

No. 682,839.

Patented Sept. 17, 1901.

J. H. BAKER, G. F. SHEVLIN & F. H. BAKER.

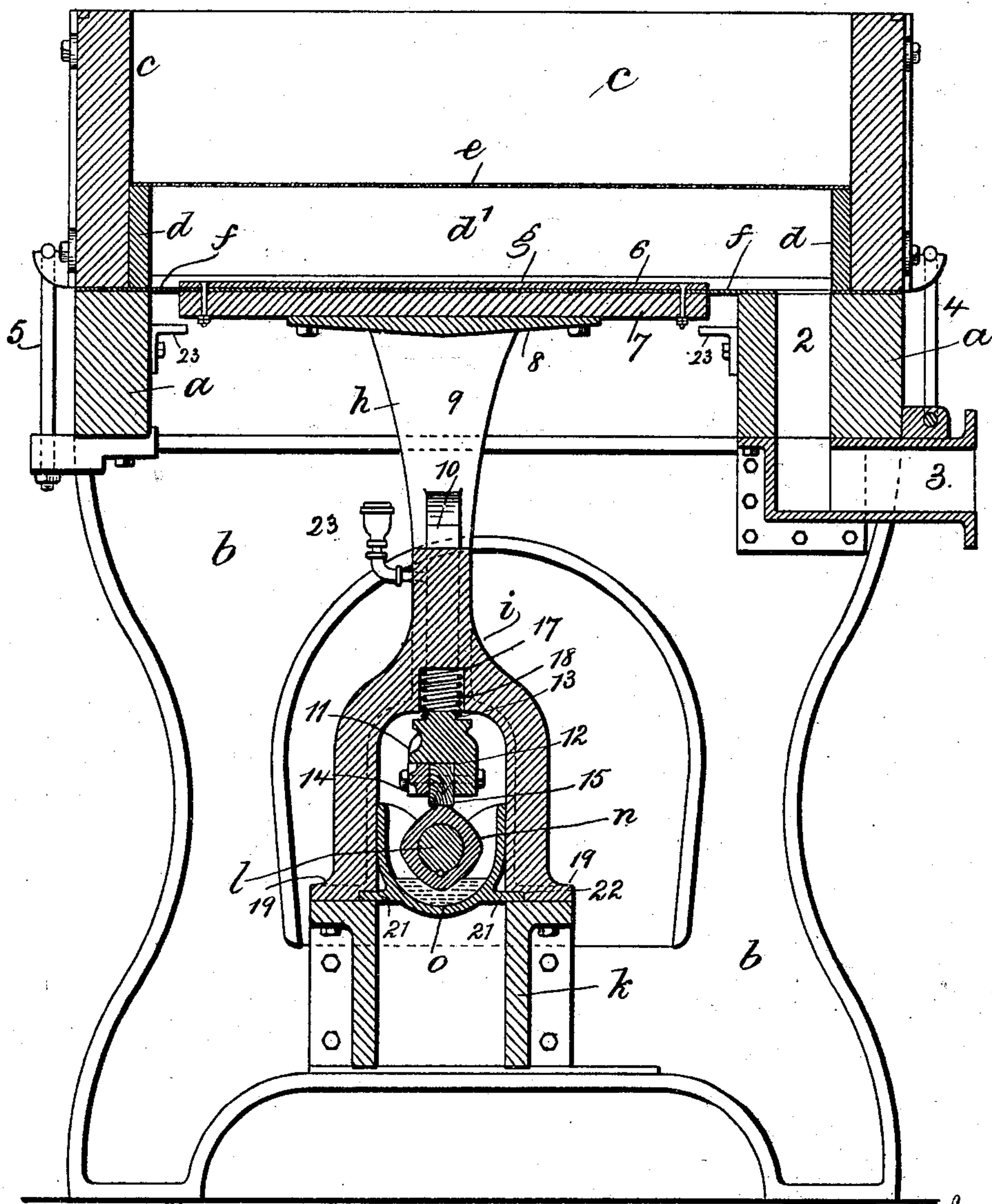
DIAPHRAGM SCREEN.

(Application filed May 6, 1901.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 1.



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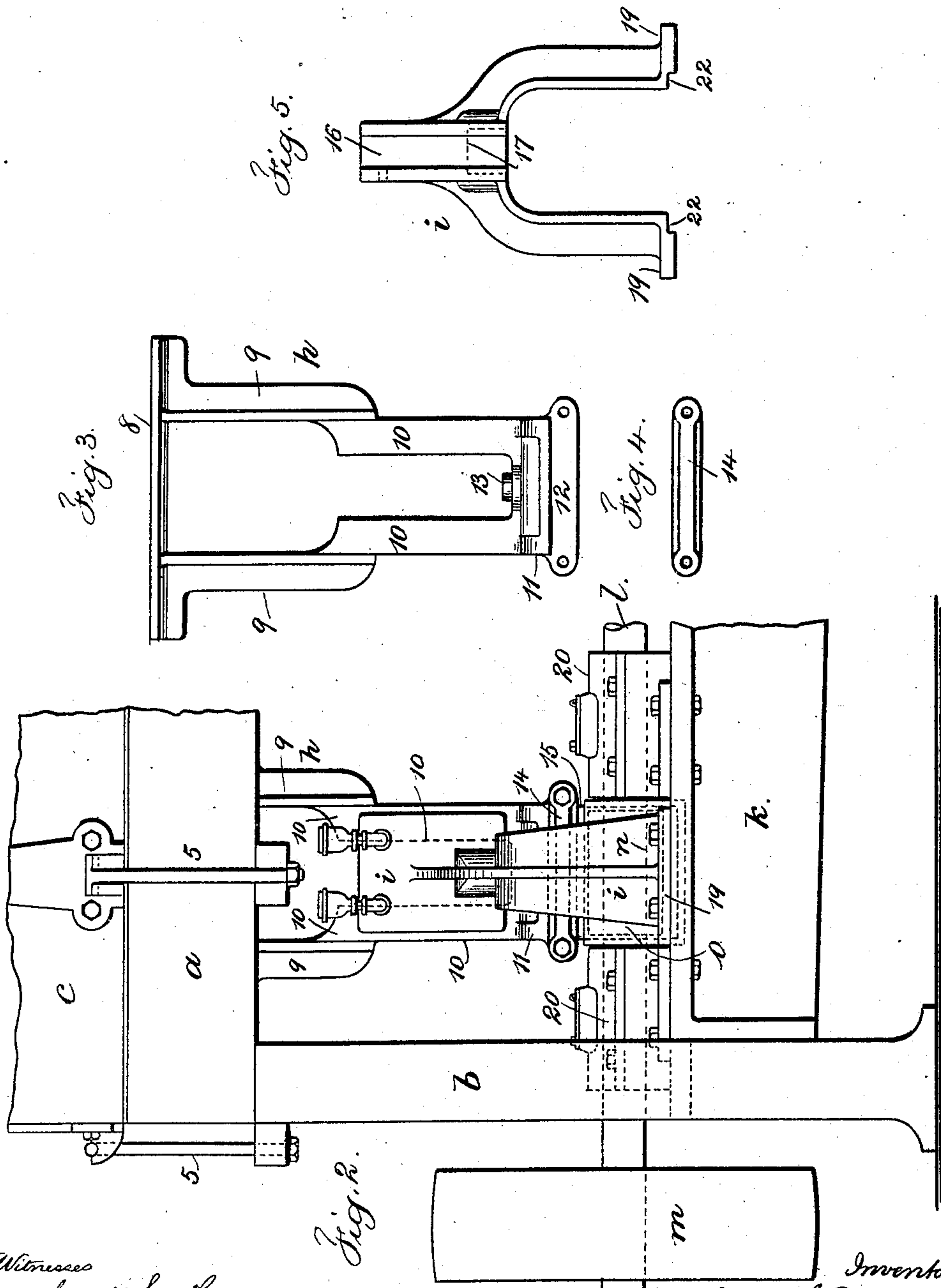
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DIAPHRAGM SCREEN.

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2 Sheets—Sheet 2.



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UNITED STATES PATENT OFFICE.

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DIAPHRAGM-SCREEN.

SPECIFICATION forming part of Letters Patent No. 682,839, dated September 17, 1901.

Application filed May 6, 1901. Serial No. 58,913. (No model.)

To all whom it may concern:

Be it known that we, JAMES H. BAKER, GEORGE F. SHEVLIN, and FREDERICK H. BAKER, citizens of the United States, residing at Saratoga Springs, in the county of Saratoga and State of New York, have invented an Improvement in Diaphragm-Screens, of which the following is a specification.

Our invention relates to an improvement in diaphragm-screen devices employed in the treatment of wood or other pulp for the manufacture of paper-stock. With these machines it is usual in the treatment of wood-pulp for the manufacture of paper-stock to flow the pulp upon a series of screen-plates, which retain particles of pulp not sufficiently reduced in fineness, allowing only the fine particles to pass through the screen-plates. While this flowing action of the pulp and the screening of the particles is taking place, diaphragms beneath the screen-plates are operated at a high rate of speed to loosen up the material as it passes over the screen-plates. The finer material after passing through the screen-plates is conveyed away for further employment in the paper-making operation. In this class of machines difficulties have heretofore been experienced owing to the vibration and the fact that in the constructions a good many bolts were employed which were liable to come loose, so as to render the operations of the machine ineffective and the machines to require constant attention, thereby lessening their usefulness; and the object of our present invention is to overcome these difficulties in a device employing but few parts and an arrangement believed to be superior to the devices heretofore employed.

In carrying out our invention and in combination with a vat-frame and screen-plates and the main frame, a shaft, and power devices in the machine, and the usual rubber sheet to which the diaphragms are connected, we employ a cast-metal frame of peculiar form, carrying a diaphragm-plate, and which frame is movable vertically in guides formed as a part of a yoke-stand straddling the aforesaid frame and secured to the main frame carrying the power-shaft. Between these devices we employ a spring for returning the parts after being raised by a cam upon the

power-shaft. At the lower end of the cast-metal frame we employ devices for clamping thereto a wooden block which bears upon the cam. The cam is preferably provided with four sides, so as to impart four movements with one revolution of the power-shaft to the vertically-actuated diaphragm, and the cam revolves with the power-shaft in a receptacle holding oil or grease for its lubrication.

In the drawings, Figure 1 represents our improvement by a vertical section and partial elevation at one end of the diaphragm-screen. Fig. 2 is an elevation of part of a screen at one end. Fig. 3 represents an elevation of the aforesaid cast-metal frame carrying the diaphragm-plate. Fig. 4 represents a clamp-plate employed in connection with the cast-metal frame, and Fig. 5 is an elevation of the yoke-stand located at right angles to and straddling said frame.

The main frame *a* is supported upon standards *b* at the respective ends of the diaphragm-screen, and as only one end of such device is illustrated in the drawings there is only one standard shown. These diaphragm-screens may be made of any desired length, employing any number of diaphragms desired in series. An opening or outlet 2 is provided in the length of the frame *a*, from the central portion of which is a discharge 3, and by means of the opening 2 and discharge 3 the finer grade of pulp is conveyed from the machine away to any desired point for further use. The vat-frame *c* is secured to the main frame *a* by hinge connections 4 upon one side and adjustable tie-bars 5 upon the opposite side, there being within the vat-frame *c* an inner frame *d* and cross-bearers *d'*, secured thereto, for supporting the screen-plates *e*, said screen-plates covering the entire opening within the vat-frame *c*. The inner frame *d* and the main frame *a* substantially correspond in internal dimensions, except along one side, where the opening 2 is provided, and between the vat and main frames is an intervening sheet of rubber *f*, which in extreme dimensions agrees with the dimensions of the frames, so that when the vat-frame rests upon the main frame it also rests upon the rubber and forms a tight joint between the parts.

We have illustrated in Fig. 1 a diaphragm *g*, one of a series of any number which may be employed, all being alike. We have shown this diaphragm as composed of two plates 6 and 7, that are bolted together, with the intervening rubber sheet *f*. We have also illustrated a frame *k* connected to and supported by the standard *b*, said frame carrying the main shaft *l* and power-wheel *m*, the shaft being in suitable bearings 20 upon the said frame.

The parts just described form no necessary part of our present invention, being substantially the same as parts of like machines heretofore employed by us.

Our invention has special reference to the following parts: A cast-metal frame *h*, vertically movable, comprises a diaphragm-plate 8 at the upper end, vertical parts 9, and flat guide-surfaces 10, a foot 11 extending across and connecting the guide-surfaces at the lower end of the frame. The lower edge of this connecting-foot is provided with a shouldered recess 12 and the upper part between the guide-surfaces 10 with a spring-rest 13. We employ in connection with this foot 11 a clamp-plate 14, there being openings through the ends of the clamp-plate and through the ends of the foot 11 for bolts, and a wooden block 15 is placed in the recess of the foot, against the flanged edge thereof, in the shouldered recess, and the bolts pass through the parts to hold the wooden block, which is preferably of very hard material, to the lower end of said cast-metal frame. This frame is shown in elevation in Fig. 3, and in Fig. 4 the clamp-plate is shown separately. A yoke-stand *i* (shown in elevation, Fig. 5) is placed at right angles to the frame *h*, extending through or straddling the same, so that the guide-surfaces 10 fit within the grooves 16 of this yoke-stand, and in the under surface of this stand *i* is provided a recess 17 for the spring 18, the lower end of the spring being received around the spring-rest 13 of the frame *h*. This stand *i* is provided with feet 19, which rest upon and are securely bolted to the frame *k*, said stand *i* in its relation to the frame *k* occupying a fixed and unvarying position. The power or main shaft *l*, where the same passes through the yoke-stand, is provided with a cam *n*, preferably made with four sides or cam-surfaces, said cam varying in its extreme dimensions about three-sixteenths of an inch and said variation agreeing with the vertical movement to be imparted to the diaphragms of the screens. The wooden block 15, which occupies a position in the frame *h* axially in line with the shaft, rests upon the surface of this cam, and we provide an oil or grease receptacle *o* beneath the shaft and cam and substantially embracing the shaft, said receptacle being of U form, as shown in cross-section, Fig. 1, and provided with ears 21 on opposite sides, by which the same is supported, resting upon the frame *k* and received within recesses 22 in the feet 19 of the yoke-stand *i*,

so that when said receptacle is in place and the yoke-stand secured to the frame the parts are held in a fixed relation to one another. We also provide oil-cups 23, secured to the upper end of the yoke-stand *i*, for supplying oil to the vertically-movable guide-surfaces 10 and the grooves 16 for lubricating the parts. The diaphragm-plate 8 is bolted to the under side of the plate 7. Thus the parts 6, 7, and 8 are connected together and are movable vertically as the frame *h* is moved by means of the cam *n*. The parts to which a vertical movement is imparted comprise the integral cast-metal frame, the several parts of which have been designated herein as the "diaphragm-plate" 8, the "vertical parts" 9, the "guide-surfaces" 10, the "foot" 11, and "spring-rest" 13, and as these parts are all cast as one the rapid vertical movement imparted thereto can have no detrimental effect. The parts connected to this frame are only the wooden block 15, the clamp-plate 14, and the securing-bolts and the parts above the plate 8—that is, the plates 6 and 7 and the rubber sheet *f*—which are connected in a vertical line. The wooden block 15 is renewable and is quickly removed and replaced with another when worn by the rapid movement of the cam *n* to such an extent that the desired height of movement is no longer imparted to the diaphragms. It will also be noticed that in this construction there are only two places that require lubrication—that is, the guide-surfaces 10 in the groove 16—and that even the parts bolted together because of their construction are not liable to be loosened by the rapid vibration necessarily imparted to the diaphragms. We employ bracket-plates 23 below the diaphragms and secured along opposite inner surfaces of the main frame *a*, the office of which is to hold up and support said diaphragms when it may be necessary to remove or replace any of the vertically-movable parts below the same.

We claim as our invention—

1. In a diaphragm-screen, an integral vertically-movable frame comprising a diaphragm-plate 8, vertical parts 9, guide-surfaces 10 and a foot connecting the lower end of the guide-surfaces and provided with a shouldered recess, substantially as set forth.

2. In a diaphragm-screen, an integral yoke-stand *i* including opposite grooves 16, feet 19 and a recess 17, substantially as set forth.

3. In a diaphragm-screen, a vertically-movable frame of integral parts, a yoke-stand also of integral parts located at right angles to, within and straddling the vertically-movable frame and serving as a guide therefor, substantially as set forth.

4. In a diaphragm-screen, the combination with the main and vat frames, and the intervening rubber sheet, of the plates 6 and 7 at opposite sides of the rubber sheet and bolts for securing the same, an integral vertically-movable metal frame *h* having a plate 8 at

the upper end adapted to be secured to the under side of the plate 7 and which, with the plates 6 and 7 and the intervening rubber sheet constitute the entire diaphragm proper, and a yoke-stand straddling and forming a guide for the vertically-movable integral frame, a spring 18 between said parts, a power-shaft a multisurface cam upon the power-shaft and a hard-wood block, and means for securing the same in the lower end of the vertically-movable frame, said block bearing upon the surface of the cam and being renewable when worn out, substantially as set forth.

5. In a diaphragm-screen, the combination with the main and vat frames, and the intervening rubber sheet, of the plates 6 and 7 at opposite sides of the rubber sheet, and bolts for securing the same, an integral vertically-movable metal frame *h* having a plate 8 at the upper end adapted to be secured to the under side of the plate 7 and which, with the plates 6 and 7 and the intervening rubber sheet constitute the entire diaphragm proper, and a yoke-stand straddling and forming a guide for the vertically-movable integral frame, a spring 18 between said parts, a power-shaft a multisurface cam upon the power-shaft and a hard-wood block and means for securing the same in the lower end of the vertically-movable frame, said block bearing upon the surface of the cam and being renewable when worn out, and a receptacle *o* of U form in cross-section within the yoke-stand extending around below the cam and the power-shaft and having ears in recesses in the feet of the yoke-stand and by which the same is secured in place, substantially as set forth.

6. In a diaphragm-screen, an integral vertically-movable frame comprising a diaphragm-plate 8, vertical parts 9 guide-surfaces 10, a foot connecting the lower end of the guide-surfaces and provided with a shouldered recess, a wooden block 15 and clamp-plate 14

adapted to fit the shouldered recess and bolts for clamping the said plate and wooden block to the lower end of the vertically-movable frame, substantially as set forth.

7. In a diaphragm-screen, the combination with the diaphragm-plates and the rubber sheet, of an integral vertically-movable frame connected to said plates, a device at opposite edges thereof for guiding the same in its vertical movements, a power-shaft and a cam for raising the same, and a device beneath and surrounding the cam and embracing the power-shaft and fixed in its relation to the other parts of the machine for holding oil or grease for lubricating the cam, a device secured to the vertically-movable frame and bearing upon the cam and removable from the said frame for renewal as worn, and a spring located in a recess centrally between the movable frame and the device for guiding the same to insure the downward movement of the movable frame, substantially as set forth.

8. In a diaphragm-screen, the combination with the main and vat frames and the intervening rubber sheet, of the plates 6 and 7 at opposite sides of the rubber sheet and bolts for securing the same, a vertically-movable metal frame *h* having an integral plate 8 at the upper end adapted to be secured to the under side of the plate 7 and which, with the plates 6 and 7 and the intervening rubber sheet constitute the entire diaphragm proper, and means at right angles thereto for guiding and means for vertically moving the said frame and diaphragm parts, substantially as set forth.

Signed by us this 1st day of May, 1901.

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