(No Model.) 3 Sheets—Sheet 1.

O. M. MORSE.

SEPARATING MACHINE.

No. 456,585. Patented July 28, 1891.

Fig. 1.

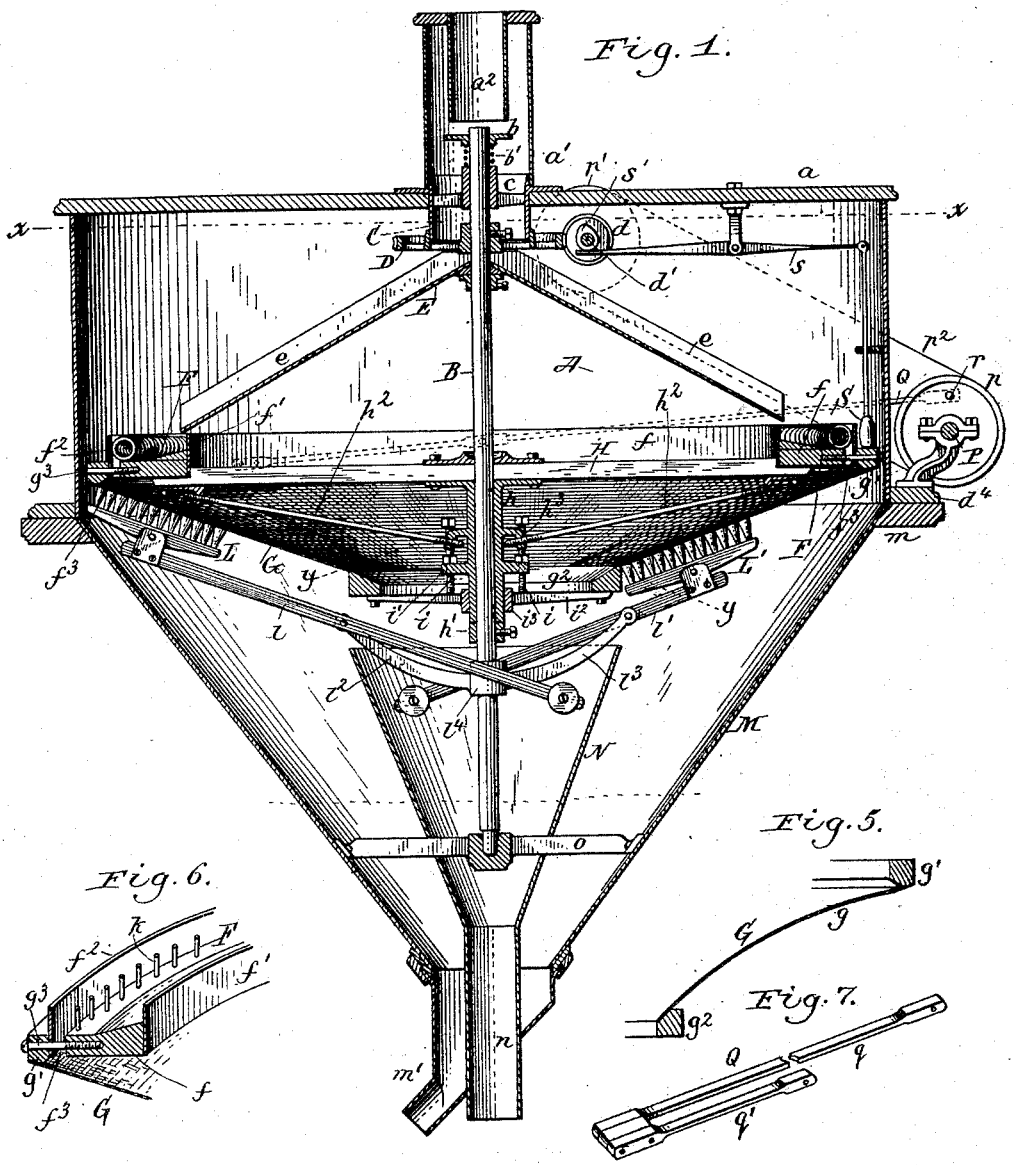


Fig. 6.

Fig. 5.

Fig. 7.

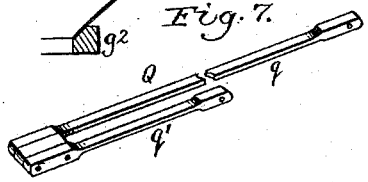
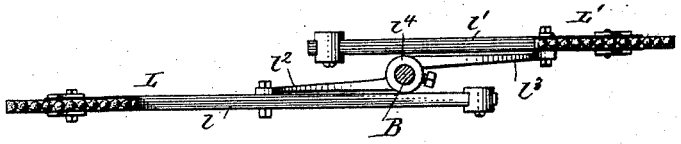


Fig. 2.



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(No Model.) 3 Sheets—Sheet 2.

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Fig. 3.

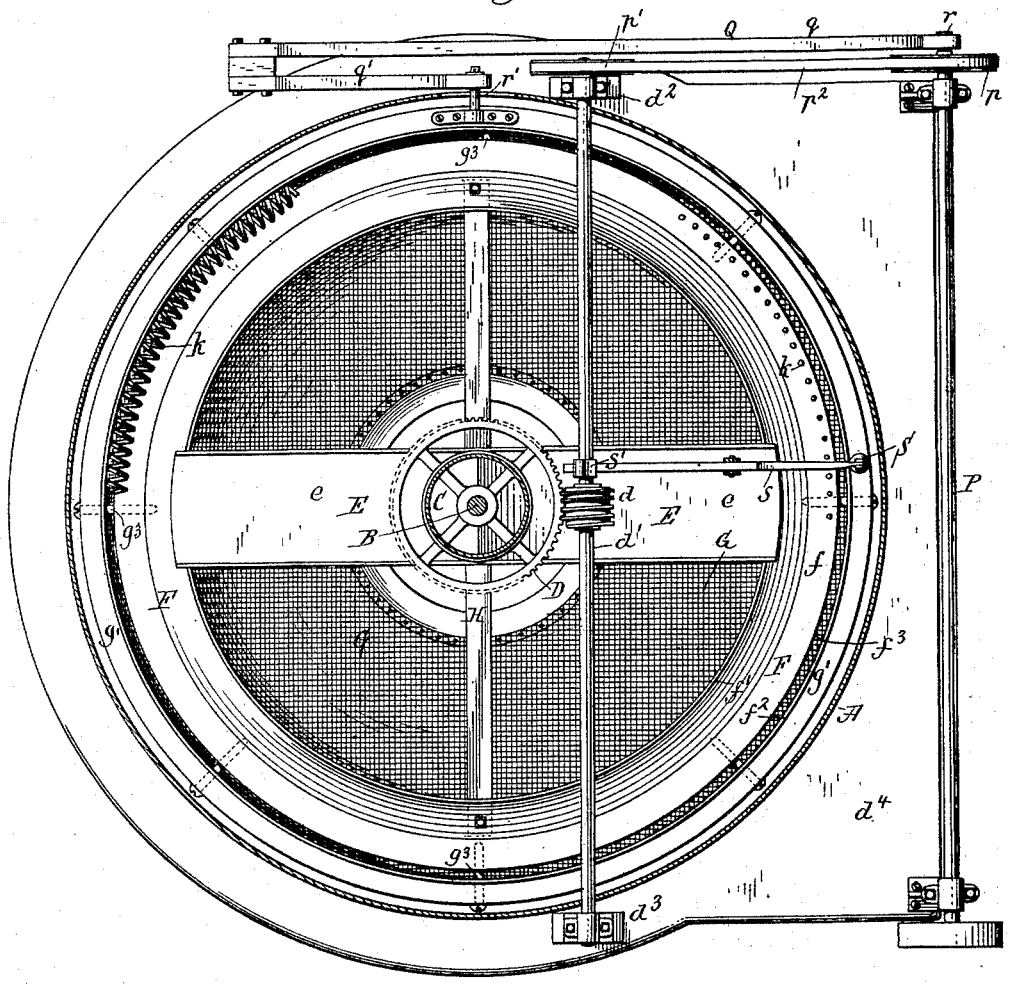
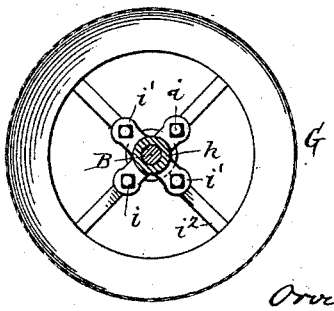


Fig. 4.



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(No Model.) 3 Sheets—Sheet 3

O. M. MORSE.

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Fig. 8.

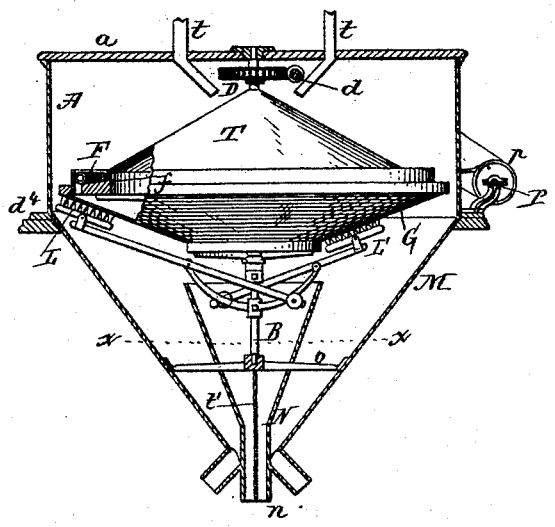
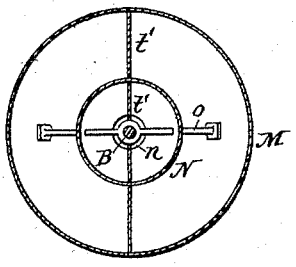


Fig. 9.



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UNITED STATES PATENT OFFICE.

ORVILLE M. MORSE, OF JACKSON, MICHIGAN, ASSIGNOR TO THE KNICKERBOCKER COMPANY, OF SAME PLACE.

SEPARATING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 456,585, dated July 28, 1891.

Application filed March 19, 1890. Serial No. 344,467. (No model.)

To all whom it may concern:

Be it known that I, ORVILLE M. MORSE, a citizen of the United States, residing at Jackson, in the county of Jackson and State of Michigan, have invented new and useful Improvements in Separating-Machines, of which the following is a specification.

This invention relates to a separating-machine in which a circular screen is employed, which receives the material to be separated near its periphery and discharges the tailings at its center.

The object of my invention is to produce a simple and efficient separating-machine, which can be successfully employed in flour-mills for scalping or separating breaks from roller-mills for grading and dusting middlings and similar purposes.

In the accompanying drawings, consisting of three sheets, Figure 1 is a sectional elevation of my improved separating-machine. Fig. 2 is a horizontal section through the brush-shaft, and a plan view of the brushes. Fig. 3 is a horizontal section in line $x\,x$, Fig. 1. Fig. 4 is a transverse section in line $y\,y$, Fig. 1. Fig. 5 is a fragmentary vertical section of the separating-screen after the same has been stretched. Fig. 6 is a fragmentary perspective view of a modified construction of the agitator in the feed-trough. Fig. 7 is a perspective view of the flexible connecting-rod. Fig. 8 is a sectional elevation showing my improvements applied to a machine which separates two kinds of material simultaneously. Fig. 9 is a horizontal section in line $x\,x$, Fig. 8.

Like letters of reference refer to like parts in the several figures.

A represents the upper cylindrical portion of the casing of the machine, provided with a deck or cover a, which carries a central cylindrical feed-box a'. The latter is provided in its top with a depending feed-spout a^2.

B represents the vertical rotating shaft, to which the brushes and other rotating parts are attached, and which is provided at its upper end with a feed-disk b, which is arranged underneath the feed-spout a^2. This feed-disk turns with the shaft, and is made self-adjusting on the same toward and from the feed-spout by means of a spring b'. The latter rests upon a bearing c, in which the upper end of the shaft is journaled, and which is secured by arms in a sleeve C, fastened by an external flange to the deck a and supporting the feed-box a'.

D represents a worm-wheel secured to the shaft below the sleeve C, and receiving motion from a worm d, which is secured to a horizontal shaft d', arranged underneath the deck of the machine and having its end portions arranged outside of the cylindrical casing A. The shaft is journaled in standard-bearings d^2 d^3, secured to the base-flange d^4 of the cylindrical casing.

E represents the rotary feeder, which receives the material to be separated from the feed-box and delivers the same to an annular feed-trough F, arranged over the peripheral portion of the circular screen G. This feeder consists of two inclined spouts e e, having their highest portions joined together and secured to the shaft B underneath the worm-wheel D, so as to receive the material to be separated, which descends through the sleeve C and the spaces between the arms of the worm-wheel. The lower ends of the spouts are arranged over the annular feed-trough F, so as to deliver the material into the same and distribute the material over the periphery of the screen by the rotative movement of the spouts.

The annular feed-trough F is composed of an annular bottom plate f, an inner cylindrical upright wall f', secured to the bottom plate, and an outer cylindrical upright wall f^2, separated from the outer edge of the bottom plate by a narrow annular opening f^3, through which the material to be separated escapes from the trough and passes upon the peripheral portion of the screen below.

The screen G is composed of a clothing g, of wire or other suitable material, an upper ring g', and a lower ring g^2, to which the outer and inner edges of the clothing are respectively secured. The upper ring g' is arranged on the outer side of the feed-trough and carries on its inner side the outer cylindrical wall f^2 of the feed-trough. The ring g' and the wall f^2 are secured to the bottom plate of the feed-trough by horizontal screw-bolts g^3.

H represents horizontal arms, upon which the feed-trough and the screen are supported, and which are secured with their outer ends to the under side of the bottom plate of the feed-trough. The inner ends of these arms are secured in sockets, which are formed at the upper end of a sleeve h, surrounding the shaft B loosely. This sleeve rests upon a collar h', secured to the shaft.

h^2 represents oblique brace-rods extending from the outer ends of the arms H to ears h^3, formed on the sleeve h.

i represents tension-screws, which work in ears i', formed on the sleeve h and bear downwardly against the arms i^2 of the lower screen-ring g^2 for the purpose of stretching the clothing of the screen. The hub i^3 of the lower ring g^2 is mounted loosely upon the sleeve h, so as to be capable of vertical movement thereon. Upon stretching the wire clothing of the screen it assumes the curved form indicated in Fig. 5, its inclination becoming gradually steeper from the upper to the lower edge of the screen, so that the discharge of the coarse material is accelerated while the material is held longest upon the upper peripheral portion of the screen upon which the separation takes place principally.

k represents an agitator, which is arranged in the annular feed-trough F for the purpose of distributing the material and breaking up any lumps or aggregations which may exist therein. This agitator may be composed of an annular coil of wire, as represented in Fig. 1, or of pins secured to the bottom of the feed-trough, as represented in Fig. 6. Both constructions of the agitator are represented in Fig. 3.

L L′ represent traveling brushes, which sweep the under side of the screen, the brush L bearing against the outer portion of the screen and the brush L′ against the portion nearest the central opening. These brushes are pivoted, respectively, to bars l l', which are in turn pivoted to arms l^2 l^3, projecting in opposite directions from a hub l^4, which is secured to the shaft B. The inner ends of the arms are provided with weights, by which the brushes are held against the under side of the screen.

M represents the lower hopper-shaped portion of the outer casing, provided at its upper end with a flange m, which is secured to the base-flange d^4 of the upper cylindrical portion of the casing.

N represents an internal hopper arranged centrally in the outer hopper M and underneath the central opening in the screen, so as to receive the coarse material which tails off from the screen. The internal hopper N is provided with a central discharge-spout n and the outer hopper M with a swiveled discharge-spout m', which surrounds the inner discharge-spout n.

o is a cross-piece, which is secured to the lower portion of the outer hopper M and provided with a step-bearing for the shaft B. This cross-piece also supports the inner hopper N.

P represents the horizontal driving-shaft, which is journaled in bearings secured to the base-flange d^4 of the upper portion of the casing.

p p' are pulleys secured, respectively, to the driving-shaft P and worm-shaft d', and p^2 represents a belt running around these pulleys and driving the worm-shaft.

The screen receives a horizontal oscillating motion from the driving-shaft P by means of a flexible pitman Q, connecting a crank-pin r on the pulley p with a pin r', secured to the top ring g' of the screen. This pitman consists of a forwardly-extending flexible member q, attached to the crank-pin and a rearwardly-extending flexible member q', attached to the screen-pin, the two members being secured together with their ends, so as to form a pitman, which is doubled upon itself. This construction of the pitman permits the latter to move in the circular path of the screen, which oscillates horizontally upon the shaft B as an axis without binding and without producing a hard or violent shock or jar at each reversal of the movement of the screen, but cushions the movement of the screen, so that the actual linear movement of the screen is somewhat longer than the throw of the crank-pin by which it is produced.

S represents a knocker, which strikes downwardly upon the upper ring g' of the screen and which is attached to the outer end of a lever s, pivoted to the under side of the deck a. This lever is actuated by a cam s' upon the worm-shaft d'.

The material to be separated passes from the feed-disk upon the rotating feed-spouts, and is delivered by the latter to the feed-trough, over which it is distributed by the rotation of the feed-spouts. In the feed-trough the material is further distributed by the oscillations of the trough which takes part in the oscillating movement of the screen. The movement of the material in the feed-spout toward the outer edge of the bottom is facilitated by the outward inclination of the upper surface of the bottom. Before the material escapes from the spout it encounters the agitator, which oscillates with the spout and breaks up any lumps which the material may contain. The material drops from the feed-trough upon the peripheral portion of the screen and passes inwardly and downwardly over the same, the finer portions passing through the screen into the outer hopper, while the coarser portions pass over the screen and tail off through the central opening into the inner hopper.

When the machine is designed for scalping, the screen is clothed with wire-cloth, and when it is designed for separating middlings the screen is clothed with bolting-silk.

It is obvious that the annular feed-trough may be omitted and that the revolving feed-spouts may deliver the material directly

upon the screen; but this construction is less desirable, because the feed-trough serves to distribute the material and equalize the feed over the periphery of the screen. A single rotating feed-spout may be used instead of the double feed-spout which is shown in the drawings.

When the material to be separated is of such a nature that either the oscillations of the screen or the knocker produces the necessary agitation of the screen, the oscillating devices of the knocker may be omitted.

When several different kinds of material are to be separated simultaneously upon the same machine, which is sometimes desirable in small mills, the rotating feed-spouts are omitted and a distributing-cone T is substituted, which is secured to the screen and receives the different kinds of material from different spouts *t*. The receiving-hoppers are divided by partitions *t'* to receive and discharge the several kinds of material separately. This construction of the machine is represented in Figs. 8 and 9.

I claim as my invention—

1. The combination, with a circular screen inclined from the periphery to the center, of a feed-trough arranged above the peripheral portion of the screen and a distributer which conducts the material to be separated to the feed-trough, substantially as set forth.

2. The combination, with a circular screen inclined from the periphery to the center, of a feed-trough arranged above the peripheral portion of the screen and a rotating feed-spout which delivers the material to the feed-trough, substantially as set forth.

3. The combination, with a circular screen inclined from the periphery to the center, of a feed-trough arranged above the peripheral portion of the screen and an agitator arranged in said trough, substantially as set forth.

4. The combination, with a circular screen, of an annular feed-trough arranged over the peripheral portion of the screen and provided on the inner side of its outer wall with an annular discharge-opening, substantially as set forth.

5. The combination, with the circular screen provided with an upper peripheral ring to which the screen-cloth is secured, of a central shaft, a feed-trough having its bottom and inner wall supported upon said shaft and its outer wall and the peripheral screen-ring attached to the bottom of the trough, so as to leave an intervening discharge-opening, substantially as set forth.

6. The combination, with an oscillating screen, of a flexible pitman composed of two members arranged side by side and having their free ends connected, respectively, with the screen and the crank-pin and their farther ends secured together, substantially as set forth.

7. The combination, with a circular screen provided with a fixed peripheral ring and an axially-movable internal ring to which the screen-cloth is secured, of a central shaft, a sleeve mounted on said shaft, arms secured to said sleeve and supporting the peripheral ring, and adjusting devices attached to said sleeve and engaging against the internal ring, substantially as set forth.

Witness my hand this 12th day of March, 1890.

ORVILLE M. MORSE.

Witnesses:
N. S. ELLIS,
JNO. G. MUNDY.