

No. 694,678.

Patented Mar. 4, 1902.

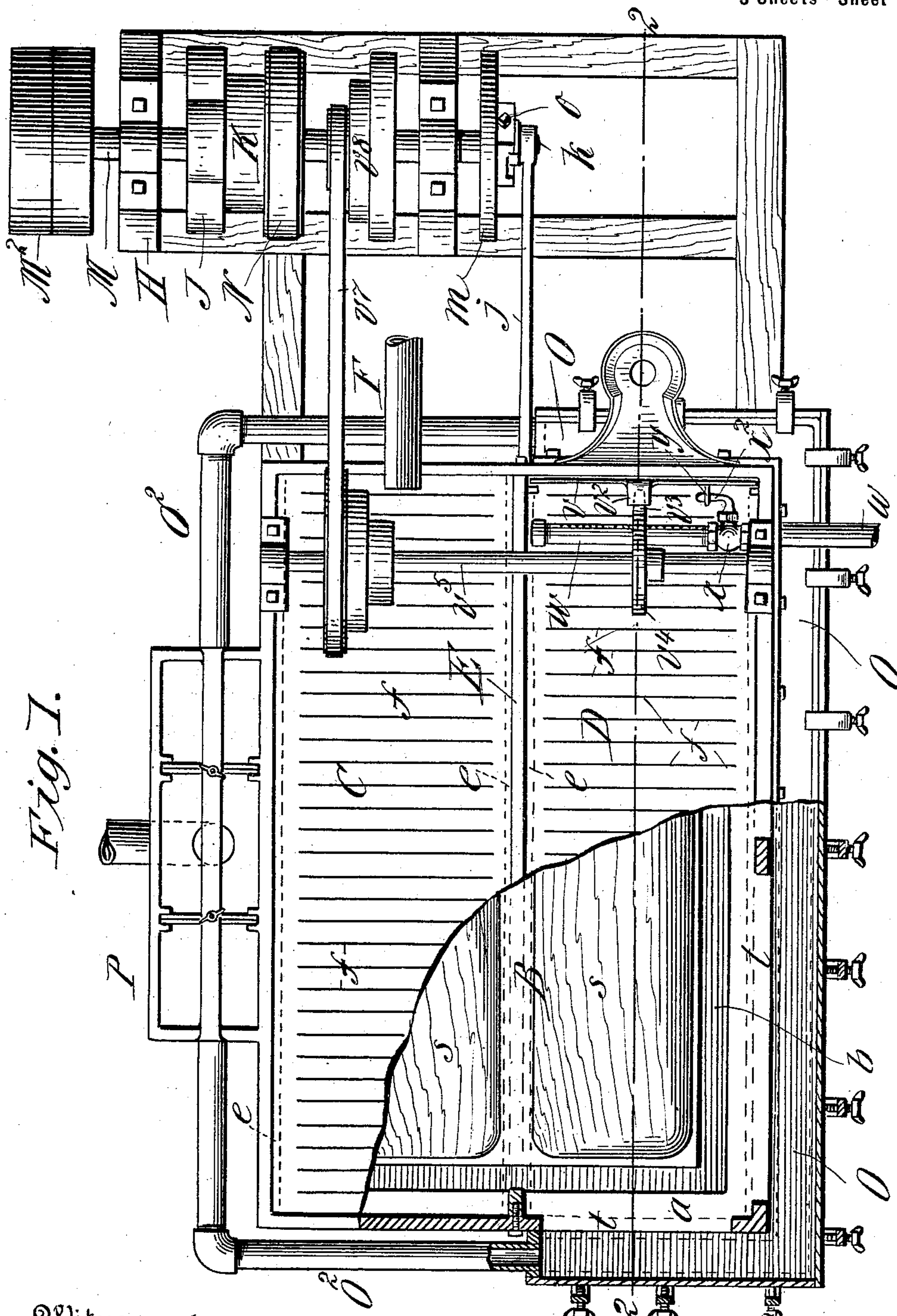
D. SHARPE.

SCREEN APPARATUS FOR PAPER PULP.

(Application filed Sept. 24, 1901.)

(No Model.)

3 Sheets—Sheet 1.



Witnesses
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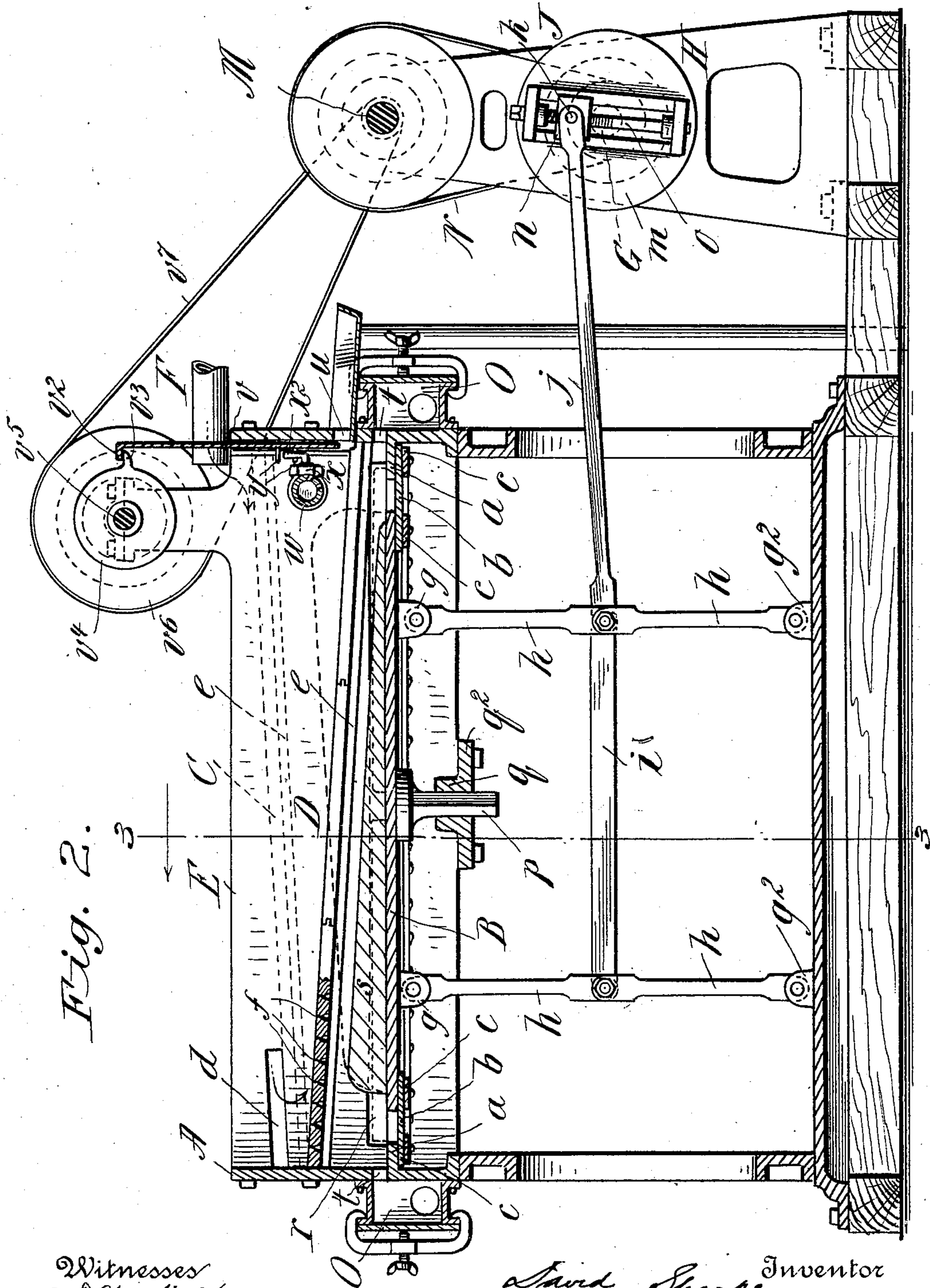


Fig. 2.

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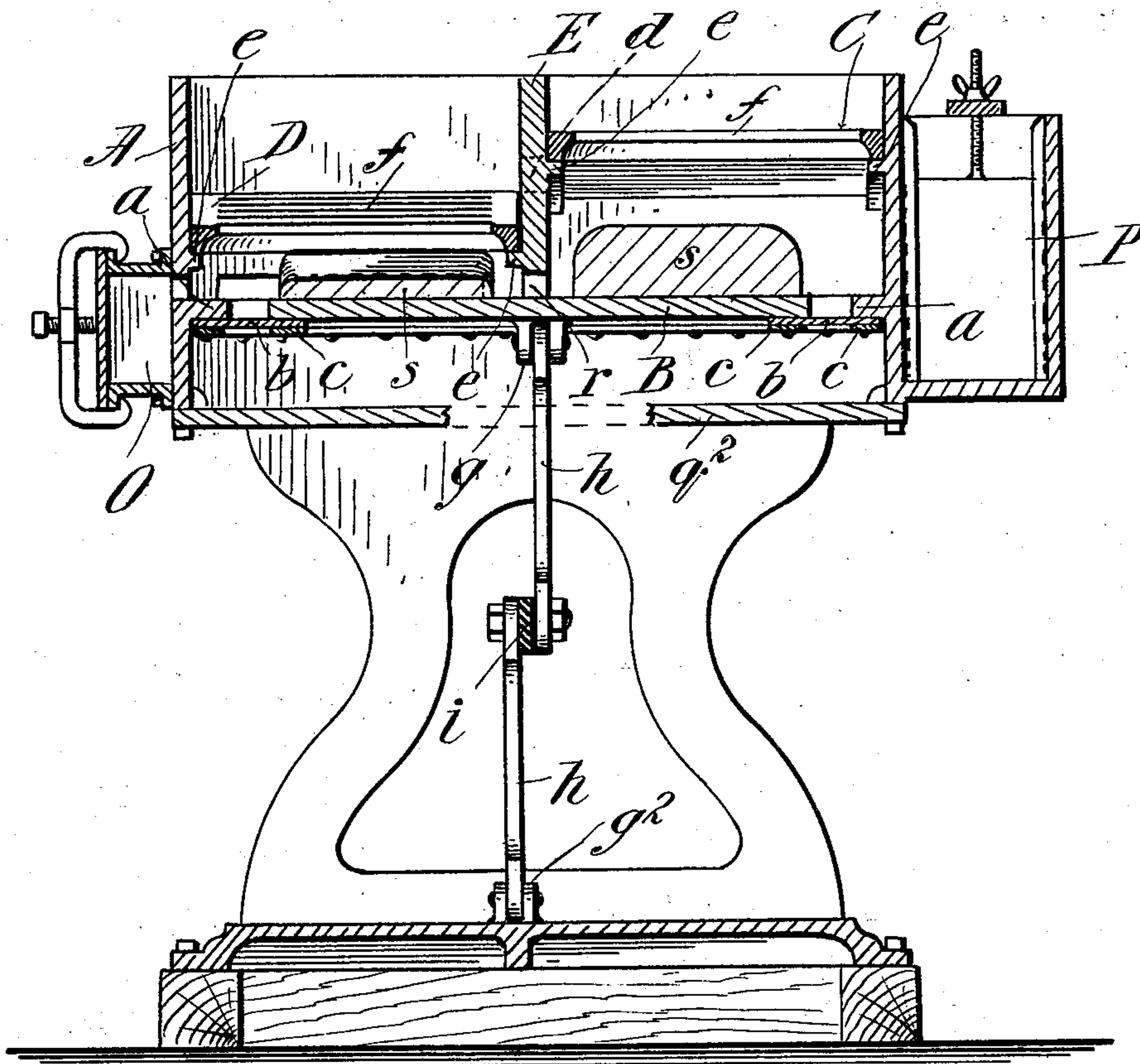
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3 Sheets—Sheet 3.

Fig. 3.



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UNITED STATES PATENT OFFICE.

DAVID SHARPE, OF SOUTH HADLEY FALLS, MASSACHUSETTS.

SCREEN APPARATUS FOR PAPER-PULP.

SPECIFICATION forming part of Letters Patent No. 694,678, dated March 4, 1902.

Application filed September 24, 1901. Serial No. 78,340. (No model.)

To all whom it may concern:

Be it known that I, DAVID SHARPE, a subject of the King of Great Britain, and a resident of South Hadley Falls; in the county of Hampden and State of Massachusetts, have invented certain new and useful Improvements in Screen Apparatus for Paper-Pulp, of which the following is a full, clear, and exact description.

This invention relates to improvements in strainer-screens for paper-pulp, the object being to provide an improved apparatus for separating from the pulp which has been brought into the straining apparatus from the engine dirt and other foreign matter or substances which may be found in the pulp and which should be extracted before the pulp is supplied to the paper-machine.

The improvements above generally referred to more particularly consist in improved means for operating the diaphragm which imparts a suction in the box or vat beneath the strainer bed or screen, for changing the length of the working play or stroke of the diaphragm, and for varying the speed of the reciprocation of the diaphragm.

The improvements further consist in the construction and arrangement of the strainer bed or screen in the apparatus, whereby the capacity and efficiency is increased, in provisions for automatically and periodically clearing the screen of the residue or foreign matter withheld from the strained pulp, and in the arrangement of the trough or conduit for taking the pulp off from the diaphragm which constitutes the movable bottom of the vat or box.

To these ends the invention consists in the apparatus as hereinafter described and in constructions and arrangements of certain of the parts thereof, all as hereinafter pointed out, and set forth in the claims.

The improved strainer-screen for paper-pulp is illustrated in the accompanying drawings, in which—

Figure 1 is a plan view, a portion of the strainer bed or screen being broken away, showing the portion of the diaphragm which constitutes the movable bottom of the vat, and portions of the vat and trough or service-conduit being shown in horizontal section. Fig. 2 is a vertical longitudinal sectional

view on line 2 2, Fig. 1. Fig. 3 is a vertical cross-sectional view on line 3 3, Fig. 2.

Similar characters of reference indicate corresponding features in all of the views.

In the drawings, A represents the box or vat of a suitable size and form, preferably rectangular, open at the top and having the bottom thereof constituted principally by the diaphragm B, which works freely within the surrounding internal horizontal flange or base-ledge *a*. The diaphragm B is joined to the said base-ledge *a* by the band or gasket *b*, which may be of rubber, rubber-cloth, leather, or any other suitable flexible material, said gasket being firmly and closely united to the ledge *a* and marginal portions of the diaphragm by the clamping-bands *c*.

The strainer bed or screen is shown as comprised in two sections occupying opposite halves substantially of the area of the vat having their locations above and suitably separated from the diaphragm. The screen C at the one side is separated from the screen D at the other side by the longitudinal partition or mid-bridge E. The screen C is inclined downwardly from the right-hand toward the left-hand end of the apparatus, as viewed in Figs. 1 and 2, and the screen D is inclined from its left-hand end downwardly rightward, the lower end of the first screen reaching a level adjacent that of the higher end of the second screen, and communication at the left-hand end of the apparatus from the low end of the first screen to the high end of the second screen is had through the aperture *d* in the mid-bridge. The longitudinal vertical side walls of the vat and the mid-bridge are provided with ledges *e*, which are inclined corresponding to the desired inclinations of the strainer-screens C and D and upon which the latter are supported. The strainer-screens have the slits *f*, which are downwardly widened, as usual in this class of apparatus.

F represents the pulp-supply conduit for bringing the pulp from the engine onto the screen C.

The diaphragm has the two sets of depending ear-lugs *g*, below which at the base for the machine are the upstanding ear-lugs *g*² pivotally connected to both sets of which ear-lugs are the toggle-bars *h h*, both of the sets of toggles being united by the link *i*, and this

double-link united toggle mechanism has the engagement therewith of the connecting-rod j , one end of which is secured to the crank-stud k provided in the disk or face-plate m .

5 The said disk or face-plate is slotted, receiving within the slot a block n , which carries stud k , which is screw-engaged by the screw-shaft o , mounted to turn without endwise motion in bearings therefor in the face-plate, all so that the pivotal point k may be nearer or farther from the center of the face-plate to vary the extent of the toggle action, and thereby the length of the working play for the diaphragm, the downward motion of which

10 brings the pulp by suction down through the strainer-beds C and D. The face-plate m , of which the adjustable crank-pin k is an adjunct, is mounted on the shaft G in bearings in the supporting-framing H, which is located adjacent the end of the vat. Said shaft

20 G has thereon the cone-pulley J, above which is another cone-pulley K, the belt N running around both said cone-pulleys and driving the one J from the one K, the latter being on the driving-shaft M, provided with the driving-pulley M². While step speed-cones K and J are shown in the drawings, axially parallel and reversely-tapered speed-changing cones may be substituted therefor as well-

30 known equivalents.

In addition to the capability of changing the extent of working play of the suction-diaphragm, as insured by the adjustability of the crank-pin, the shifting of the belt N in the line of the axes of the cone-pulleys J and K insures, as may be desired, a variation in the frequency of reciprocations of the diaphragm. The diaphragm has the depending polygonal stud p , playing through the correspondingly-apertured hub q for guidance and the steadying of the diaphragm in its motions, the said apertured hub q being supported on the cross-bar q^2 , which is secured to the base of the vat. The chamber beneath the

45 strainer-bed, of which the diaphragm substantially constitutes the bottom, has the top wall thereof constituted by the inclined screens C and D, and in order to equalize the vacuum, so that the suction will be uniform under all portions of the screens, the diaphragm B is built up with the inclined blocks or plates s .

The mid-bridge E has a space r between its lower edge and the diaphragm top, so that

55 the pulp which has been strained through the screen C may pass or flow laterally under the screen D, from which portion of the vat it passes by way of the apertures $t t$ in the side of the vat into the trough O, which is provided at three sides of the vat, and is continued in the conduits O² into the head-box P, from which it is delivered in the usual manner onto the paper-machine. The dirt and foreign matter retained at the top of the

65 screens finally gravitates to the lower end of the second screen D, at the right-hand end of and near one side of the vat, whereat there

is an outlet-opening u , normally closed by the gate v . This gate is periodically raised, (for instance, once every few minutes,) and as

70 means to this end the gate is engaged at the offset lug v^2 , at the upper portion thereof, by the tappet v^3 on the disk v^4 , which is mounted for a slow rotation on the shaft v^5 , the large end of the cone v^6 thereof carrying the belt

75 v^7 , which is driven by its frictional engagement on the small end of the cone v^8 on the driving-shaft M. Concurrently with the raising of the gate a water-flush is given near the aforesaid opening u within the vat in a direction to wash out the dirt, &c., which has gravitated to this place, and this is automatically insured by providing the flushing or sprinkler pipe w , which is located just within the gate, and having the lever extension x^2 of the stem

80 of said cock extended for engagement between upper and lower studs y , which are extended inwardly from the gate, all so that the movements of the gate insure in cooperation therewith the opening and closing of

90 the cock, permitting and shutting off the water-flushes in the sprinkler-pipe.

While I have shown the vat divided by the mid-bridge E and two screens oppositely inclined at either side of the mid-bridge, with a

95 port or aperture leading from the space above the one screen near its low end to the high end of the second screen, I do not necessarily limit myself to this arrangement, although I regard it as highly preferable, for I may construct the strainer apparatus within the scope of this invention and the terms of my claims without following this specified arrangement.

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

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1. In a screen apparatus for paper-pulp, the screen-box having a base-forming diaphragm, toggles below and engaged with the diaphragm, and linked together, a driving-shaft

110 and a counter-shaft having cone-pulleys, a driving-belt around said pulleys, an apertured face-plate on the counter-shaft, an adjustable block in the apertured face-plate, with an adjusting-screw therefor, a crank-pin carried by

115 said block, and a connecting-rod secured to the crank-pin, and to the linked toggles.

2. In a screen apparatus, the box having an inclined screen therein, and its base constituted by a horizontal reciprocatory diaphragm, the top of which has a section s , the upper surface of which is inclined substantially corresponding to the inclination of the screen, for equalizing the suction action.

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3. In a screen apparatus for paper-pulp, the box having the diaphragm-base, and a screen thereabove which is inclined, an outlet for the pulp leading from the box below the screen and an outlet for the extraneous matter leading from the box adjacent the top of the lower

125 portion of the screen, a gate for said latter outlet, and means for automatically periodically opening the same, and means for clearing the extraneous matter on the lower por-

130

tion of the screen adjacent the gate-provided opening through the latter.

4. In a screen apparatus for paper-pulp, the box having the diaphragm-base, and a screen thereabove which is inclined, an outlet for the pulp leading from the box below the screen and an outlet for the extraneous matter leading from the box adjacent the top of the lower portion of the screen, a gate for said latter outlet having a projection v^2 , and a rotating part having a tappet, periodically engaging the projection.

5. In a screen apparatus for paper-pulp, the box having the diaphragm-base, and a screen thereabove which is inclined, an outlet for the pulp leading from the box below the screen and an outlet for the extraneous matter leading from the box adjacent the top of the lower portion of the screen, a gate for said latter outlet, and means for automatically periodically opening the same, a sprinkler-pipe above the screen adjacent the gate-provided opening having a shut-off cock, and means operating concurrently with the opening and closing of the gate for opening and closing the said cock.

6. In a screen apparatus for paper-pulp, the box having the diaphragm-base, and a screen thereabove which is inclined, an outlet for the pulp leading from the box below the screen and an outlet for the extraneous matter leading from the box adjacent the top of the lower portion of the screen, a gate for said latter outlet, and means for automatically periodically opening the same, a sprinkler-pipe above the screen adjacent the gate-provided opening having a shut-off cock, having on its stem, a lever-handle, and projections extended from the gate and engaging the lever-handle of the cock, substantially as described.

7. In a screen apparatus for paper-pulp, the box having its base constituted by a reciprocatory diaphragm, and having therewithin the longitudinal partition E, a screen above the diaphragm at one side of said partition inclining from one end downwardly toward the other, another screen at the other side of the partition having its high end inclining from about the level of the low end of the first screen downwardly in the opposite direction, the said partition having the aperture d , one or more outlet-openings for the pulp leading from the box below the screen, and an outlet-opening leading from the box adjacent the lower end of the second screen, and means for closing the latter opening.

8. In a screen apparatus for paper-pulp, the box having its base constituted by a reciprocatory diaphragm, and having therewithin

the longitudinal partition E, a screen above the diaphragm at one side of said partition inclining from one end downwardly toward the other, another screen at the other side of the partition having its high end inclining from about the level of the low end of the first screen downwardly in the opposite direction, the said partition having the aperture d , one or more outlet-openings for the pulp leading from the lower portion of the box at the side thereof of the second inclined screen, the trough O, inclosing three sides of the box, the head-box and the conduits connecting the trough therewith.

9. In a screen apparatus for paper-pulp, the box having its base constituted by a reciprocatory diaphragm and having therewithin the longitudinal partition E, a screen C above the diaphragm at one side of said partition, inclining endwise downwardly, another screen at the opposite side of the partition inclining in the opposite direction from, and located at a lower level than the first screen, said partition having an aperture at one end portion, above said screens, said diaphragm being constructed with reversely-inclined built-up portions $s s$ at opposite halves thereof, substantially as and for the purposes set forth.

10. In a screen apparatus, the combination with the box having an inclined screen and the diaphragm-base, and provided with a pulp discharging aperture below the screen, and a waste-clearing aperture adjacent the top surface of the screen having a gate, of the toggles below and connected to the diaphragm and linked together, the shaft M and counter-shaft G having cone-pulleys and connecting-belt, and said shaft G having crank k , the rod connecting said crank and said linked toggles, and the shaft v^5 driven from said shaft M having the tappet v^3 cooperating with the gate.

11. In a pulp-screening apparatus, the box or vat having on its opposite inner side walls, the ledges e at different heights and oppositely inclining and the intermediate longitudinal partition E having on its opposite sides inclined ledges opposite and parallel with those of the box-wall, the screens C and D on said ledges, the diaphragm constituting the base of the box, and means for operating the diaphragm.

Signed by me at Springfield, Massachusetts, this 21st day of September, 1901.

DAVID SHARPE.

Witnesses:

WM. S. BELLOWES,
M. A. CAMPBELL.