(No Model.) 4 Sheets—Sheet 1.

H. SECK.

MIDDLINGS PURIFIER.

No. 587,240. Patented July 27, 1897.

Fig. 1.

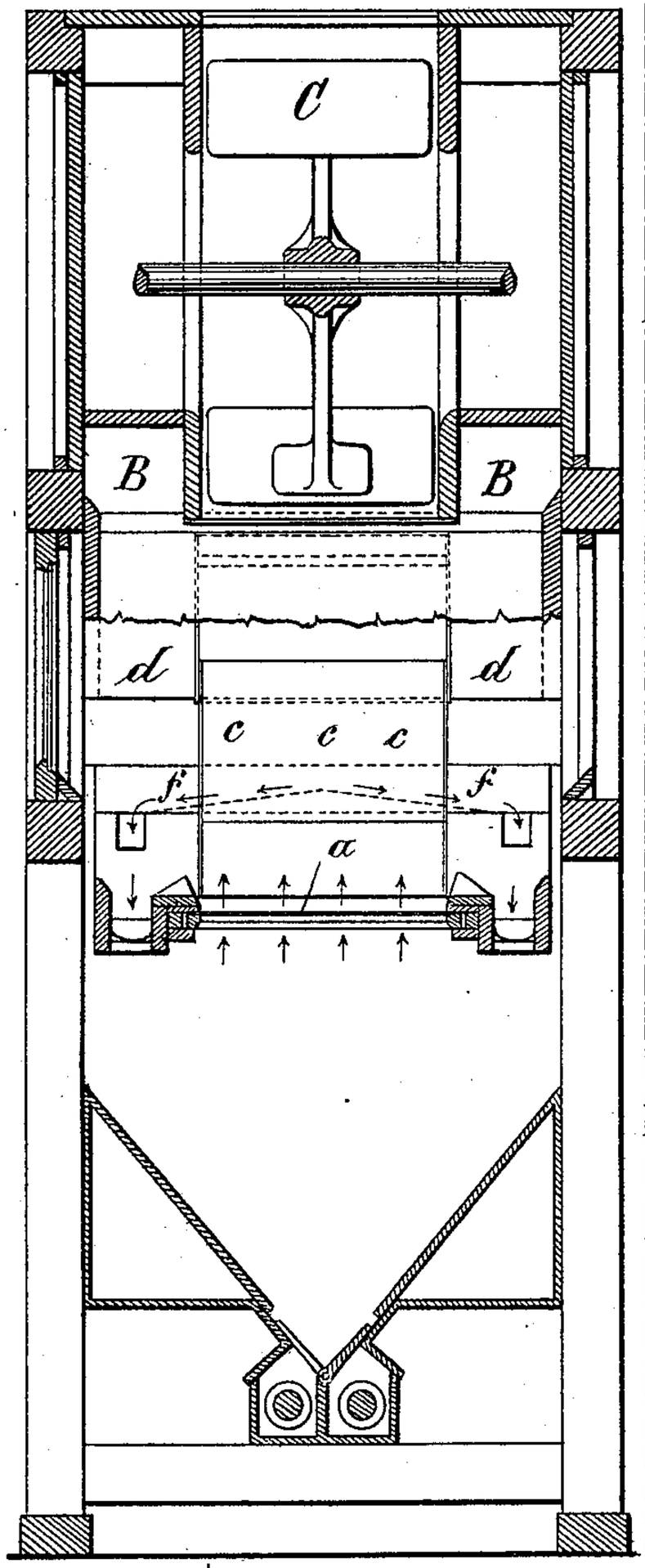


Fig. 2.

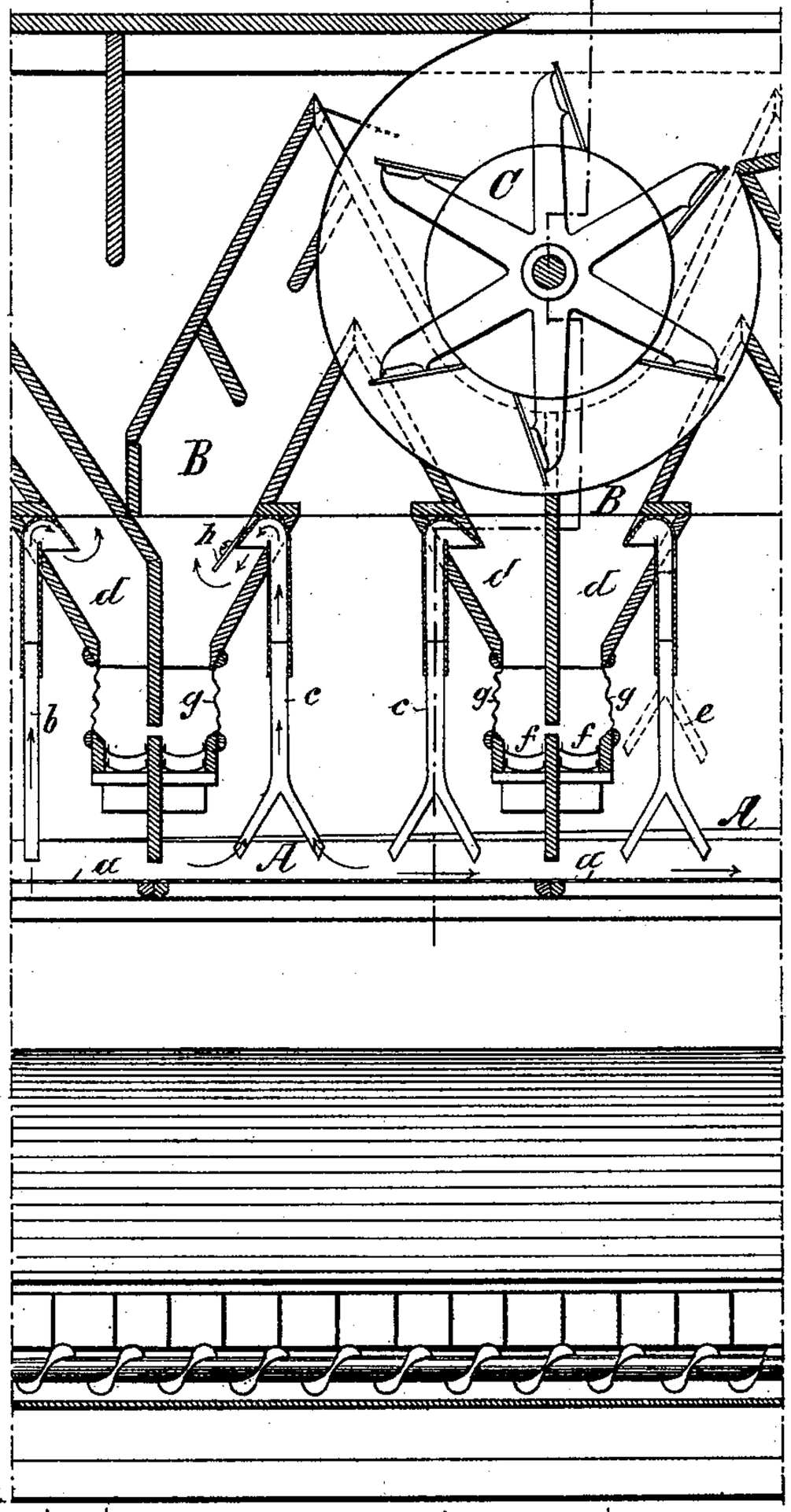


Fig. 3.

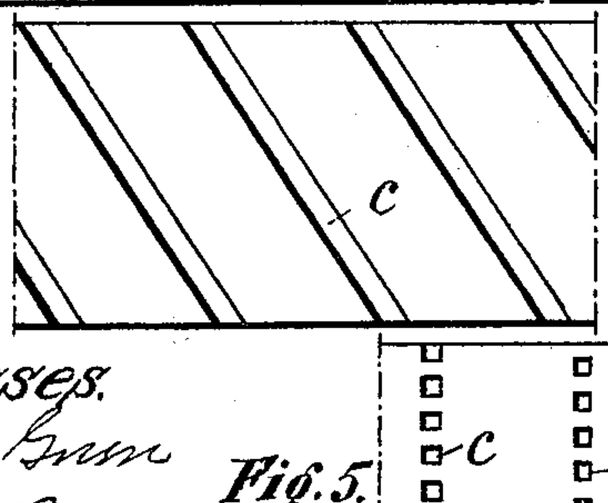


Fig. 4.

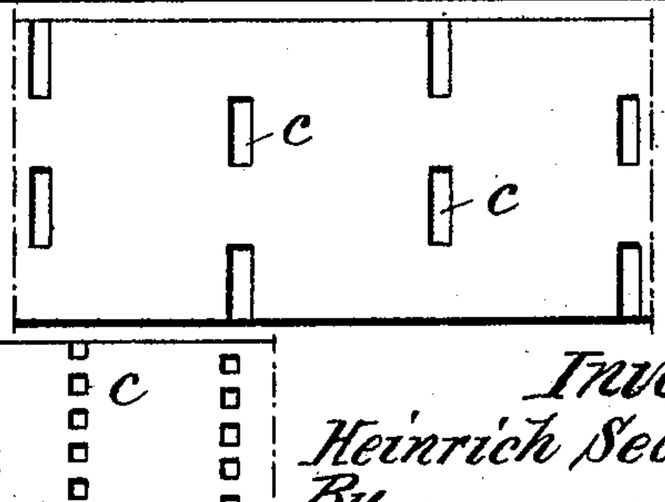
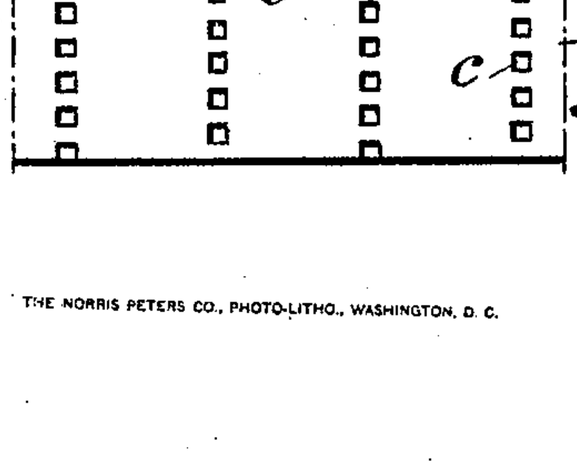


Fig. 5.



Witnesses.
Thos. A. Grant
Robert Gault.

Inventor.
Heinrich Seck.
By James L. Norris.
Atty.

(No Model.)

4 Sheets—Sheet 2.

H. SECK.

MIDDLINGS PURIFIER.

No. 587,240. Patented July 27, 1897.

Fig. 6.

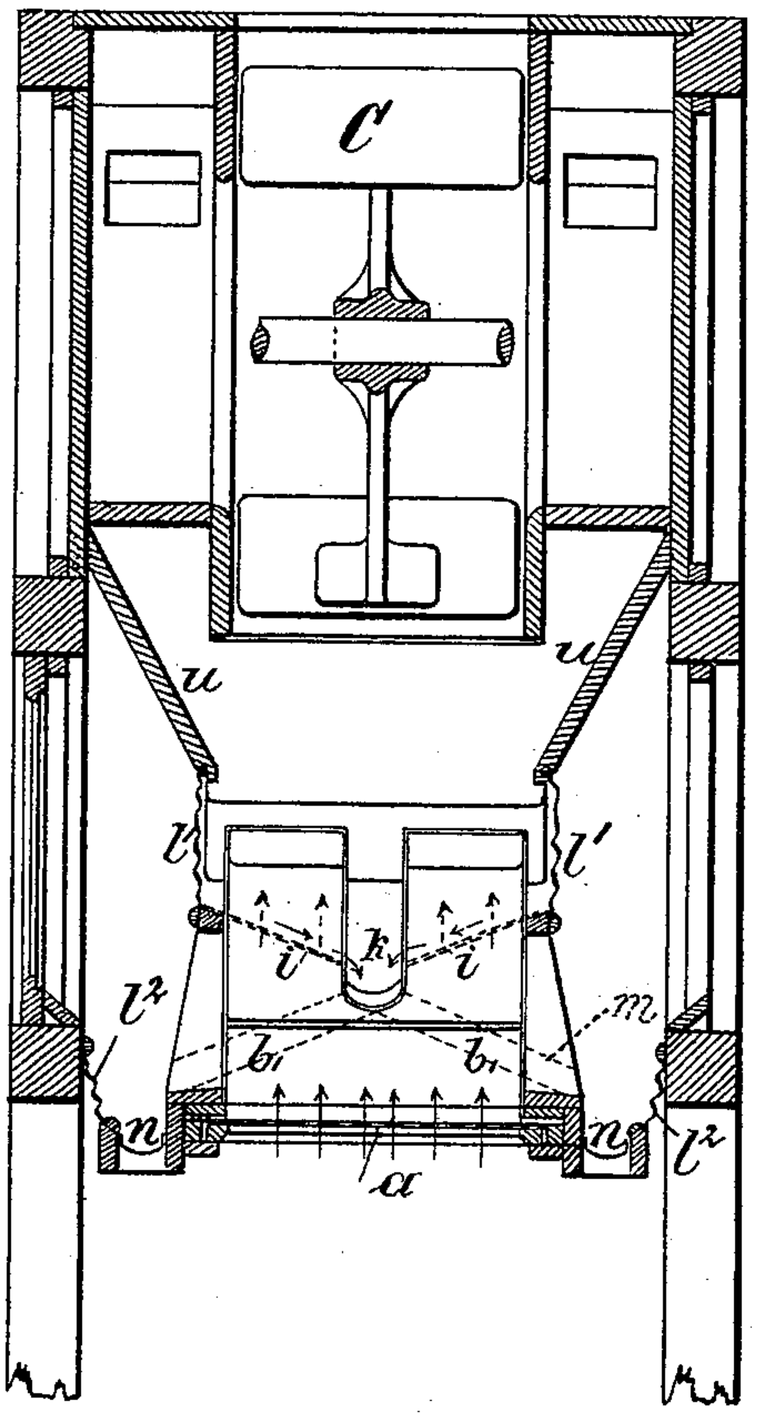


Fig. 7.

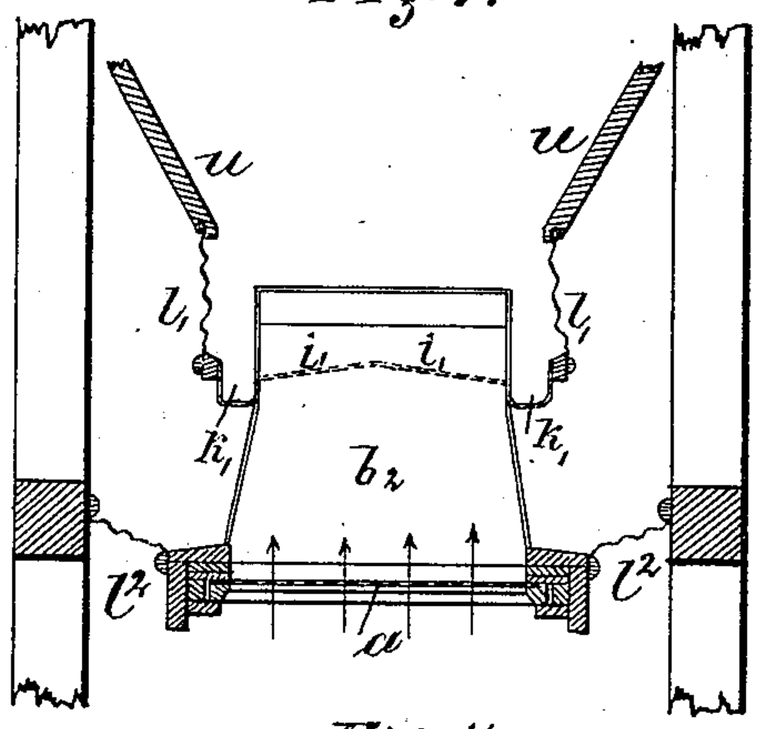


Fig. 11.

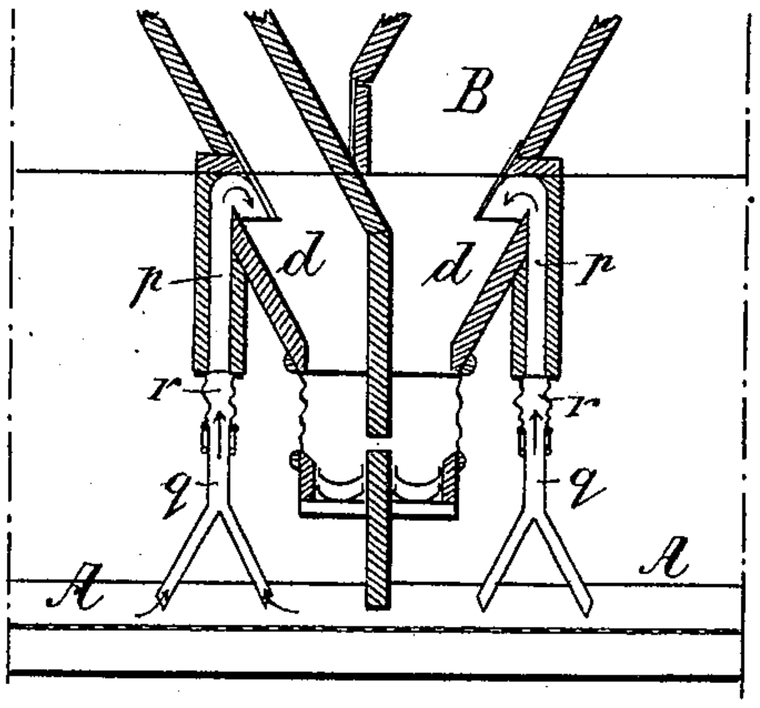
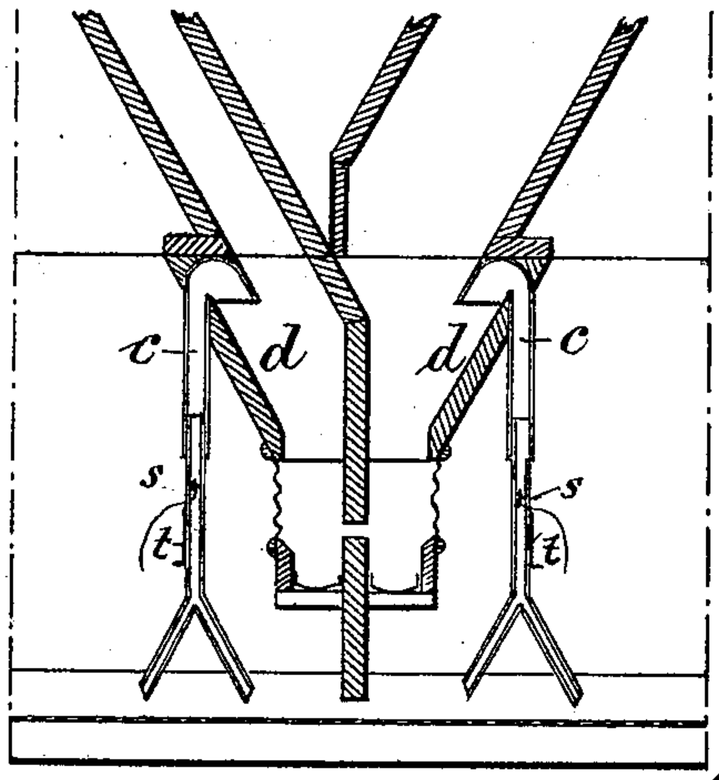


Fig. 12.



Witnesses.
Thos. A. Snow
Robert Gerdtt.

Inventor.
Heinrich Seck.
By
James L. Norris.
Atty.

(No Model.) 4 Sheets—Sheet 3.

H. SECK.

MIDDLINGS PURIFIER.

No. 587,240. Patented July 27, 1897.

Fig. 8.

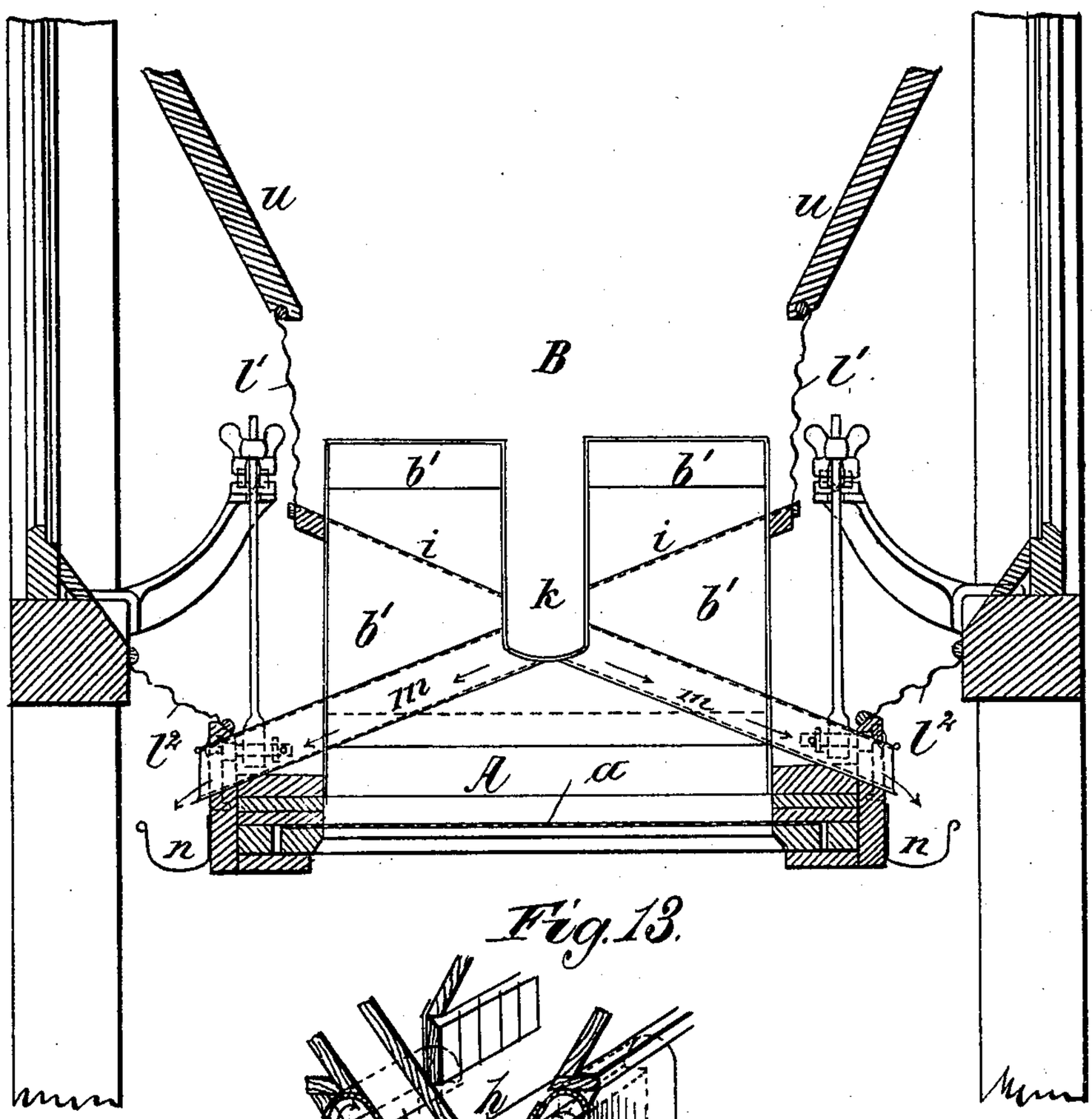
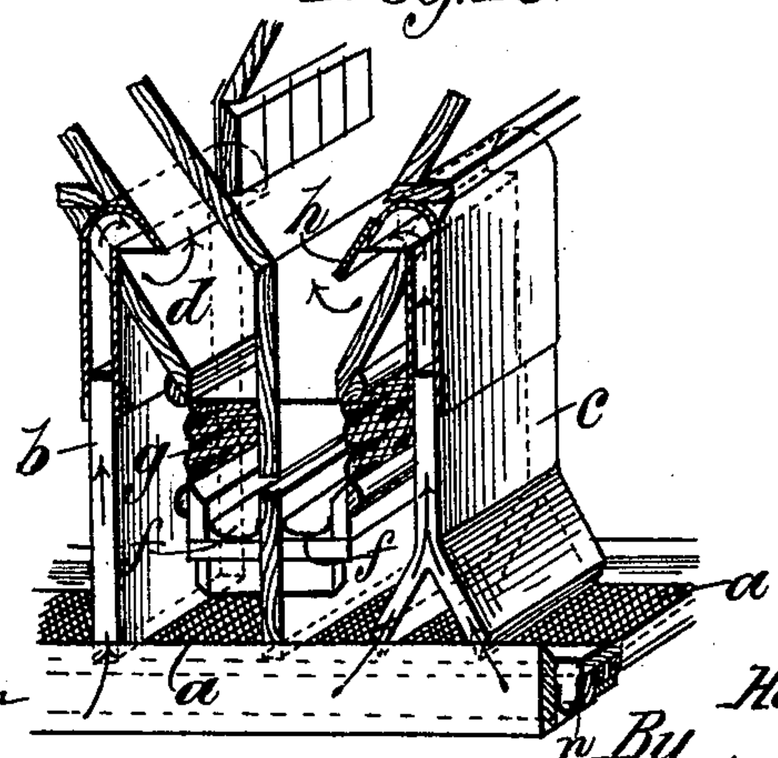


Fig. 13.



Witnesses.
Thos. A. Brown
Robert Everett.

Inventor.
Heinrich Seck
By James L. Norris.
Atty.

(No Model.) 4 Sheets—Sheet 4.

H. SECK.

MIDDLINGS PURIFIER.

No. 587,240. Patented July 27, 1897.

Fig. 9.

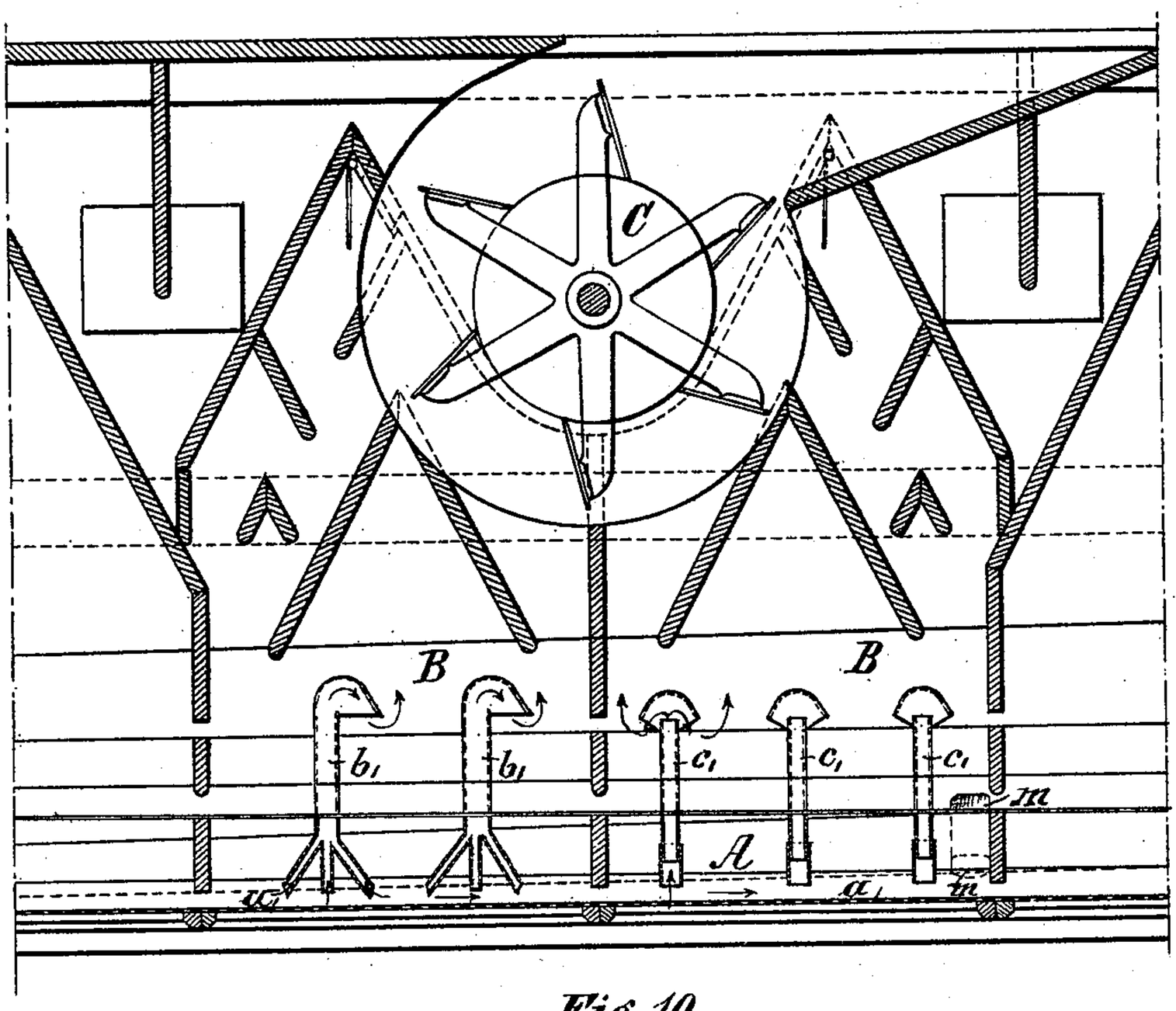
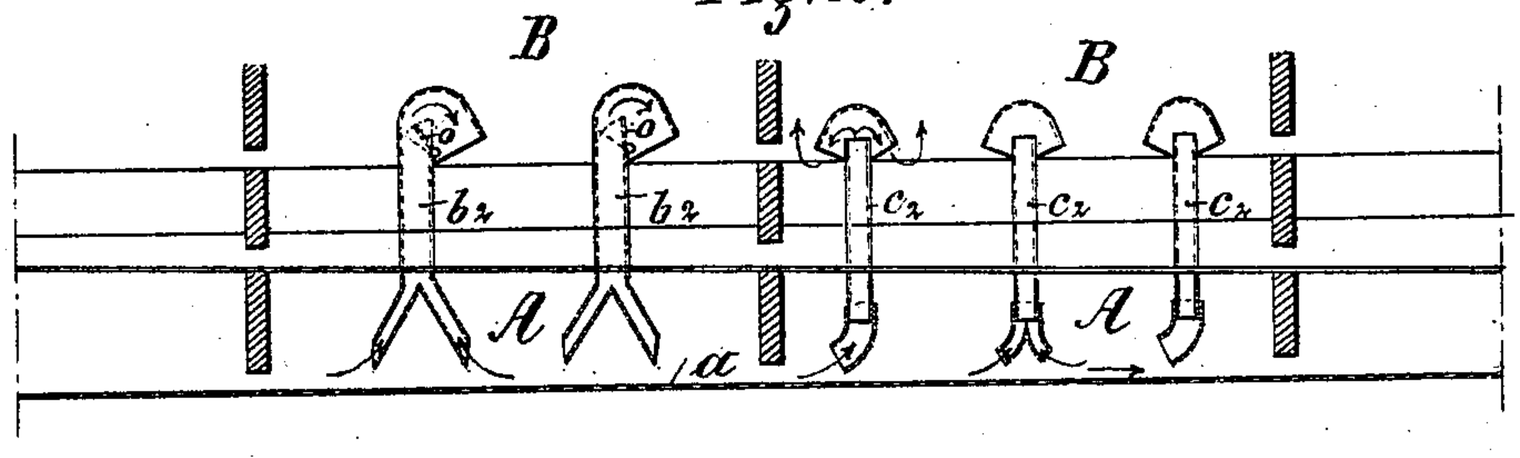


Fig. 10.



Witnesses
Thos. A. Brown
Robt Everett.

Inventor.
Heinrich Seck.
By
James L. Norris.
Atty.

UNITED STATES PATENT OFFICE.

HEINRICH SECK, OF DRESDEN, GERMANY.

MIDDLINGS-PURIFIER.

SPECIFICATION forming part of Letters Patent No. 587,240, dated July 27, 1897.

Application filed June 25, 1896. Serial No. 596,916. (No model.)

To all whom it may concern:

Be it known that I, HEINRICH SECK, of Dresden, in the Kingdom of Saxony and German Empire, have invented a certain new and useful Improvement in Middlings-Purifiers; 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 use the same, reference being had to the accompanying drawings, forming part of this specification.

This invention relates to machines for separating light from heavy substances, and more especially to middlings-purifiers for use in flour-mills.

One object of the invention is to provide for an efficient separation of the substances treated, such as grits or middlings, from the dust or other light particles contained therein while the said substances are caused to move over the surface of the usual shaking-sieve within the machine and there subjected in a well-known manner to the action of a current of air created by suction.

Other objects of the invention are to provide for the possibility of continuously observing and watching the process of separation from without, to admit of the sifting-surface being readily cleaned at any time, to prevent the accumulation within the machine of the dust usually created therein by the suction-current of air, and thus to keep the lateral glass windows of the machine clear, to dispense with the deflectors usually employed in machines of this class, and to provide for a more efficient traveling movement of the material on the shaking-sieve, and hence for a more efficient separation than has been possible to obtain heretofore.

The invention therefore consists in the details of construction and combination of parts more fully hereinafter referred to and described, whereby the dust or other light particles to be separated and removed from the material treated, instead of being at once lifted and carried away in a vertical direction, are by means of connecting suction canals or tubes sucked in a direction toward the discharge end of the machine, this resulting in a speedier and more efficient traveling movement of the dust or lighter particles relatively to the heavier particles, such as the granules of grits or other material treated, at the same time assisting the forward movement of the material worked upon and thereby preventing all excessive accumulation of the said material on the sieve, and thus reducing the danger of the sifting-surface becoming obstructed.

Another advantage obtained by the material on the sieve being thus moved along by suction is this, that a current of air of less force than heretofore is required for separating out the light particles, experiments made having proven that one of the connecting suction-canals, which are made relatively high in a vertical, wide in the lateral, and narrow in the longitudinal sense of the direction of the path of movement of the sieve, has about the same useful effect as six of the open spaces between the transverse channels or grooved bars heretofore employed immediately above the sieve in machines such as the one described in prior patent, No. 306,648; and still another advantage is this, that while the said transverse grooves or channels debar from view the greater part of the sifting-surface, even when the lateral windows are opened the improved construction leaves the greater part of the sifting-surface uncovered and thus visible from without.

In the accompanying drawings, illustrating the invention, Figure 1 is a vertical transverse section, on the line $x\ y$, Fig. 2, of a sufficient portion of a middlings-purifier constructed according to my present invention to render the improved construction thereof properly understood. Fig. 2 is a corresponding central vertical longitudinal section. Figs. 3, 4, and 5 are horizontal sectional plan views or diagrams showing different modifications of construction and arrangement of the suction canals or tubes, the latter being shown in Fig. 3 as extending each diagonally across the entire width of the sieve, while in Figs. 4 and 5 they are shown as consisting of tubes laterally interrupted by the separating-bottom of the suction-chamber and arranged in transverse sets or rows. Figs. 6, 7, and 8 are transverse sectional views taken on a similar sectional line as that of Fig. 1 and showing three modified constructions. According to these modifications the suction-canals are connected with the sieve-frame. In Figs. 6

and 7 the collecting-gutters are arranged within the sifting-chamber, whereas in Fig. 8 they are located outside of the same. Figs. 9 and 10 are central vertical longitudinal sections or diagrams showing different constructions of connecting suction canals or tubes. Figs. 11 and 12 are sectional details, taken on a similar sectional line as Fig. 2, of different modifications of construction and arrangement of the suction canals or tubes, more fully hereinafter referred to. Fig. 13 is a perspective detail view illustrating the arrangement of the suction-tubes with relation to the sifting-surface or shaking-sieve.

A designates the sifting-chamber—that is to say, the space immediately above the surface of the shaking-sieve *a*—and B is the suction-chamber. In the various modifications shown in the drawings different means are provided for effecting an air-tight separation of the said sifting-chamber from the suction-chamber, as will be presently described. The separating out of the light particles removed by suction from the sifting-chamber A takes place within the suction-chamber B, an exhaust-fan C acting within the latter.

According to my invention the means for sucking the light particles away from the surface *a* within the sifting-chamber and for conveying them into the suction-chamber consist of a number of suction canals or tubes constructed and arranged as hereinafter more fully described, the said canals or tubes terminating with their lower ends in close proximity to the surface of the material traveling along the sifting-surface *a* within the sifting-chamber A, while the upper ends of the said canals or tubes extend into the suction-chamber B.

In the construction shown in Figs. 1 and 2 the suction canals or tubes, here designated by *b* and *c*, enter the suction-chamber B from below at certain portions of the separating-bottom thereof, said portions being formed in the manner of pockets *d*. The lower ends of the said suction canals or tubes extending toward the material to be treated may terminate either in one or more sections, as shown in connection with the canals or tubes *b* and *c*, respectively, and their inlet-opening is preferably directed toward the feed end of the machine. For this purpose the ends of the said suction canals or tubes may either be bent accordingly or cut away on the respective side. The suction produced by this means upon the material moving over the sifting-surface in the direction of the horizontal arrows, Fig. 2, results in a certain acceleration of the traveling movement of the material.

The suction canals or tubes *b c*, as regards their sectional form and arrangement, may each extend approximately across the entire width of the sieve, while being rather narrow lengthwise thereof, and they may extend either transversely to the longitudinal axis of the sieve or diagonally thereto, as indicated in Fig. 3, or instead of each of the canals or tubes extending across the full width of the sieve they may form corresponding transverse or diagonal rows of two or more canals or tubes of smaller section, and in this case they may be so arranged that the canals or tubes of the one row will alternate with those of the next row, as shown in Figs. 4 and 5.

In Fig. 2 the canals or tubes are shown as being made adjustable vertically. To this end the lower portion of each canal or tube is arranged to slide within or upon the upper portion, so as to allow of being brought into the position *e*, as indicated by dotted lines in Fig. 2, when the sifting-surface will be readily accessible for cleaning.

The pockets *d*, forming part of the separating-bottom of the suction-chamber B, are in communication with gutters *f*, inclined transversely to the sieve. In the construction illustrated by Fig. 2 the said gutters are attached to the sieve-frame, so as to partake in the movement of the latter. They may, however, if preferred, be attached to the framing of the machine. The pockets and gutters are made air-tight and separated from the sifting-chamber A by means of the fabric *g*, so that the canals or tubes *b c* form the only communication between the sifting-chamber A and the suction-chamber B.

The operation of the devices described is as follows, that is to say: The suction-current of air passes through the material on the sieve from below and there lifting the dust and other light particles contained in the said material carries the same along upward on its way through the suction canals or tubes *b c*. By reason of the reduced section of the said canals or tubes the air in passing therethrough has an additional pressure and hence a somewhat increased speed of movement imparted to it. On arriving at the upper or discharge end of the said canals or tubes the air-current assumes a downward direction of movement, and in spreading out freely within the pockets *d* and thence continuing on its way to the exhaust-fan deposits the greater part of the light particles in the gutters *f*, whence the said particles thus separated out are by reason of the inclined arrangement of the said gutters or in consequence of the shaking movements of the latter discharged into the longitudinal gutters of the sieve. The discharge of the air at the ends of the canals or tubes may be regulated by any suitable means, such as the adjustable slide *h*, (shown in Fig. 2,) for guiding the air-current during a greater or smaller part of its course immediately after it has changed its direction of movement.

In the arrangement above described the suction canals or tubes are supposed to be secured to the framing of the machine—that is to say, to the air-tight bottom of the suction-chamber on its part rigidly connected with the said framing. They may, however, if desired, be connected with the shaking-sieve frame,

or, in other words, the separating-bottom of the suction-chamber, provided with the said canals or tubes, instead of being connected with the framing of the machine may be rigid on the sieve-frame, so as to partake, with the canals or tubes passing therethrough, in the shaking movements of the said frame. Modifications of this kind are shown in Figs. 6, 7, and 8. In this arrangement a separating-floor, such as i or i', rigidly connected with the sieve-frame, is provided at a suitable distance above the sieve. An air-tight joint is formed between the sifting-chamber A and the suction-chamber B by the fabric l', connecting the outer edges of the floor i, Figs. 6 and 8, or i', Fig. 7, and the side walls u of the suction-chamber above. The suction canals or tubes b', passing through the said floor, deposit thereon the light particles. The surface of the floor i is in the construction shown in Fig. 6 inclined from the two sides to the center, terminating at this point in a gutter k, which intersects the broad suction canals or tubes.

In some cases it is desirable to provide for keeping the material discharged from different sifting-sections of the machine separated from each other or to provide for observing and testing the respective different portions of the material separately. To this end a number of closed lateral canals m may in places branch off from the central gutter k to the sides, the said lateral canals discharging the material collected in the respective different sections of the machine into one or two longitudinal gutters n, connected with the sieve. In Fig. 6 these longitudinal gutters are shown as arranged within the sifting-chamber, the latter being closed at the sides below by means of the fabric l^2. In the modified construction shown in Fig. 8 the said longitudinal gutters are located on the outside of the sifting-chamber, the latter being here similarly separated from the suction-chamber. This last-described arrangement of the longitudinal gutters presents the very important advantage that the material discharged into the said gutters through the lateral canals m from the several sections of the machine may be observed and controlled and that it is thus rendered possible to see at any time how the machine is working. In the arrangement as heretofore a window had to be opened when it was desired to gain access to the longitudinal gutters, and every time when this was done while the machine was in operation the working of the machine would become temporarily impeded, and, moreover, even then the gutter was visible only to the extent of the length of the opened window, whereas in the improved arrangement above described the gutter is visible at all times in its entire length.

In the modification shown in Fig. 7 the intermediate bottom, here designated by the letter i', instead of being inclined from the sides toward the center is shaped in the manner of a roof, and instead of the central gutter k two longitudinal gutters k' are here provided, into which the light particles deposited on the bottom i' are discharged.

In Figs. 9 and 10 the connecting canals or tubes b' are shown as provided with different kinds of outlets, the canals or tubes on the left-hand side having single outlets, while those on the right-hand side have double outlets, so that the air can escape on two sides. The regulation of the sucking current of air is usually effected by suitable devices, such as valves, provided in the top part of the machine. These may, however, if desired, be arranged in the suction canals or tubes themselves, as shown in Fig. 10, where two of the said canals or tubes are provided with valves o.

Fig. 11 illustrates a modified arrangement which unites, as it were, the principles of construction shown in Figs. 1 and 2 on the one hand and in Figs. 6, 7, and 8 on the other hand. The upper tube portion p of the suction-canal is here shown as being secured to the pocket d, while the lower tube portion q is attached to the shaking-sieve. The connection between the two portions is formed by a tubular piece r, of flexible and air-tight material, such as canvas or india-rubber, detachably held on one of the tube portions by a surrounding strap or rubber band or other suitable means. With the other tube portion it may be rigidly connected. This construction possesses the advantage that it allows of making the sieve comparatively light, which tends to make the machine run smoothly and easily. The detachable arrangement of the lower tube portions permits of the entire sifting-surface being readily uncovered when it is desired to clean the same thoroughly.

In Fig. 12 the suction canal or tube c, secured to the pocket d in a similar manner as in Fig. 2, is provided on one side with a special suction-opening s, the size of which may be regulated by means of a slide t. This admits of creating in the entire respective portion of the sifting-chamber a slight upward air-current, which will act to impart to the light particles of the material a tendency to remain as much as possible near the surface of the material until the said particles in their forward movement over the sieve will have come under the influence of the suction-canals, when they will be seized by the current and carried along upward through the said suction canals or tubes, as already described.

It is obvious that the improved devices above described will require only a very moderate current of air to enable them to serve the object for which they are intended. One reason for this is that the suction canals or tubes approach very closely the sifting-surface, and another reason is that the effect of the suction does not extend over the entire area of the sieve, but is confined to certain portions thereof and is materially increased

by the narrow section of the canals or tubes in which the air is thus caused to ascend with increased speed in consequence of the pressure thereby imparted to it. As already stated, the said canals or tubes may either be cut away straight, as in case of the tube *c'*, (shown in Fig. 9,) or they may be cut away on a bevel, as shown in the other figures of the drawings. The direction of movement imparted to the current of air by the latter construction possesses the advantage that the lighter particles are not only lifted just at the moment when they arrive below the canals or tubes, but that the said particles are already previously brought under the influence of a lateral suction, as indicated in the drawings by the arrow.

Since the entire quantity of air set in motion by the exhaust-fan is obliged to pass through the broad canals or tubes, it is obvious that no dust will be visible immediately above the sieve in the sifting-chamber, which is hermetically separated from the suction-chamber. The glass windows will in consequence not become covered with dust, and it will therefore at all times be possible to control the progress of the material on the sieve through the closed glass windows. In the improved construction described the greater part of the sifting-surface remains visible, since the suction canals or tubes are arranged at suitable distances apart, which is to be considered an improvement on the arrangement described in the patent already referred to, wherein a grate consisting of a number of transverse grooves or channels overlies the sieve and excludes the greater part of the latter from view. Moreover, the fact that the inlet-openings of the canals or tubes are directed toward the feed end of the machine results in an acceleration of the traveling movement of the material on the sieve, and hence in a more efficient sifting action, as already stated. On the other hand, the arrangement of the collecting-gutters on the outside of the machine renders it possible to continuously observe the operation of the machine without requiring the sifting-chamber to be opened for the purpose.

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

1. In a machine for separating light from heavy substances, the combination of a sifting-chamber having a shaking-sieve located therein, a suction-chamber having in its bottom a series of pockets, inclined gutters located below and communicating with said pockets, but hermetically separated from the sifting-chamber, series of vertically-adjustable suction canals or tubes connecting the sifting-chamber with the said pockets of the suction-chamber, the said suction-tubes being arranged with their inlet ends close to the upper side of the shaking-sieve, and an exhaust-fan for the suction-chamber, substantially as described.

2. In a machine for separating light from heavy substances, the combination of a sifting-chamber having a shaking-sieve located therein, a suction-chamber having its bottom provided with a series of pockets, an exhaust-fan, series of vertical suction canals or tubes connecting the sifting-chamber with the said pockets and having their inlet ends close to the upper side of the shaking-sieve, inclined gutters located at the bottom of the pockets, said gutters being open to the suction-chamber but hermetically separated from the sifting-chamber, and conveying-gutters arranged on the outside of the machine, substantially as described.

3. In a machine for separating light from heavy substances, the combination with a closed sifting-chamber having located therein a shaking-sieve and means for separating out and receiving dust or other light particles, of one or more collecting and conveying gutters arranged outside of said sifting-chamber, whereby the discharged material in said gutters is visible without requiring the machine to be opened, and means for discharging into the said outside gutters the dust or other light particles from within the said sifting-chamber substantially as and for the purpose described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HEINRICH SECK.

Witnesses:
O. DERSCHOW,
HERMANN FRÜHE.