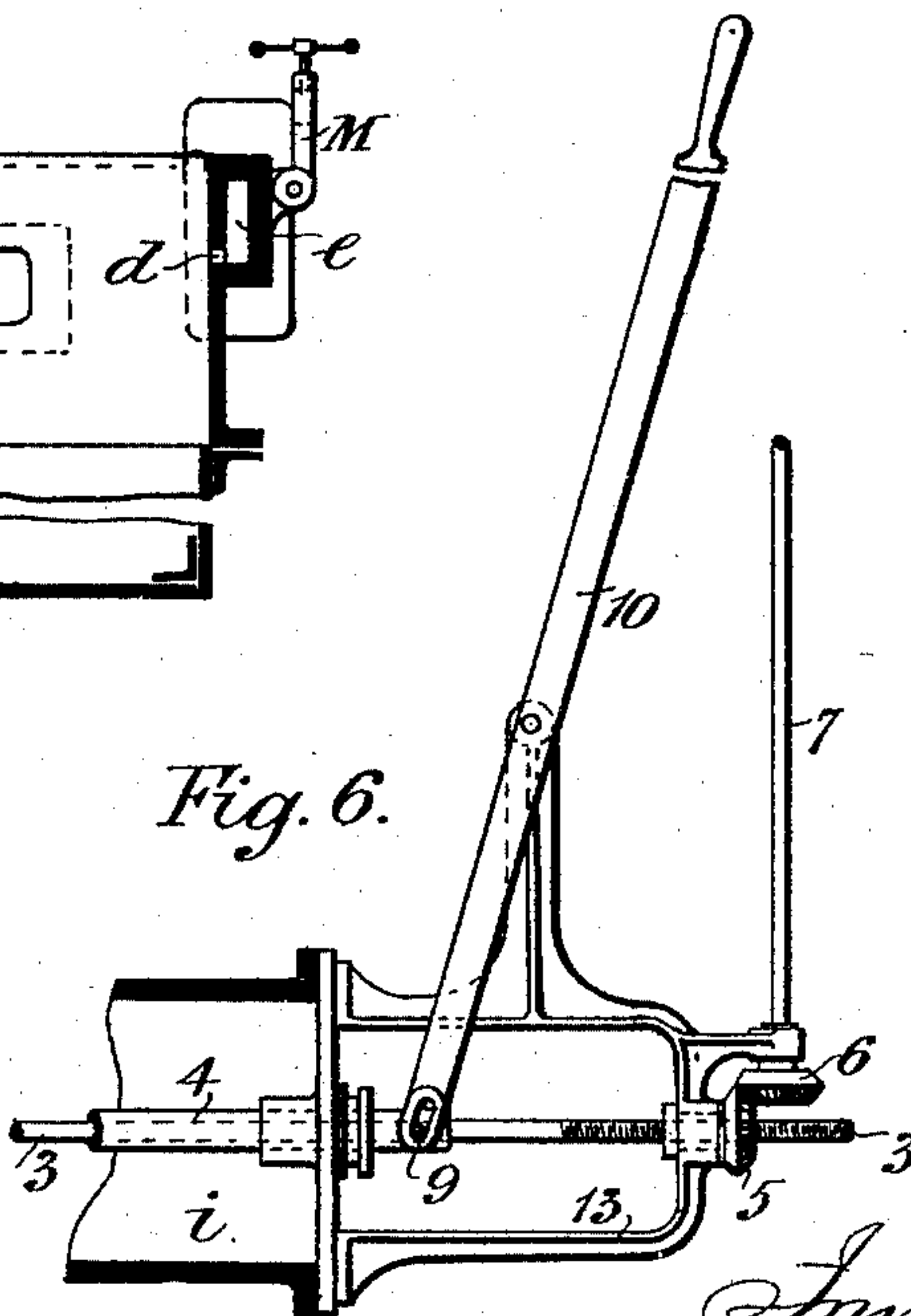


Fig. 6.



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Fig. 8.

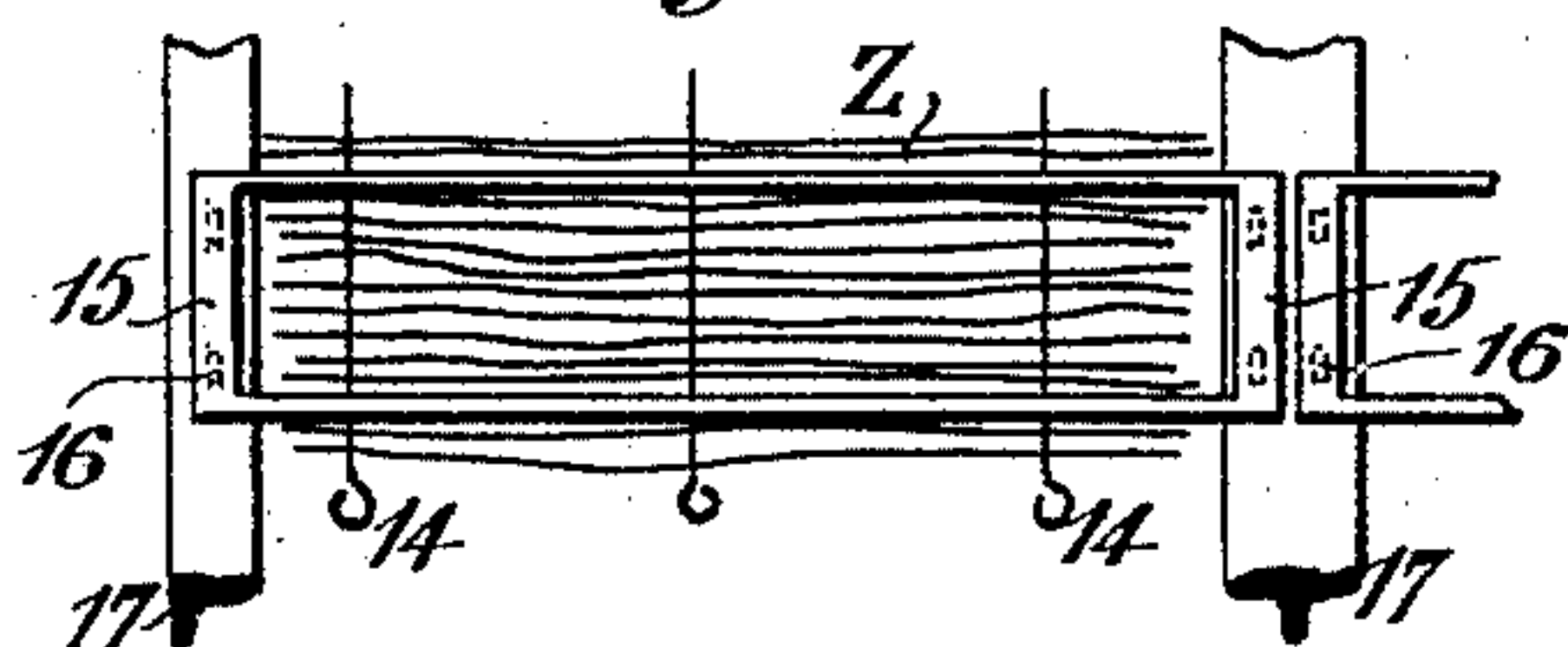


Fig. 9.

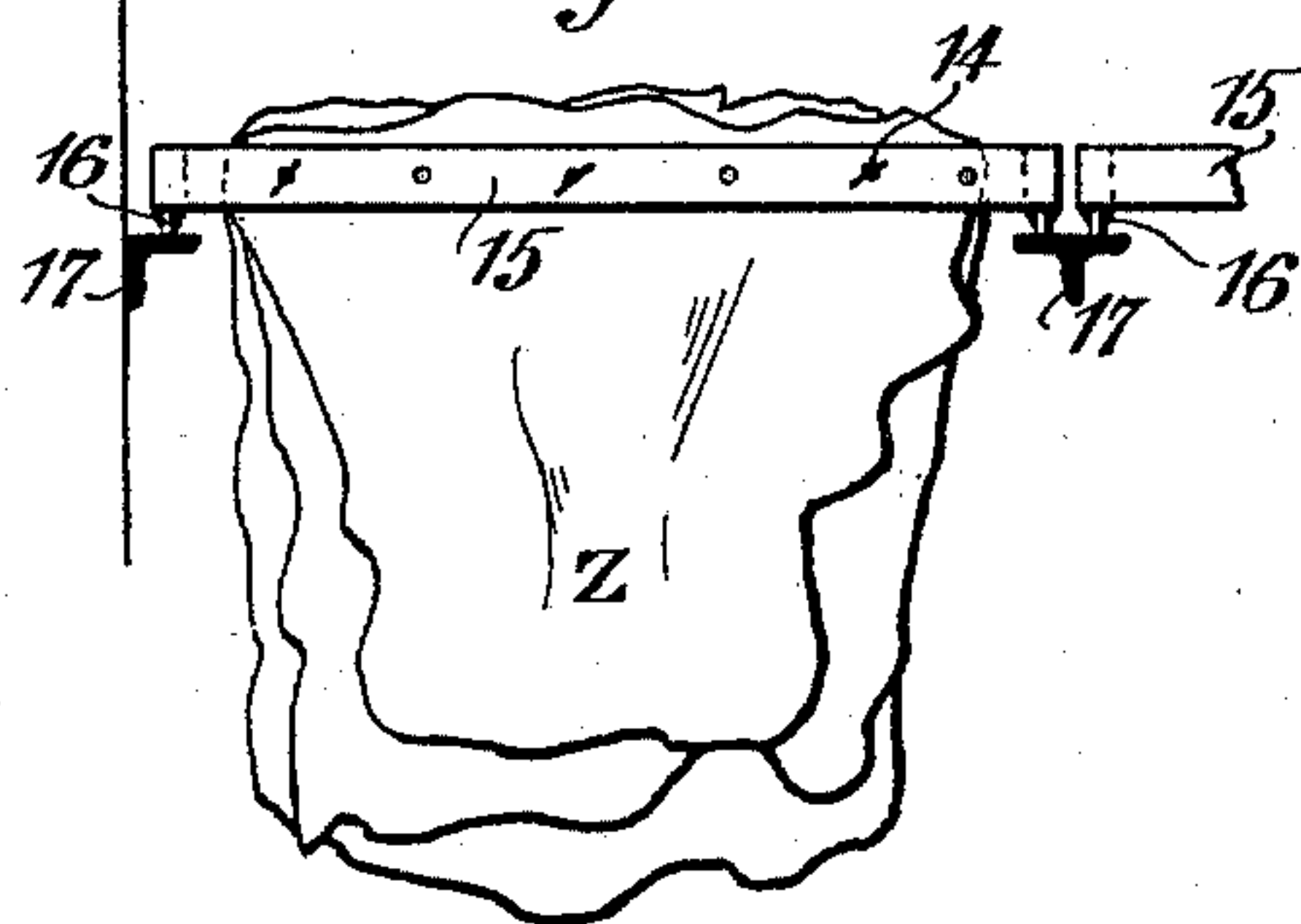


Fig. 11.

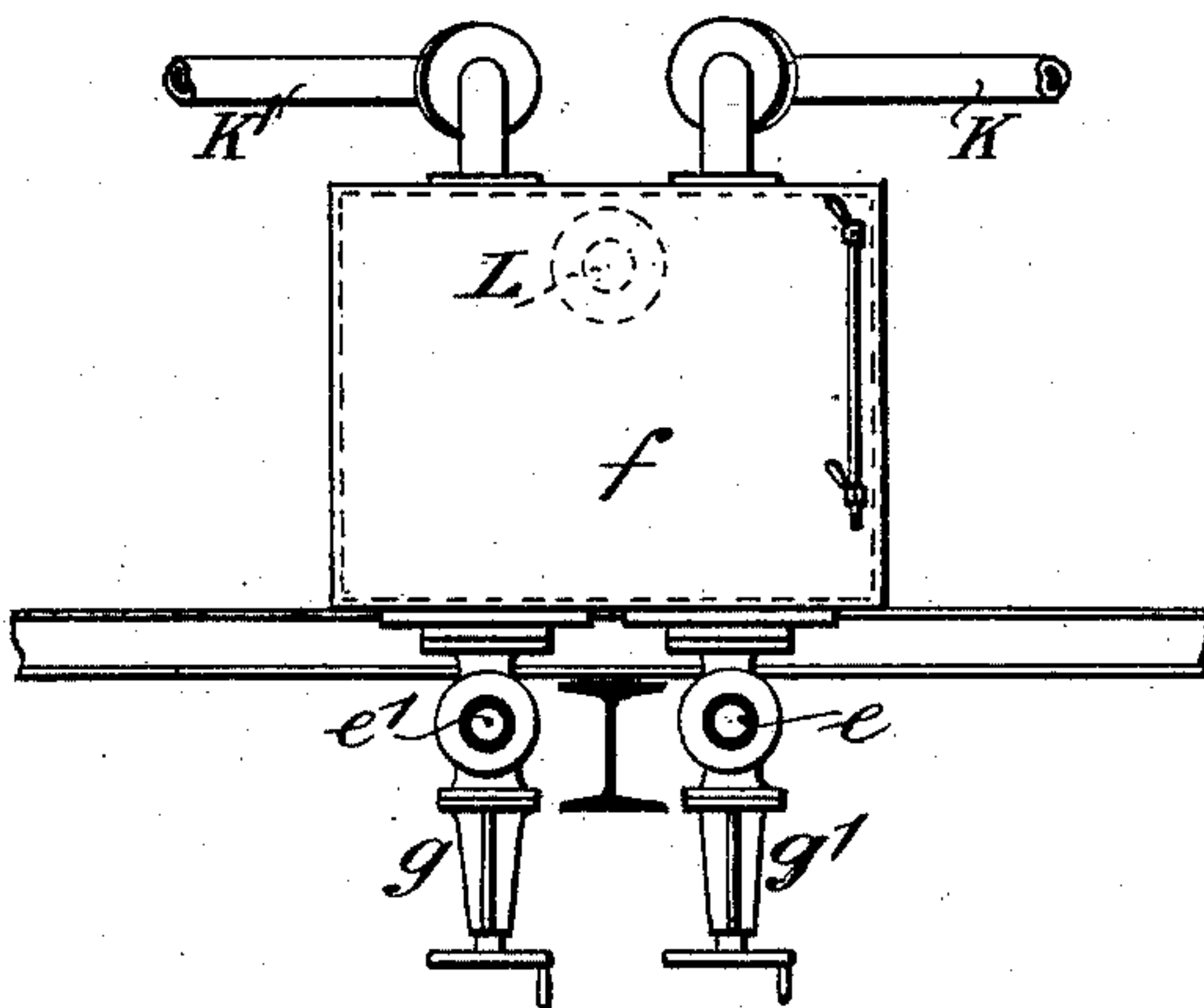


Fig. 10.

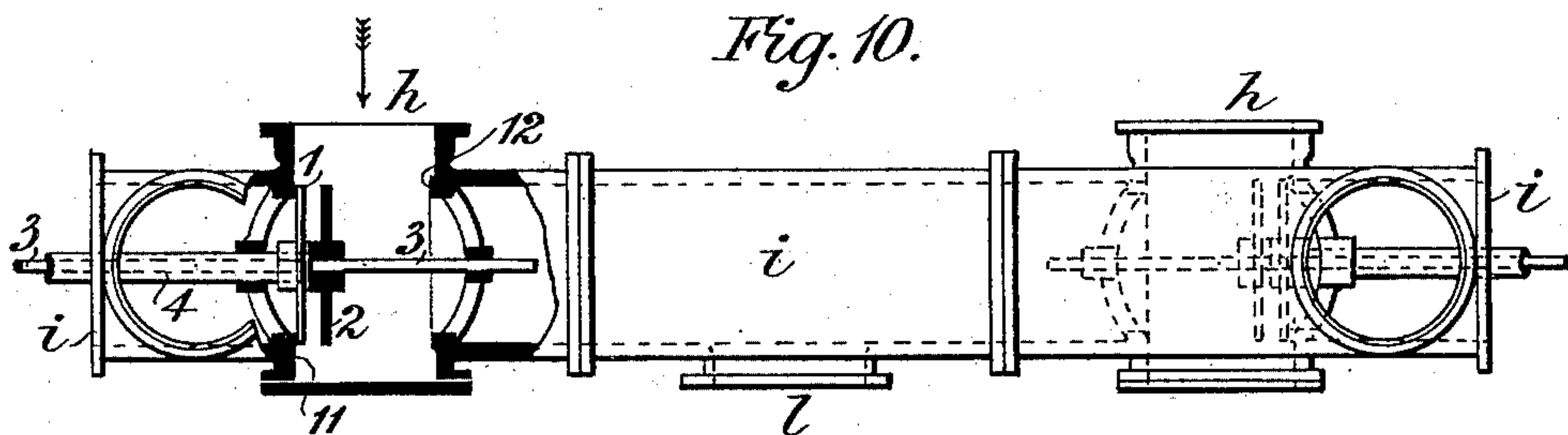
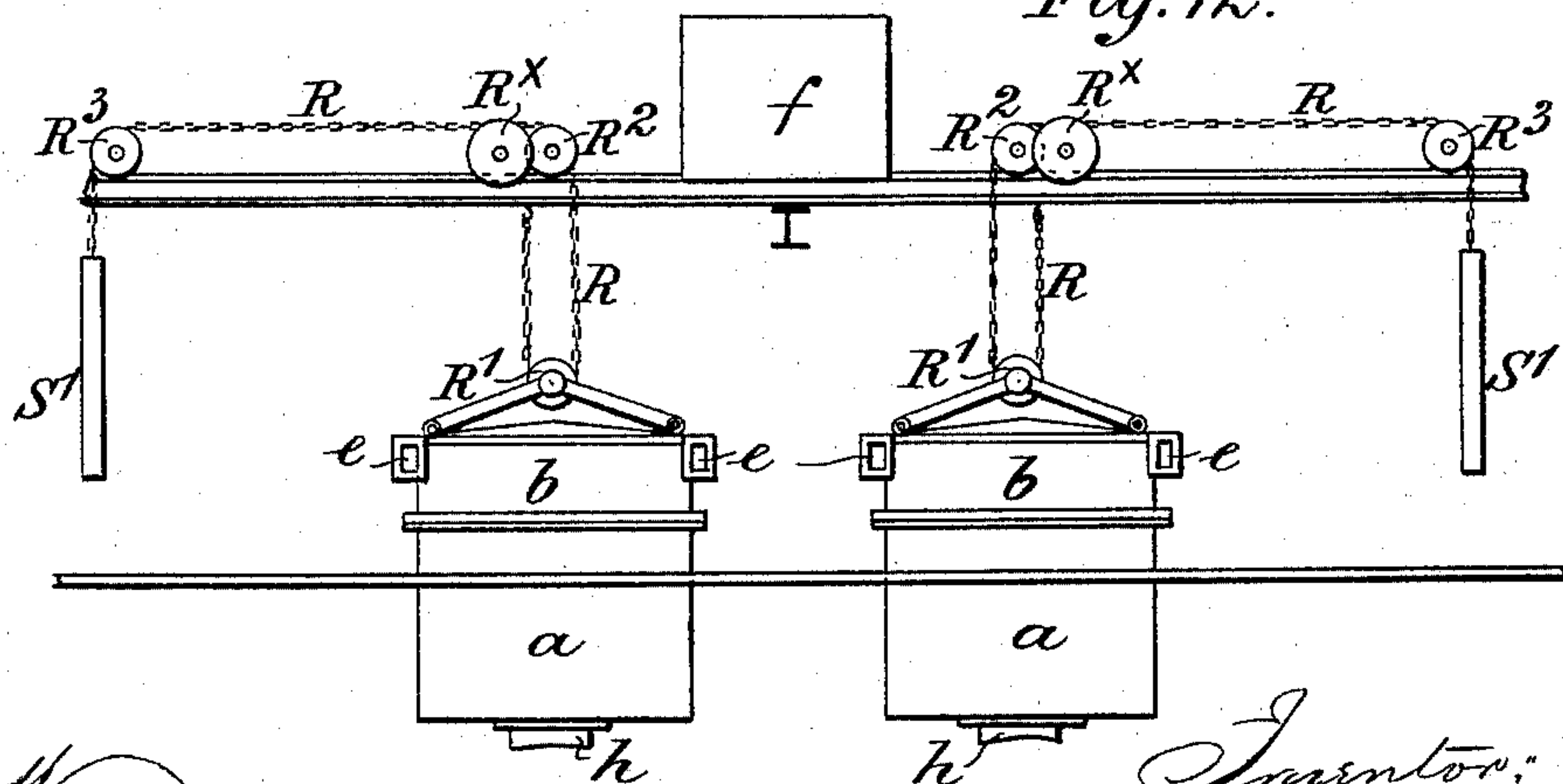


Fig. 12.



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UNITED STATES PATENT OFFICE.

FREDERICK NICHOLSON TURNEY, OF NOTTINGHAM, ENGLAND.

PROCESS OF AND APPARATUS FOR DEGREASING LEATHER.

SPECIFICATION forming part of Letters Patent No. 482,661, dated September 13, 1892.

Application filed January 9, 1892. Serial No. 417,555. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK NICHOLSON TURNEY, a subject of the Queen of Great Britain and Ireland, residing at Nottingham, England, have invented a certain new and useful Improved Process of and Apparatus for Degreasing Leather; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to an improved process for degreasing leather, whereby I am enabled to effect the degreasing operation in a far more perfect and rapid manner than heretofore and at the same time to greatly cheapen the process by effecting a substantial economy in the quantity of solvent employed, as by my process the same solvent will serve again and again in the degreasing operation.

The principal features of the process are that a large quantity of leather is treated by a small quantity of solvent; that the small quantity of solvent is discharged, sprinkled, showered, or run over the goods which, according to my process, are suspended in the solvent, and that the whole operation is performed without removing the goods or transferring them from one tank or portion of the degreasing apparatus to another.

In carrying out my process I usually subject the leather to the action of petroleum spirit; but other solvents—such as the benzenes, chloroform, bisulphide of carbon, and the like—may be used with my apparatus and with the goods arranged in a similar manner in the degreasing-tank—that is to say, suspended within the tank, so that the whole surface of said goods may be acted upon by the solvent, which would not be the case if the leather skins were simply piled one upon the other and immersed in the solvent.

For carrying out my process I employ specially-contrived apparatus, hereinafter fully described, by the use of which the degreasing and cleansing of the goods are effected in a superior and more perfect manner than has hitherto been possible with economy of the solvent and recovery of the grease extracted, thus rendering the process capable of being carried on continuously, as the goods in one

tank may be undergoing the drenching operation while those in the other are being dried.

My invention will be more readily understood by reference to the annexed drawings, 55 in which—

Figure 1 is an end elevation of the apparatus; Fig. 2, a part plan in which for sake of clearness all parts above the top of the degreasing-tanks are shown broken off or removed. The condenser on one side is also only partially shown, being of similar design to that shown on the other side. Figs. 3 and 4 represent longitudinal and transverse sections, respectively, of one of the degreasing-tanks, drawn to a larger scale than Figs. 1 and 2. Fig. 5 is a side elevation, also on an enlarged scale, of one of the covers of the degreasing-tanks. Fig. 6 is a side view, and Fig. 7 an end view, also on an enlarged scale, showing the handle and screw appliances for operating from the working floor the air and vapor regulating disk-valves beneath the degreasing-tanks. Fig. 8 is a plan representing the means by which the leather is suspended in the degreasing-tank, and Fig. 9 is a side elevation of the same. Fig. 10 is a part sectional elevation of the air or vapor pipe forming a communication between the jacketed steam-pan and the degreasing-tanks and shows the construction of the air and vapor regulating disk-valves. Fig. 11 is an end view of the drenching-tank, showing the screw-down valves controlling the supply to each of the degreasing-tanks. Fig. 12 represents in end elevation the degreasing-tanks with their covers on and shows the position of the chains and gear for raising these covers. 75

The same letters and numerals of reference indicate similar parts throughout the drawings. 90

a a' are the degreasing-tanks, preferably constructed of wrought-iron, with a cast-iron upper portion *b*, and provided with covers *c c*. A flanged passage or pipe *e* is formed at each side of the degreasing-tank, and said passages communicate by orifices *d* with the interior of the tank and connect by the pipework *e'* the tanks *a* and *a'* with the drenching-tank *f* through the screw-down valves *g* and *g'*, Fig. 11, respectively. At the bottom of each of the tanks is a pipe *h*, which projects a short dis- 95 100

tance therein and communicates with the disk-valves in the pipe *i*. (Shown in detail in Fig. 10.) Above the mouth of the pipe *h* is a conical cap *h'*, which prevents the liquid solvent thrown into the tank from entering the pipe *h*, but allows free passage for vapor. The degreasing-tanks are supported on columns *j* and girders and joists *j' j''*, as shown, or in any other convenient manner.

By operating the disk-valves in the air-pipe *i* communication can be established between the said pipe *i* and the atmosphere through pipework *k*, at the end of which a "Black-man" or other exhaust-fan may be arranged. At the middle of this pipe *i* is a branch or junction *l*, connecting it with the steam-jacketed pan *m*. The said pan is provided at bottom with a grease-outlet *n*. A small pipe *p*, in which is the valve or cock *q*, connects this steam-pan *m* with the pipework *r*, which is attached to valves *S*, one of which is arranged at the bottom of each of the degreasing-tanks. At each side of the steam-pan is a longitudinal pipe *t*, (see Figs. 1 and 2,) which is connected to another longitudinal pipe *u* of similar area by means of a suitable number of condensing coils or siphons, the area of the whole of which is equal to the area of the longitudinal pipe *t*. One end of the pipe *r* is connected to the three-way cock *w* at the top of the suction-pipe *x*, said three-way cock being flanged to the pump, which is carried or supported on the wall by girders or in any convenient manner and at such a height as to allow that portion of the pipe *r* which is joined to the said three-way cock to slope or incline toward the longitudinal portion arranged below and communicating with the degreasing-tanks. One end of the suction-pipe *x* is carried nearly to the bottom of the store-tank *z*, said tank being provided with a gage-glass for ascertaining the height of the solvent therein and with a draw-off cock for any water which may collect at the bottom.

An inlet-pipe *A* connects the pipe *u* with the store-tank *z*. At the middle of the pipe *u* is a branch *u'*, leading to a fan *B*, which is driven by belts from line-shafting or by any convenient motor. The outlet-pipe *u''* from the said fan discharges into a tubular heater *C*, (or a coil of steam or hot-water piping,) connected above to the vapor-tube *D*. At the point where the pipe *u''* joins the vapor-tube *D* is a two-way disk-valve consisting of a disk *E*, Fig. 2, on a rod *F*, passing through a stuffing-box and screwed at one end, the screwed end passing through a miter-wheel *G*, carried in a bearing on a bracket at one end of the vapor-tube *D* and operated by a hand-wheel and second miter-wheel. The disk *E* is shown midway between the two seats *H H'*.

The vapor-tube *D* is furnished with two screw-down air-admission valves *I I'*, one of which is arranged at each end of the tube *D*, and when operated admits air from the room

in which the process is being carried onto the said tube. The vapor-tube *D* communicates with each of the degreasing-tanks by means of oblong passages *J J'*, opening thereinto at their ends, and shown more clearly in the section Fig. 4. Two pipes *K K'*, furnished with cocks *K''*, Fig. 1, lead from the vapor-tube *D* to the drenching-tank *f* for the purpose of admitting air to the said tank to allow the liquid to flow therefrom when desired. The pipework *L* connects the pump *y* with the drenching-tank *f*.

The lid or cover *c* of each degreasing-tank is preferably constructed of cast-iron, the edge of which rests on the rim of the degreasing-tank, said rim being machined to form an air-tight joint when closed. Felt is placed between the edge of the cover and the rim of the tank, and the cover is secured by clamps *M*, taking over lugs *N* on the cover, or in any other convenient manner. Perforated sheet-metal trays *O*, Figs. 1 and 5, are suspended from the cover *c* by short rods or hangers. These trays are formed with notches *Q* at the sides to allow the whole of the liquid from the orifices *d* to flow into them and at the same time permit the trays to be deeper without being lower down in the tank. The notches *Q* correspond with and lie opposite the orifices *d* when the trays are in the degreasing-tanks. The covers *c* are raised and lowered by chains *R*, (furnished with counterbalance-weights *S'*), Figs. 1 and 12, attached or hooked at one end to a girder or other support and passing over pulleys *R'* to pulleys *R''*, whose spindles carry spur-gear working into spur wheels or pinions on the axis of the hand-wheel *R'''*, Fig. 12. The chains pass thence over pulleys *R''*, or the covers may be raised in any other convenient manner. I do not, however, confine myself to suspending the trays from the covers, as it is obvious that they may be independent thereof and be arranged to lie within the tanks.

A framework composed of two end pipes *Y*, Fig. 5, connected together by any suitable number of pipes *U*, perforated underneath, is suspended by rods *V* over each of the series of condensing pipes or siphons *v* and receives a reciprocating motion by means of a connecting-rod *W*, connecting it centrally with a disk or crank *X* on line-shafting, or in any other convenient manner. Water is conveyed to the end pipes *T T'* by an india-rubber tube or flexible hose *Y''*. Each of the two disk-valves in the pipe *i* has two disks 1 2, which are provided on their working faces with grooves, into which lead or antifriction metal is run, so as to avoid heat by friction. The disk 1 is secured to the sleeve 4 and the disk 2 to the rod 3. Both the sleeve and the rod are continued through a stuffing-box in the end of the pipe *i*. The rod has a screwed end passing through a miter-wheel 5, which is in gear with a second miter-wheel 6 on a rod 7, which can be operated by the hand-wheel 8, Fig. 1. The sleeve 4 has a pin 9 working in a slot in

the hand-lever 10. By this mechanism the disks 1 and 2 can be moved independently of each other and either or both be brought against either of the valve-seatings 11 and 12.

5 The miter-wheels and hand-lever are carried in a bracket 13. The leather Z is secured by steel pins 14 to wooden frames 15, as shown in Figs. 8 and 9, and said frames run on rollers 16 and are carried in the degreasing-tanks on angle and T bars 17, arranged across said tanks.

The working of the process is as follows, assuming that one tank only is being used for the drenching portion of the operation, while the other tank is being used for the drying portion of the operation: A sufficient number of the wooden frames to stock one of the degreasing-tanks is first filled with the leather to be degreased and is placed upon the angle and T bars 17 within the degreasing-tank. When this tank is thus filled, its lid or cover *c* is lowered by the chains R, closed, and made tight by the fastenings M N. The disk-valves 1 2 in the air-pipe *i* are now placed in the position shown in Fig. 10 to open communication between the degreasing-tank containing the leather and the steam-pan *m*. By this means any vapor given off during the drenching operation, instead of causing a pressure in the decreasing-tank, flows through the pipe *i* into the steam-pan *m* and thence into the coils or siphons *v*, wherein it is condensed. The condensation in the coils is hastened by the sprinkling of the cold water through the pipes T and U. The pump *y*, which may be of any of the types used for volatile liquids, is now started and a charge of the solvent is drawn from the store-tank *z* and pumped into the drenching-tank *f*. If it be supposed that only the degreasing-tank *a* contains goods to be degreased, the valve *g* is now opened, and also the cock K² in the pipe K', and the charge of liquid flows down through the pipework *e'* by way of the passages *e*, through the orifices *d* into the perforated trays O, and through the perforations in them onto the leather. The part of the solvent not absorbed by the leather is collected in the bottom of the tank and is prevented from flowing away down the pipe *h* by said pipe projecting within the tank. When the valve S is opened, and thus communication established between the degreasing-tank and the pump, the collected solvent or liquid can be thrown by the pump into the drenching-tank *f* time after time until the degreasing of the goods to the desired extent has been completed. The tap *q* is then opened and the liquid from the tank and pump is drawn into the steam-pan, and if necessary a fresh charge of liquid from the store-tank *z* is drawn out by the pump and circulated over the goods to complete the degreasing. The drenching process having been completed and the liquid drained into the steam-pan *m*, the fan B is started and the valve E set so as to open communication from the heater C to the

degreasing-tank, and by means of the fan air and vapor of the solvent are caused to circulate through the goods, passing in turn from fan to heater, thence to the degreasing-tank, and thence to the steam-pan and condensing-coils, and to the fan again in a constant circuit. The air and vapor, being raised in temperature, carry off or evaporate from the leather the solvent remaining in it and carry the solvent in the form of vapor into the condensing-coils *v*, where it becomes condensed and is collected for use again in the store-tank *z*. If water accumulate at the bottom of the store-tank, it must be drawn off by the draw-off cock at the bottom. By this vapor circulation the goods are entirely freed from the solvent, so that they may be taken later from the tank quite dry. Except a very small quantity, all the solvent is collected for use again. By the arrangement of the apparatus with two degreasing-tanks and valves and connections, as shown, the valves may be operated so as to isolate one tank completely from the other and the process can be carried on continuously, the goods in one tank being drenched, while in the other they are being dried by the fan. From time to time as the work proceeds the grease-cock *n* is opened and the grease which has accumulated in the steam-pan withdrawn. After the drenching and at the same time that the fan started, steam is admitted into the jacket of the steam-pan *m*. The evaporation of the liquid in this pan is assisted by the circulation of the vapor through the coils by the fan B. When the operation is completed and the goods are dry, communication between the heater C and the degreasing-tank is cut off by valve E, and communication between the steam-pan and the degreasing-tank by moving the disks in the air-pipe *i* one after the other on the face or seating 12. The valve I is then raised from its seating and air allowed to flow in between the seating and the valve, the cock K² is closed, and the exhaust-fan (not shown) attached to pipe *k* is started. This is done in order to ventilate and get rid of the small residuum of uncollected vapor from the degreasing-tank by drawing through the said tank a current of air entering by the valve I. The valve I' is operated in the same manner when the other degreasing-tank is to be ventilated, the degreasing-tank during ventilation being completely isolated by the valve E and disk-valves in the pipe *i* from communication with all other parts of the apparatus. The heater C should be provided with a steam-pipe and valve or some other suitable means for regulating the temperature of the air or vapor, which should not exceed 100° Fahrenheit. Ventilation having been effected, the lid of the degreasing-tank is raised and the goods are taken out and removed from the frames, the whole operation having been performed without removing the goods and by the use of a minimum quantity of solvent.

As an instance of the rapidity with which my process can be carried out, I may mention that I am able to treat—that is, to completely degrease—thirty-six dozen of sheep-skins in about two hours with, say, from two hundred to two hundred and fifty gallons of the solvent, and with a loss, at the utmost, of only about one to two gallons of the solvent, the size of the degreasing-tank being for the above-mentioned quantity of skins thirteen feet six inches long, six feet wide, and six feet deep.

This process is applicable to skivers, basils, white leather, chamois, and all classes of oil leather, calf, goat, hides, &c. Any class of leather, no matter how dressed or tanned, may be treated as above described without injury, and even if the leather has been dyed the colors are not damaged.

Having now described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The process of degreasing leather herein described, which consists in suspending the leather within a closed tank, drenching it with a solvent, passing a current comprising heated air and a vapor of the solvent over the leather, condensing the vapor of the solvent out of the current of heated air and vapor, and passing air substantially free of the vapor over the leather, substantially as described.

2. The process of degreasing leather herein described, which consists in suspending the leather within a closed tank, drenching it with a solvent, passing a current comprising heated air and a vapor of the solvent over the leather, and recovering the solvent for re-use by condensing the vapor of the solvent out of the current of heated air and vapor, substantially as described.

3. In an apparatus for degreasing leather, the combination, with a storing-tank for the solvent and a degreasing-tank, of means for suspending the leather in said tank, a drenching-tank having communication with the degreasing-tank, a steam-jacketed pan for vaporizing the solvent, communicating with the degreasing-tank, a longitudinal pipe located beneath and communicating with the degreasing-tank, condensing-coils connected with said longitudinal pipe and with the solvent-storing tank, a pump for conveying the solvent from the storing-tank to the drenching-tank, and a pan connected with the vaporizing-chamber and with the degreasing-tank, substantially as described.

4. In an apparatus for degreasing leather, a degreasing-tank formed with flanged pipes *e* and provided with orifices *d*, communicating with said flanged pipes, and provided, also, with an oblong passage *J* and having angle and **T** bars 17 located therein, substantially as described.

5. In an apparatus for degreasing leather, the combination, with a degreasing-tank and angle and **T** bars located within said tank, of perforated trays for showering a solvent upon the leather and leather-supporting frames provided with rollers running on said angle and **T** bars, substantially as described.

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

FREDERICK NICHOLSON TURNEY.

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