No. 887,436. PATENTED MAY 12, 1908.

H. H. SMITH.

CLAY SCREEN.

APPLICATION FILED FEB. 2, 1907.

3 SHEETS—SHEET 1.

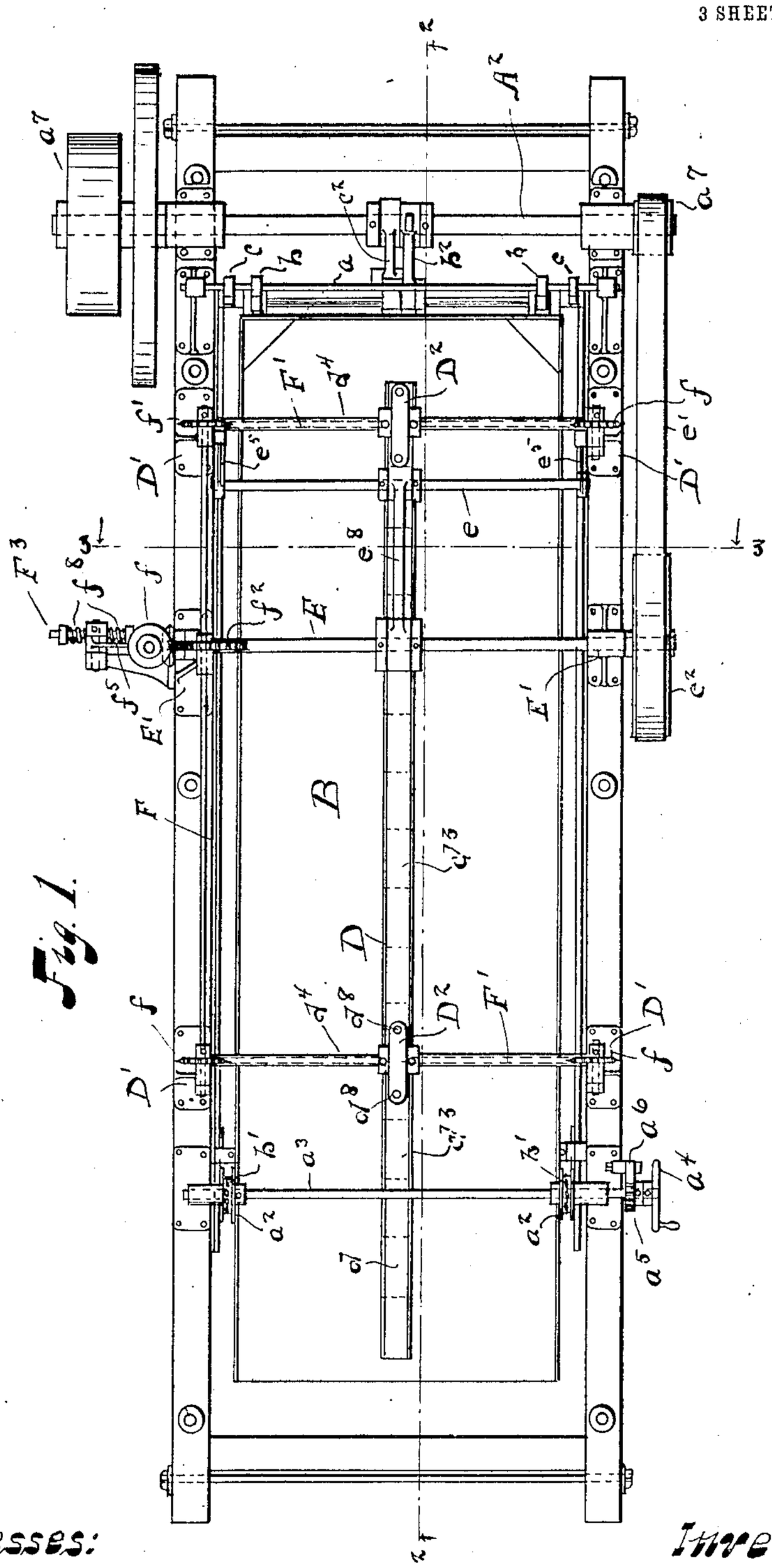


Fig. 1.

Witnesses:
Edw. Lindmueller.
Jno. F. Oberlin

Inventor:
Herbert H. Smith
By J. B. Fay
His Attorney.

No. 887,436. PATENTED MAY 12, 1908.

H. H. SMITH.

CLAY SCREEN.

APPLICATION FILED FEB. 2, 1907.

3 SHEETS—SHEET 2.

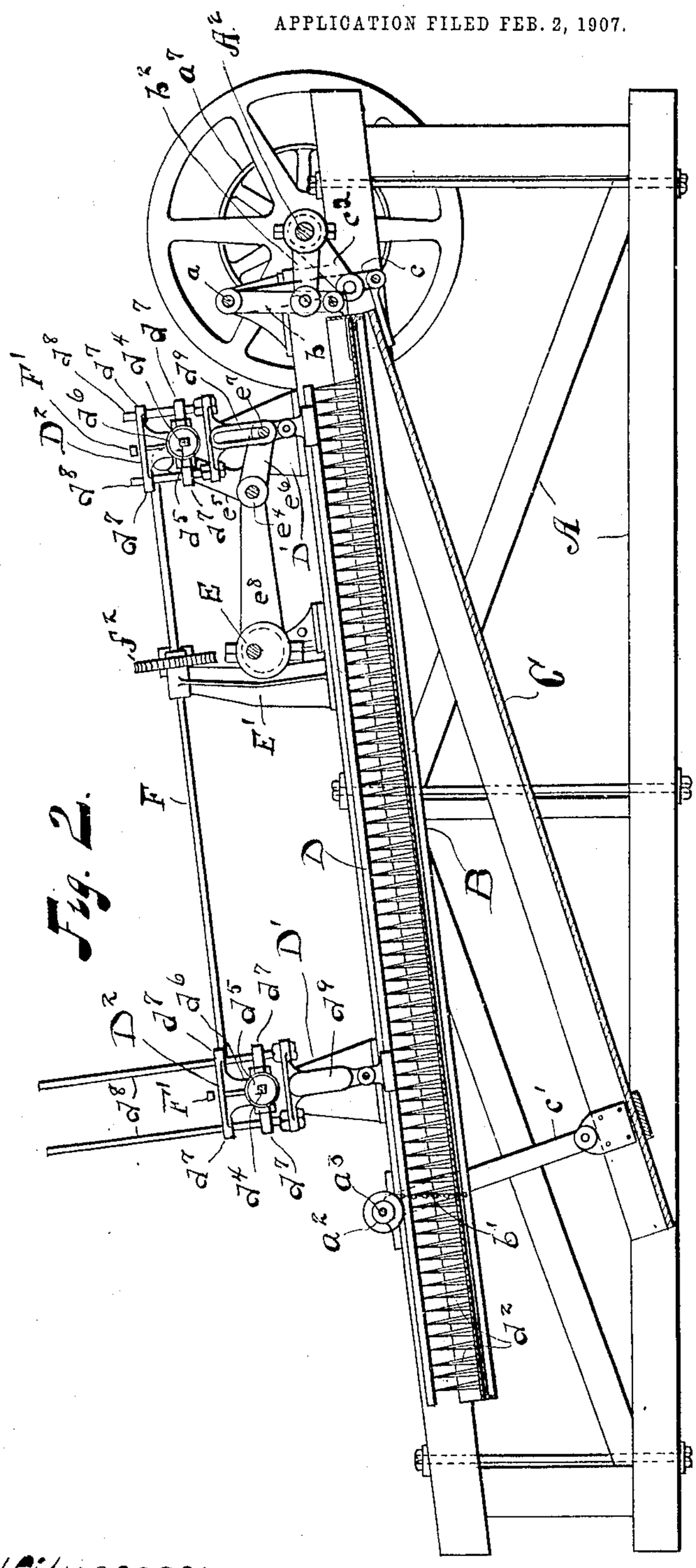


Fig. 2.

Witnesses:
Edw. Lindemeller.
Jno. F. Oberlin

Inventor:
Herbert H. Smith
By J. B. Fay
His Attorney.

No. 887,436. PATENTED MAY 12, 1908.

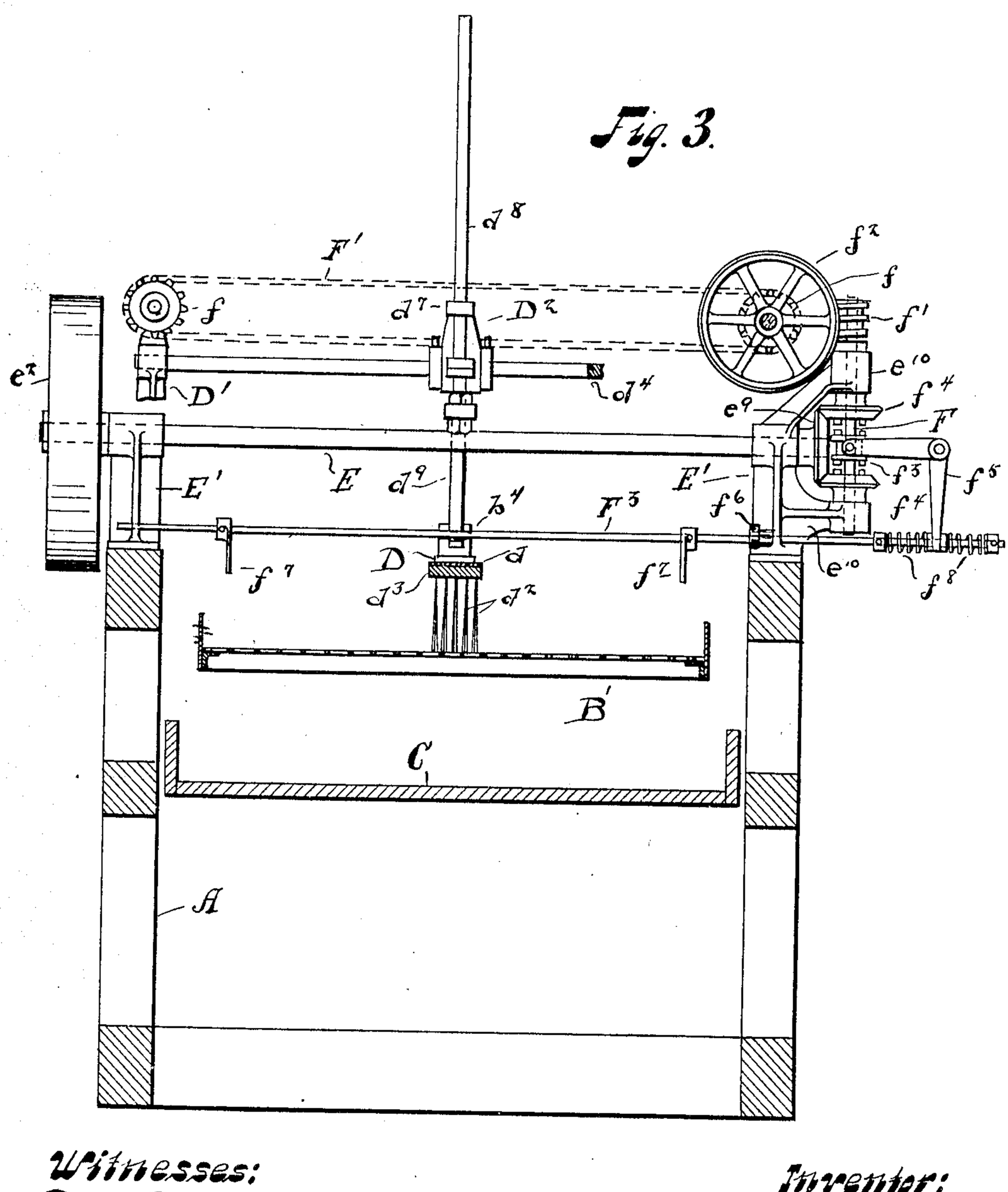
H. H. SMITH.

CLAY SCREEN.

APPLICATION FILED FEB. 2, 1907.

3 SHEETS—SHEET 3.

*Fig. 3.*




Witnesses:
Edw. Lindemueller.
Jno. F. Oberlin

Inventor:
Herbert H. Smith,
By J. B. Fay
His Attorney.

# UNITED STATES PATENT OFFICE.

HERBERT H. SMITH, OF ELSINORE, CALIFORNIA.

## CLAY-SCREEN.

No. 887,436. Specification of Letters Patent. Patented May 12, 1908.

Application filed February 2, 1907. Serial No. 355,418.

*To all whom it may concern:*

Be it known that I, HERBERT H. SMITH, a citizen of the United States, resident of Elsinore, county of Riverside, and State of California, have invented a new and useful Improvement in Clay-Screens, of which the following is a specification, the principle of the invention being herein explained and the best mode in which I have contemplated applying that principle so as to distinguish it from other inventions.

My invention relates to improvements in screens and particularly in screens designed for the handling of clay or like materials which are apt to clog up the mesh of the screen and otherwise interfere with the proper operation of the same. As will be obvious later, such invention is equally well adapted to handle other materials than clay, where difficulties of the sort above noted require to be overcome.

Said invention, then, consists of the means hereinafter fully described and particularly pointed out in the claims.

The annexed drawings and the following description set forth in detail certain mechanism embodying the invention, such disclosed means, however, constituting but one of various mechanical forms in which the principle of the invention may be employed.

In said annexed drawings: Figure 1 is a plan view of one type of a screen rig embodying my several improvements; Fig. 2 is a central vertical cross-section of such screen rig, taken on the line 2—2, Fig. 1; and Fig. 3 is a transverse vertical cross-section of such rig taken on the line 3—3, Fig. 1.

In view of what has been said above of the particular adaptability of my improved screen construction to the handling of clays, I have chosen to here illustrate my invention embodied in a rig designed primarily for this service. Such illustrative rig is accordingly shown as embodying a vibratory, as distinguished from a stationary, screen, this being the construction most efficient for use with the material named. My invention, however, I should have it understood, is not limited in its application to such particular type of vibratory screen.

Having reference, then, to the several figures of the drawings, A will be seen to designate the frame of the machine whereon are supported the various mechanical elements entering therein, comprising first of all a vibratory screen B, to which allusion has already been made. This screen, so far as concerns its details of construction, such as character of mesh, and the like, may be of any approved form, and will naturally be varied as different kinds and grades of materials are, from time to time, passed over the screen. The frame of such screen is pivotally hung at its upper end from a transverse shaft $a$ by means of links $b$. The lower end of the frame is similarly pivotally hung, but chains $b'$ are here utilized instead of links in order that this end of the screen may be raised and lowered to vary its inclination as desired. One such chain $b'$ is attached near such lower end to each side of the frame, its free end being wound about drums $a^2$ mounted upon a transverse shaft $a^3$, that may be rotated as desired by means of a hand wheel $a^4$ fixed on its one end. Shaft $a^3$ is normally held against rotation to sustain the screen-frame at the desired angle of inclination by means of a ratchet wheel $a^5$ fixed on said shaft adjacent to said hand wheel, a pawl $a^6$ being adapted to engage therewith. Below screen-frame B, at any suitable angle of inclination, is oscillatorily suspended a discharge trough or chute C, of familiar construction, the upper end of such chute being supported by means of links $c$ hung on the same transverse shaft $a$ as links $b$ are hung. The lower end of the chute is hung from the same shaft $a^3$ as is the lower end of the screen but by means of links $c'$, since its angle of inclination does not ordinarily require to be varied.

Transversely mounted in the upper end of supporting frame A of the machine is a drive-shaft A′ that is designed to be driven by means of a pulley $a^7$ mounted on one end thereof. Connecting rods $b^2$ and $c^2$, eccentrically mounted in shaft A′, operatively connect the latter with the upper ends of screen-frame B and chute C. By virtue of such connection it will be obvious that rotation of shaft A′ will effect a to-and-fro oscillation or vibration of the screen and chute, whereby the passage of the materials over the former and down the latter is much facilitated.

None of the foregoing structure is set up as a part of the present invention. Said invention relates more particularly to means designed to sweep or brush the upper surface of the screen B and thereby prevent the clogging of the meshes of the same by particles of the material being screened. While the

type of brush D adaptable to this service may be varied, I prefer to employ one of elongated form as shown. Such brush is, furthermore, substantially equal in length to the screen and is disposed lengthwise of the latter. It comprises a flexible back $d$, preferably a thin steel strip, Fig. 3, on the under side of which is secured the brush body $d'$ in which are mounted the bases of the bristle tufts $d^2$. Brush body $d$ is designed to be made up of a plurality of separate brush sections $d^3$ secured end to end to the flexible back $d$. The stiffness that would be given the brush, were a continuous body employed, is thus obviated, and in case of repairs being necessary only the particular sections affected need be replaced. These tufts $d^2$, in view of the severe service to which the brush is subjected, are preferably made of steel wires, such as are utilized in the manufacture of foundry brushes for cleaning and polishing castings and the like. In fact, I can utilize stock foundry brushes for the sections $d^3$, thus decreasing the expense considerably over making a special brush of the proper length. The number of rows of such bristle tufts is, of course, immaterial, there being four in the device as shown. Brush D is designed to be mounted in such a manner that the ends of the bristles will rest on or else graze the upper surface of the screen mesh with just sufficient force to dislodge any particles that happen to become stuck in the apertures of the mesh if the brush be moved across the same. Where large solid particles are encountered, as stones or the like, damage to the brush is prevented by virtue of its flexible back, which allows it to ride over any such obstruction.

To properly support the brush, as also to provide for the actuation thereof presently to be set forth, two transverse angular bars $d^4$, preferably of square cross-section, Fig. 2, are supported at a suitable distance above the screen in standards D′ mounted on either side of frame A. Slidably mounted on each of such transverse bars $d^4$ is a cylindrical block $d^5$ upon which is, in turn, rotatably mounted a frame $D^2$. Such frame comprises essentially a split collar $d^6$, thus fitted on block $d^5$, the respective portions of which collar are provided with oppositely extending arms $d^7$. Slidably mounted in these arms are two rods $d^8$ forming the upper extremity of a downwardly projecting arm $d^9$. The lower end of the latter is pivotally attached to suitable clips $b^4$ on the upper side of the brush D. By reason of the slidable connection had by the upper ends of arms $d^9$ with frames $D^2$, the brush is allowed to rest with its whole weight upon the screen. Accordingly, in spite of the shortening of the bristle tufts incident to wear, the brush is always maintained in desired close contact. Of course this result can also be attained by adjustably securing rods $d^8$ in arms $d^7$ just as effectively as by slidably mounting them in the manner described. This second method of attachment may, in fact, become desirable for other reasons where for example the weight of the brush is considerable and hence might bear too heavily on the screen. By virtue of the construction above described, it will be further obvious that brush D is susceptible of a to-and-fro, or longitudinally reciprocable, movement, as also of a lateral movement across the screen. In the first movement, frame $D^2$ and pendent arms $d^9$ from which the brush is suspended, will oscillate about block $d^5$, while in the latter movement of the brush these blocks slide along transverse bars $d^4$. To effect the first of these two movements, I provide the following mechanism: Transversely of frame A and preferably intermediately of the two bars $d^4$, is mounted a secondary drive-shaft E turning in suitable journal blocks, in standards E′, Figs. 1, 2, and 3. This shaft is continuously rotated from main drive-shaft A′ by means of a belt $e'$ passing over pulleys $e^2$ $a^8$ mounted on corresponding ends of the respective shafts. In connection with one or the other pair of standards D′, in the figures of the forward pair, is provided another transverse shaft $e^4$, that is hung from such standards by means of angular links $e^5$ so as to be oscillatory with respect to an axis transverse of the structure. The angular portions of links $e^5$ respectively form forwardly extending arms $e^6$, which bear, at their outer ends, a transversely-disposed rod or bar $e^7$. Such bar $e^7$ is designed to lie in a longitudinal opening in the arm $d^9$, to the lower ends of which is secured the brush D. An oscillatory movement is imparted to transverse shaft $e^4$ and bar $e^7$ by means of a connecting rod $e^8$, whose rear end is eccentrically mounted upon aforesaid shaft E. Rotation of shaft E, it is accordingly seen, is adapted to effect the desired longitudinally reciprocable movement of the brush, and that, too, independently of its position transversely of the bars $d^4$, from which it is hung.

To effect the transverse movement of the brush, that is its movement laterally across the screen, I mount on the top of standards D′ on the one side of the rig, a shaft F. On the respective ends of this shaft, and thus adjacent to the said standards, are mounted sprocket wheels $f$. In each of the standards D′ on the other side of the rig is mounted a similar transversely disposed sprocket wheel, and about corresponding pairs of these sprocket wheels pass broken sprocket chains F′. The respective ends of such chains are suitably secured to opposite sides of the blocks $d^5$ slidably mounted on transverse bars $d^3$, upon which the frames $D^2$ are oscillatorily mounted. Pulley $e^2$ is mounted on the end of shaft E opposite to the side of the

rig on which shaft F is thus disposed. On the end of such shaft E that lies on the same side of the rig as shaft F, is mounted a bevel gear $e^9$ that is constantly in mesh with two oppositely disposed bevel gears $f^4$ loosely mounted on a short vertical shaft $F^2$. This shaft is suitably journaled in two arms $e^{10}$ projecting outwardly from standard E'. On the upper end of vertical shaft $F^2$ is fixed a worm $f'$ that meshes with a worm wheel $f^2$ on shaft F. A sleeve or collar $f^3$, non-rotatably, but slidably, mounted on vertical shaft $F^2$ intermediately of bevel gears $f^4$, is adapted to optionally rotatively secure either of said gears to the shaft with consequent rotation of the latter one way or the other, depending upon which gear is thus connected. For, it will be remembered, the gears in question are both continuously driven by the transverse shaft E, but in opposite directions. Actuation of clutch collar $f^3$ is had through the medium of a bell crank $f^5$, the lower end of which is resiliently connected to the outer end of a transversely reciprocable rod or bar $F^3$ between two springs $f^8$. This rod is slidably mounted in suitable apertures in the bases of standards E', a stuffing-box $f^6$, or equivalent means, being provided for frictionally retaining said rod in whatever position it may be placed. Downwardly projecting stops $f^7$ are adjustably secured on rod $F^3$ and are adapted to be engaged by brush D as the latter approaches the limits of its lateral movement across the screen. The effect of this engagement is to reciprocate the rod whereby the tension on one of springs $f^8$ and the compression on the other is sufficient to shift clutch collar $f^3$ out of engagement with one bevel gear $f^4$, thus stopping the lateral movement of the brush in the direction previously pursued and causing it to move back again to the opposite side of the screen, where the same operation is repeated.

The general operation of the screen rig need scarcely be more fully indicated than has been done incidentally to describing the several movements of its component parts. The material being screened is fed onto the screen at its upper end and its rate of passage down the same is governed by the degree of angularity given thereto by appropriately lowering or raising its lower end; as also in a way by the force of the vibratory movement imparted to it. This same vibratory movement being given chute C facilitates the discharge of the screened material from the lower end of the latter. Simultaneously with this vibration of the screen and chute, brush D is caused to traverse laterally back and forth across the screen, at the same time being a more or less rapid reciprocatory movement in the direction of the screen's length. The effect of this operation of the brush is to maintain the mesh of the screen clear of particles that may have a tendency to become lodged therein. This, too, is done without offering any particular obstruction to the passage of the material down the screen, for at any one time only the relatively narrow width of the brush is interposed in the path of such material. Obviously, as has been before stated, the advantageous employment of such brush is not limited to a vibratory screen rig; it may be employed with equally satisfactory results in connection with stationary screens, and anywhere else that a like cleansing action is required.

Other modes of applying the principle of my invention may be employed instead of the one explained, change being made as regards the mechanisms herein disclosed, provided the means stated by any one of the following claims or the equivalent of such stated means be employed.

I therefore particularly point out and distinctly claim as my invention:

1. The combination of a screen, an elongated brush disposed lengthwise of said screen, bars transversely disposed above said screen, arms longitudinally movable along said bars and oscillatory about the same, the ends of said arms being connected with said brush, and means adapted to oscillate said arms irrespective of their position longitudinally of said bars.

2. The combination of an inclined screen, an elongated brush disposed substantially parallel with the direction of inclination of said screen and positioned to contact the face thereof, said brush extending substantially the entire length of said screen, bars transversely disposed with respect to said screen, arms longitudinally movable along said bars and oscillatory about the same, the ends of said arms being connected with said brush, means adapted to oscillate said arms and means adapted to move the same back and forth along said bars.

3. The combination of a screen, an elongated brush disposed lengthwise of said screen, bars transversely disposed above said screen, arms longitudinally movable along said bars and oscillatory about the same, the ends of said arms being connected with said brush, means adapted to move said arms back and forth along said bars, and means adapted to oscillate said arms irrespective of their position longitudinally of said bars.

4. The combination of a screen, an elongated brush disposed lengthwise of said screen, bars transversely disposed above said screen, arms slidable along said bars and oscillatory about the same, means adapted to slide said arms along said bars, means adapted automatically to reverse the direction of such movement at predetermined points along said bars, and means adapted to oscillate said arms irrespective of their position longitudinally of said bars.

5. The combination of a screen, an elongated brush disposed lengthwise of said screen, bars transversely disposed above said screen, arms slidable along said bars and oscillatory about the same, means adapted to slide said arms along said bars, adjustable means adapted automatically to reverse the direction of such movement at predetermined points along said bars, and means adapted to oscillate said arms irrespective of their position longitudinally of said bars.

6. The combination of a screen, an elongated brush disposed lengthwise of said screen, bars transversely disposed above said screen, blocks slidable along said bars, arms oscillatorily mounted on said blocks, the ends of said arms being connected with said brush, sprocket wheels mounted at opposite ends of said bars and in alinement therewith, a broken sprocket chain passing over said wheels and having its ends attached to said block, and means for reversibly driving said sprocket wheels.

7. The combination of a screen, an elongated brush disposed lengthwise of said screen, bars transversely disposed above said screen, blocks slidable along said bars, arms oscillatorily mounted on said blocks, the ends of said arms being connected with said brush, sprocket wheels mounted at opposite ends of said bars and in alinement therewith, a broken sprocket chain passing over said wheels and having its ends attached to said block, means adapted to reversibly drive said sprocket wheels, and means adapted to be engaged and actuated by said brush for controlling said driving means.

8. The combination of a screen, an elongated brush disposed lengthwise of said screen, bars transversely disposed above said screen, blocks slidable along said bars, arms oscillatorily mounted on said blocks, the ends of said arms being connected with said brush, sprocket wheels mounted at opposite ends of said bars and in alinement therewith, a broken sprocket chain passing over said wheels and having its ends attached to said block, a drive shaft, reversible gear mechanism connecting said shaft with said wheels, and a bar transversely reciprocable of said screen and adapted to be engaged and actuated by said brush at the respective limits of its lateral travel, said reciprocable bar being operatively connected with said reversible gear mechanism.

9. The combination of a screen, an elongated brush disposed lengthwise of said screen, bars transversely disposed above said screen, blocks slidable along said bars, arms oscillatorily mounted on said blocks, the ends of said arms being connected with said brush, an oscillatorily mounted bar having slidable engagement with one of said arms, a drive-shaft, and a connecting rod having one end eccentrically mounted upon said drive shaft and its other end attached to said oscillatory bar.

10. The combination of a screen, an elongated brush disposed lengthwise of said screen, bars transversely disposed above said screen, blocks slidable along said bars, arms oscillatorily mounted on said blocks, the ends of said arms being connected with said brush, an oscillatorily mounted bar having slidable engagement with one of said arms, a drive-shaft, a connecting rod having one end eccentrically mounted upon said drive shaft and its other end attached to said oscillatory bar, and means adapted to slide said blocks back and forth along said bars.

11. The combination of a screen, an elongated brush disposed lengthwise of said screen, bars transversely disposed above said screen, blocks slidable along said bars, arms oscillatorily mounted on said blocks, the ends of said arms being connected with said brush, an oscillatorily mounted bar having slidable engagement with one of said arms, a drive-shaft, a connecting-rod having one end eccentrically mounted upon said drive shaft and its other end attached to said oscillatory bar, means adapted to slide said blocks back and forth along said bars, sprocket wheels mounted at opposite ends of said bars and in alinement therewith, a broken sprocket chain passing over each pair of said wheels and having its ends attached to the corresponding block, and means for reversibly driving said sprocket wheels.

12. The combination of a screen, an elongated brush disposed lengthwise of said screen, bars transversely disposed above said screen, blocks slidable along said bars, arms oscillatorily mounted on said blocks, the ends of said arms being connected with said brush, an oscillatorily mounted bar having a slidable engagement with one of said arms, a drive-shaft, a connecting-rod having one end eccentrically mounted upon said drive shaft and its other end attached to said oscillatory bar, means adapted to slide said blocks back and forth along said bars, sprocket wheels mounted at opposite ends of said bars and in alinement therewith, a broken sprocket chain passing over each pair of said wheels and having its ends attached to the corresponding block, means adapted to reversibly drive said sprocket wheels, and means adapted to be engaged and actuated by said brush for controlling said driving means.

13. The combination of a screen, an elongated brush disposed lengthwise of said screen, bars transversely disposed above said screen, blocks slidable along said bars, arms oscillatorily mounted on said blocks, the ends of said arms being connected with said brush, an oscillatorily mounted bar having slidable engagement with one of said arms, a drive-shaft, a connecting-rod having one end ec-

centrically mounted upon said drive shaft and its other end attached to said oscillatory bar, means adapted to slide said blocks back and forth along said bars, sprocket wheels mounted at opposite ends of said bars, a sprocket chain passing over corresponding pairs of said wheels and having its ends attached to the corresponding block, reversible gear mechanism connecting said shaft with said wheels, and a bar transversely reciprocable of said screen and adapted to be engaged and actuated by said brush at the respective limits of its lateral travel, said reciprocable bar being operatively connected with said reversible gear mechanism.

Signed by me, this 30th day of January, 1907.

HERBERT H. SMITH.

Attested by:
D. T. DAVIES,
JNO. F. OBERLIN.