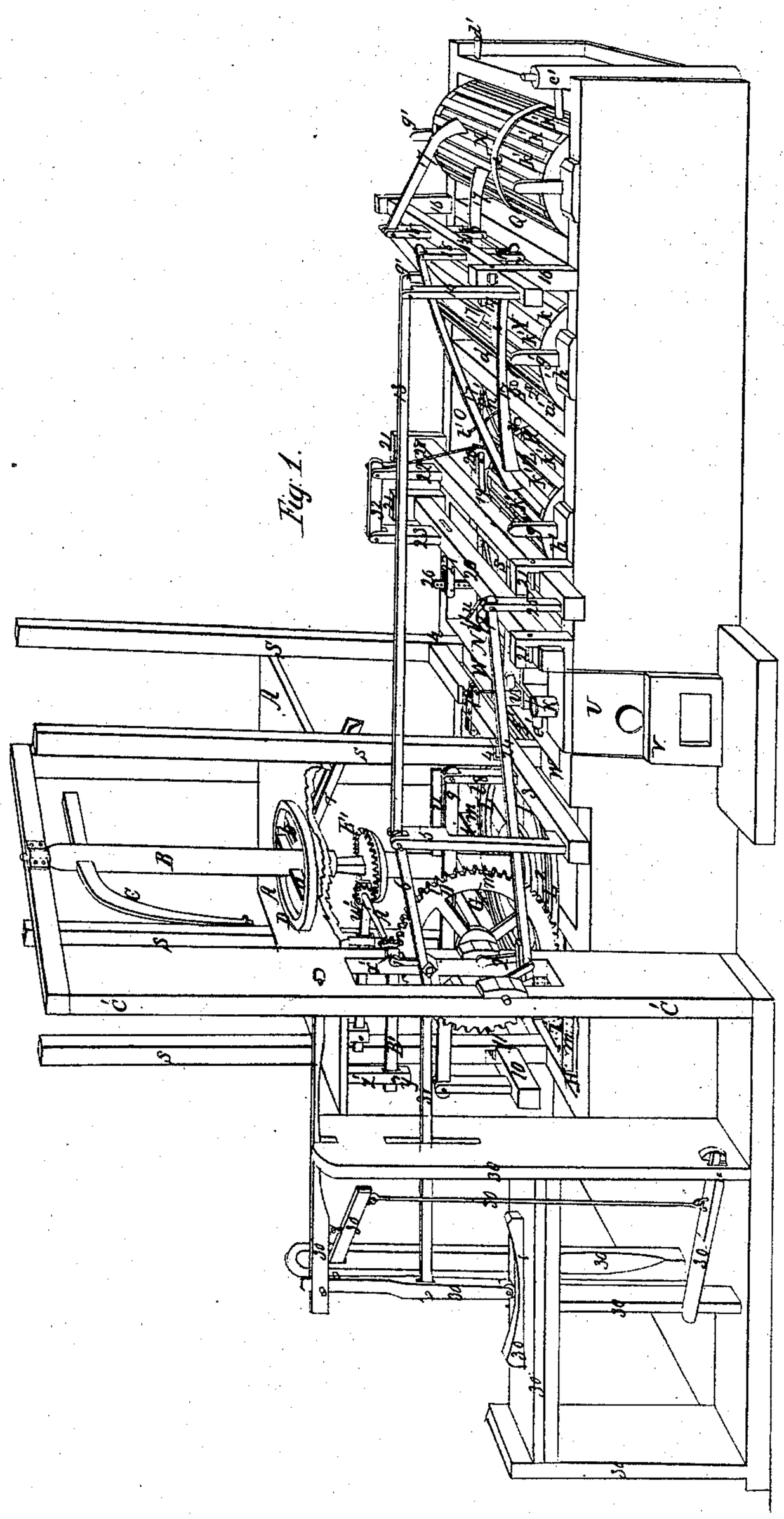
2 Sheets—Sheet 1.

W. BROWN.

Tanning Apparatus.

No. 3,688. Patented Aug. 1, 1844.

Fig. 1.



2 Sheets—Sheet 2.

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Fig. 3.

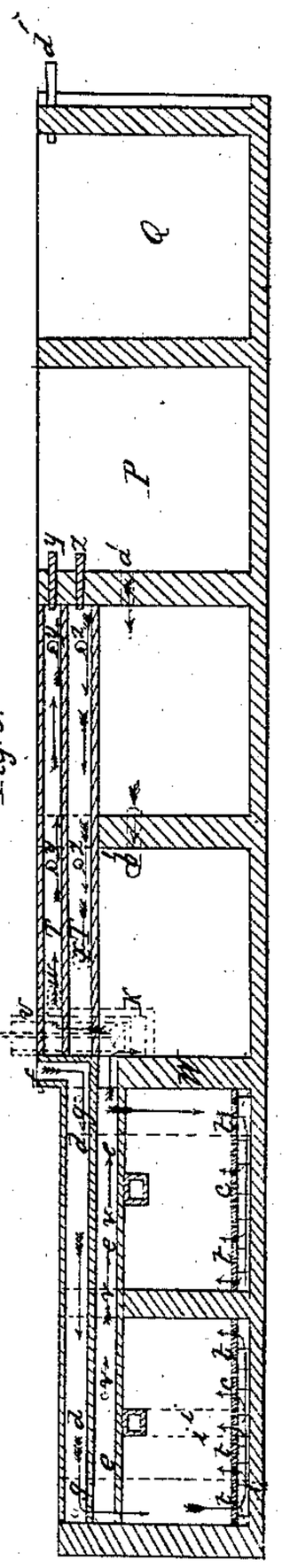


Fig. 2.

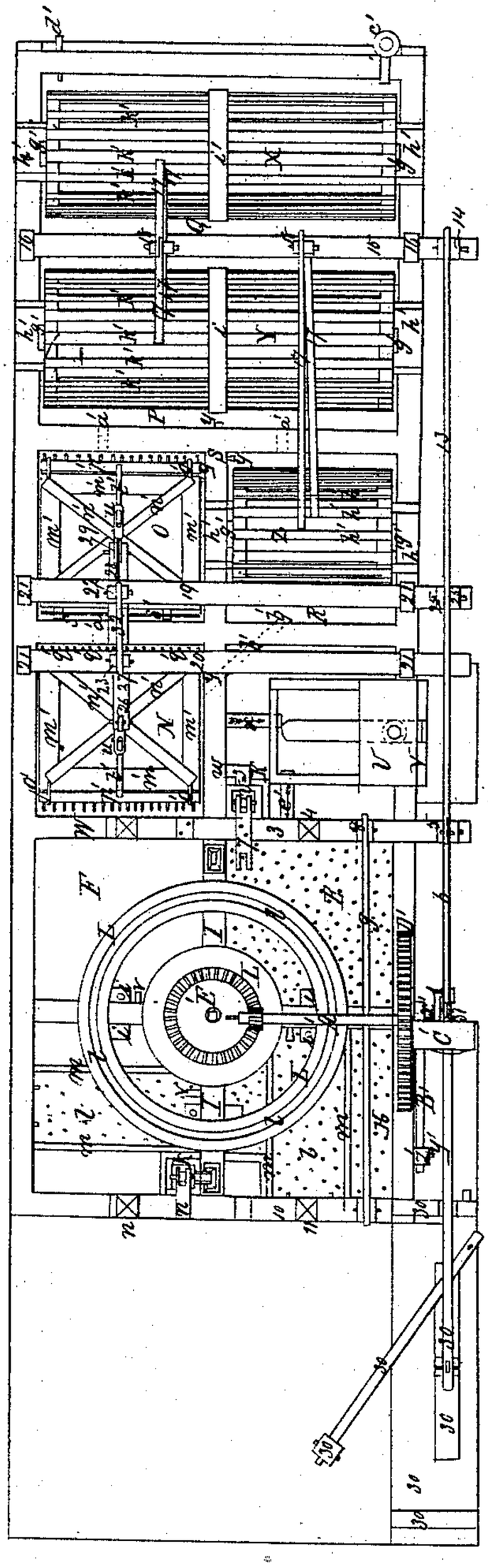


Fig. 5.

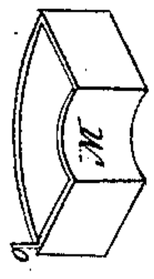
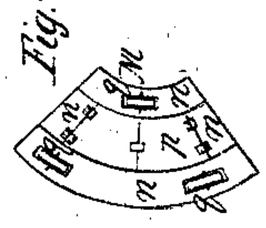


Fig. 4.



UNITED STATES PATENT OFFICE.

WM. BROWN, OF MANCHESTER, MARYLAND.

TANNING.

Specification of Letters Patent No. 3,688, dated August 1, 1844.

To all whom it may concern:

Be it known that I, WILLIAM BROWN, of the town of Manchester, in Carroll county and State of Maryland, have invented a new and useful Improvement in Tan-Yards for Tanning Ox-Hides and other Skins, and that the following is a full and exact description of the construction and operation of the same.

In the annexed drawings Figure 1 is a perspective view of the bark-mill, leaches, vats, &c. Fig. 2 is a bird's-eye view of the same with the floor of the bark mill removed, and Fig. 3 shows a vertical section of the leaches and vats through the center partition.

The same letters are used to denote the same parts in all the drawings.

A is the floor of the bark mill on which the horse path is constructed in the ordinary way. It is supported by a suitable frame S, S, S, raised about four feet above the leaches hereinafter described and is covered with sides and a roof of ordinary construction.

B is the main shaft of the mill extending through the floor and is stepped into a block placed and secured on the top of the partitions of the leaches hereinafter described. It has a slip joint of ordinary construction immediately under the floor A, for the purpose of detaching the lower part when necessary to make repairs.

C, is the beam or lever to which the horse is attached.

The mill and vat being of ordinary construction are not represented in the model or drawings; but D is the hopper into which the ground bark is received from the mill, and from which it is conveyed by a hopper-boy (*a*) connected with the main shaft B through a hole (*b*) in the floor, and falling into a movable chute (*r*) is conducted to the leach-car hereinafted described.

I construct under the mill four or more leaches E, F, G, H, of single plank and calk them. They have movable false bottoms C, C, Fig. 3, which are perforated with holes *t*, *t* and rest on short sills or blocks two or three inches high placed on the bottom of the leach, so as to permit the water or liquors to pass freely under every part of the leach and to rise through the bark. In the top of the middle partition I two horizontal trunks *d*, *d* and *e*, *e*, Fig. 3, are made between the planking, the upper one of which *d*, *d*, conveys the weak liquors from the vats to the bottom of the leaches and the lower one *e*, *e*, supplies the pump stock or cistern at K, with new liquors from the leaches. Leach-eyes open at both ends are placed in one corner of each leach at the extremities of the middle partition I, these extend from the top to the bottom of the leaches as shown by the dotted lines in Fig. 3, and communicate with the upper trunk *d*, *d*, by means of a hole and spiggot *g*, the lower end is notched or perforated with holes so as to discharge at the bottom of the leach; these eyes are constructed of a square form with two planks nailed to the sides of the leach and large enough to admit the pump *k* for drawing off the old liquor preparatory to casting the leach, for which purpose a small funnel is placed on each end of the trunks *d*, *d*, into one of which the pump discharges when the old liquor is to be conveyed into one of the opposite leaches, otherwise it discharges into the eye of the adjoining leach. Square stocks are likewise placed against the middle of the partitions one in each leach as shown by the dotted lines *i i* the upper end of which has a rectangular elbow which passes through a mortise in the partition made a few inches below the trunk *e*, *e*, and projects a short distance into the adjoining leach. The end of the elbow is closed and a spiggot is inserted in the upper side thereof for the purpose of drawing the liquor from above the strainer, *l*, which is made of boards with side pieces *m*, *m*, rising to the level of the top of the leach the bottom and sides being all perforated as seen in the drawing; it extends entirely across the leach and is supported at one end by the projection of the rectangular elbow of the stock *i*, *i*, and at the other by a cleat secured to the side of the leach, they are likewise confined down by wooden pins inserted into the side planking.

On the top of the leaches I construct a circular rail road L L, the outer rail having a groove *l*, and the inner one being a plain surface.

M, (Figs. 4 and 5) is a car of a circular form so as to adapt it to the road, for carrying the ground bark to the different leaches. It is constructed with strong sills *n*, *n*, *n*, *n*, (Fig. 4 which is a view of the under side)

and has a drop door p in the bottom with a latch of ordinary construction for discharging it.

q, q, q, are the pulleys or wheels let into the sills n, n, n, the two outer ones of which run in the groove l, of the rail road and guide the car on the road; an arm (o) Fig. 1, is fixed to the upper edge of the car, which is movable on a pin which means it may be thrown in or out of gear at pleasure with the revolving arm w of the main shaft which carries the car around to any one of the leaches desired.

N, O, P, R, represent the tan vats the tops of which rise 10 or 12 inches above the tops of the leaches. They are constructed of plank in the ordinary way; at the top of the middle division S, two trunks T, T, Fig. 3, similar to those described in the leaches are made between the planking, the upper one communicating through an opening w with the supply pump v, into which it discharges the liquors raised by it from the leaches as shown by the dotted lines, the lower one communicates through a tube x with the heater (Figs. 2 and 3).

y, y, y, are holes and spiggots through which the vats are supplied with strong liquors from the upper trunk and z, z, are similar openings by which the weak liquors are drawn from the tops of the vats. Immediately under the trunks holes a', a', are made through the sides of the vats forming a communication between them, and a communication between the vats N, R, by a tube (b') passed across the outer angle of these vats and which completes the circuit.

Q represents a vat in which the hides are washed after lining, it is supplied with water through the fountain stock c' and runs off at the waste spiggot d'. This vat or one of similar construction I also use for baiting the hides.

The boiler U of the heater I construct of planks, except the bottom which I make of sheet copper, it is placed on a brick fire chamber or furnace V, of ordinary construction, the smoke funnel of which after passing up through the bottom of the boiler near the back end thereof is carried forward by a rectangular elbow along the bottom to the front end of the boiler, where it receives an upright smoke funnel or pipe descending through the top of the boiler, and is closed by a cap which is removed for cleaning out the soot when necessary; those parts of the smoke funnel which are within the boiler must be made of copper so as not to effect the liquors; the remaining part may be made of sheet iron.

X, is the tube through which the waste liquor from the vats enter the boiler and e' represents the tube through which the heated liquor is conveyed from the boiler to a descending channel f', made in the upper part of the partition W, which communicates with the upper trunk d, d, of the leaches.

In the washing or bating vat Q, the large handles for heavy stock P, and the small handle R, for light stock, I place reels X, Y, Z, which extend through the whole length of the vats, the ends are constructed of two double plank heads with gudgeons, which have their bearings in the two upright bars g' g' the lower ends of which rest on pins fixed in the partitions of the vats or on the bottom and the upper ends slide in notched blocks h' h' secured to the tops of the partitions of the vats so that the reels may be readily taken out. The sides are composed of wooden bars or common sawed lathes used for roofing (which I use for the purpose and find to answer) k', k', k', &c. which are let into the heads about three inches apart and nailed to them, in order to strengthen them; one or more tough wooden hoops i' i' are drawn on the outsides, the bars are likewise armed with pins made of tough wood which project into the reels and take hold on the hides when in motion, one or more of the bars is fastened in by pins and staples or any other convenient mode so as to be removed for the purpose of putting in or taking out the hides.

For the tan vats N, O, I construct strong square wooden frames m' m' m' m' with tough wooden bows n' n' attached diagonally to them by which they are suspended, to one edge of each frame; a wooden roller p' is attached by means of two copper bands o', o', these rollers have a row of strong copper or tinned hooks bent upward and spaced about $1\frac{1}{2}$ inches apart on their outsides for suspending the hides at one end, while the other is suspended to a row of corresponding hooks in the opposite edge of the frame as shown at q' q' in the vat N, or by means of short wooden rods, passed through holes in the hides, and having their bearings in square notches cut in the upper sides of short wooden arms mortised in the outer edge of the frame as shown at s', s', s', in vat O.

The rollers p' p' have levers or arms t', t', let into their upper sides the ends of which are connected by straps and buckles u, u, to the center of the bows which can be lengthened or shortened so as to accommodate the hooks to the shrinking of the hides, and when cast off suffers the roller to revolve in its bearings upon which the hides fall off, thus saving much time and labor consumed in suspending and casting off the hides by the means heretofore used. The space occupied by the frames and their rollers &c. is about 12 inches less than the length of the vats so as to leave a space of some six inches at the ends.

For propelling the reels, pumps, &c., I place a large horizontal cogwheel E′ on the main shaft B, under the mill floor A, and a line shaft A′ with a spur wheel on each extremity. This shaft, has one of its bearings in the end of an arm *w* supported by framing from the under sides of the floor timbers, which works on a center pin, so that the shaft may be thrown out or into gear with the cog-wheel E the other extremity of the shaft bears in the end *x′*, of a short strong lever B′ which passes through a mortise in the large side post C′ of the frame of the mill, and is movable on the pin *y′* in an arm *z′* framed into the under side of the floor A, by which means the spur wheel on outer end of the shaft is thrown out or into gear with the large vertical cog-wheel D′ immediately under it. The wheel D′ likewise has its bearings in the post C′. The shaft A′ has a strong single crank (1) at the outer end and a double crank 2, is formed on the shaft of the cog-wheel D′ both of which cranks revolve in a suitable slot or mortise made in through the side post C′ and impart the requisite motions to the several pump-shafts and other shafts hereinafter described.

The pump-shaft, 3, which has its bearings at 4, 4, in the framing, has an upright arm, 5, at the end, to the upper part of which is attached a pitman, 6, from the crank, 1, of the line shaft by which it is rocked; transverse arms one of which is shown at (7) are let into the top and secured by screws to the extremities of which arms are attached by pins the rods of the pumps for casting the leaches, and the supply pump V. In the top of this shaft a short arm, 8, is mortised to the end of which the bar, 9, is attached by a loose pin on which it works, the other end of the bar is attached in like manner to a similar arm on the upper side of the pump shaft, 10, having its bearing at 11, 11, by the transverse arms of which shaft the leach pump *k*, is worked. A long bar, 13, is likewise attached by a pin on which it works to the top of the arm 5, and extends to the end of the upright arm 14 of the rock shaft 15, to which it is fastened by a loose pin and gives motion to the shaft. This shaft has its bearings in uprights 16, 16, mortised into the top of the vats and by means of the alternating pawls 17, 17, 17, 17, 17, 17 attached above and below the shaft to the arms, 18, 18, mortised through the shaft which act on the bars of the reels put them in revolution.

The rock shafts 19, 20, which have their bearings in the uprights 21, 21, 21, 21, from the top of the vats, and cross the vats about 12 inches from the center are connected with each other by their upright arms 22, 23, and cross bar 32 attached to them by loose pins. They are likewise connected with the double crank 2, of the cog-wheel D′ by the pitman 24, which is fastened by a loose pin to the end of the upright arm 25, mortised into the end of shaft 19, by which means both shafts are put in motion, and cause the frames *m′ m′ n′ n′* in the tan vats and the hides appended to them to move up and down through a space of 6 or 8 inches with a slow motion always however emersed in the liquor. One of the frames *m′ n′* is suspended at the lower end of a short bar 26, having several holes so that it may be shortened or lengthened which bar connects by a loose pin with the end (which is over the center of the vat) of a strong lateral arm 27 mortised or let into the shaft 20, and the other is suspended by a rope 28, attached to the upper extremity of the arm 22, of shaft 19, and works over a pulley in the end of a short arm 29 secured to the top of the vat, and extending to the center, the object of using two shafts 19 and 20, instead of one is to shorten the arms 27 and 29, and thus diminish the leverage on the shafts.

30, 30, 30, 30 represents the roller stock, table, treadle, and framing thereto, which are all of ordinary construction and are connected with the crank, 1, by a pitman 31 which it attached to the roller stock by a loose pin and gives it motion.

In filling the leaches the top strainer *l*, *m*, *m*, is first removed the bark is then conveyed in the railroad car M, over the leach, and deposited therein by opening the drop door in the bottom of the car, after a sufficient quantity of bark is put in the top strainer *l*, *m*, is replaced and the communications with the adjoining leaches through the stocks *i*, *i*, are stopped, the water is then carried through a fountain stock or pumped into the eye of the leach through which it descends under the false bottom *c*, and ascends through the apertures *t*, *t*, into the bark, after the leach is completed and ready for use the spigot *v* is drawn out which admits the liquor into the trunk *e*, *e*, through which it is conveyed to the cistern K of the pump V, and is thence pumped up into the upper trunk T, from which the vat containing the most forward pack in the circuit is supplied by opening its spigot *y*, the spigot *z* of the vat containing the new or green pack is also (all the remaining spigots *y*, *z* being closed) and the weak liquor is drawn therefrom into the lower trunk T which conducts it through the tube, *a′*, to the boiler U where it is heated and passes through the tube *e′* to the channel *f′*, thence into the trunk, *d d*, and thence through the spigot *g* and the eye of the leach to the bottom. The liquors in any one vat may be strengthened at pleasure by opening its spigot, *y*. By these means and the communications *a′ a′ b′* &c. between the vats the liquors are slowly and regularly circulated

through the whole tannery including the leaches (as indicated by the arrow points) from the strong vats and leaches toward the weak ones, but where the tannery is very extensive two or more circuits may be formed in the vats.

In proper time a second leach (the one into which the first leach discharges through the stock *i*) is filled. For this purpose after the bark is put into the leach the communication with the first leach (which I shall call No. 1) is opened and the water is then pumped into the eye of No. 1, through which it descends to the bottom of the leach and rising, carries the liquor upward before it through the top strainer and through the stock *i* to the bottom of the new leach, which operation is continued until the leach is filled. In like manner the remaining leaches are all filled and form a circuit in which No. 1 will be the weakest and No. 4 (supposing that there is 4) the strongest. The communication between the strongest and weakest leach is always kept closed and the vats supplied from the strongest leach by opening its spiggot *v*, while the weak liquors returned from the vats through the heater are turned into the weakest leach, or that which has just been pumped, taking the precaution first to open its spiggot *v* between it and the weak leach and to close the spiggot between it and the strongest leach into which it would otherwise discharge and mix the liquors, by this process a constant and regular circulation is kept up in the leaches.

When it is necessary to cast a spent leach the open communication (which is that at which it discharges) is closed. The leach is then pumped out by the pump *k*, into the eye of the next weakest leach, and if necessary a larger portion than usual of the strong liquor may be thrown into the vats to make room in the leaches, the old bark is then cleaned out and the sediment removed from under the false bottom, the new bark is put in, and the communication with the adjoining weakest leach is restored by opening the spigot by which means the new leach is partly filled from the other leaches the liquor of the weakest passing in first, the excess of liquors in the vats are likewise returned by drawing the spigot *g* of the new leach, and the filling is then completed by adding water, thus saving nearly all the labor of pumping the liquor from a junk or reservoir below the level of the leaches commonly used for drawing off.

By prolonging the shafts 15, 19 and 20 any number of vats handlers &c. may be added and worked on the same principles. For lining the hides I construct frames like those used in the tan vats above described which are suspended and worked in the lime vats in the same way.

By my plan a very large amount of the labor in the pumping and handling is effected, the liquors only requiring to be elevated by the pump through say 10 or 12 inches, and the friction merely of the journals of the reels and the rock shafts being the only resistance to be overcome by the motive power. In a tannery which I have just put into operation on my plan containing 28 tan vats, 2 lines, one bait and two pumps I have without exerting half my force applied to the horse beam put the whole in motion.

My plan of circulating the liquors, and of returning the heated liquor from the vats to the bottom instead of the top of the leaches expends the bark more perfectly and applies the liquors with more regularity and advantage than any of the modes in ordinary use.

Now what I claim as new and as my invention in the above for which I ask Letters Patent of the United States is—

1. The constructing the leaches and vats as herein described so that the liquors pass through the top strainer of one leach into the bottom of the next throughout the circuit or direct to the pump, and are returned from the vats after being heated to the bottom of the leaches, and in combination therewith the arrangement of the trunks, stocks, spigots by which I effect these objects.

2. I likewise claim the revolving rollers of the tanning and lining frames for accommodating the hooks to the shrinking of the hides, and the manner in which I arrange the two shafts connected and operating as herein described for working the tanning and liming frames to which the hides are suspended and in combination the reels and shafts for handling, baiting, and washing likewise the manner in which I arrange the railroad and car with respect to the mill and the leaches by which the bark is conveyed direct to the leaches and deposited therein.

Given under my hand this 15th day of April A. D. 1844.

WILLIAM BROWN.

Witnesses:
FRANCIS L. DARNELL,
CLARK T. COOTE.