

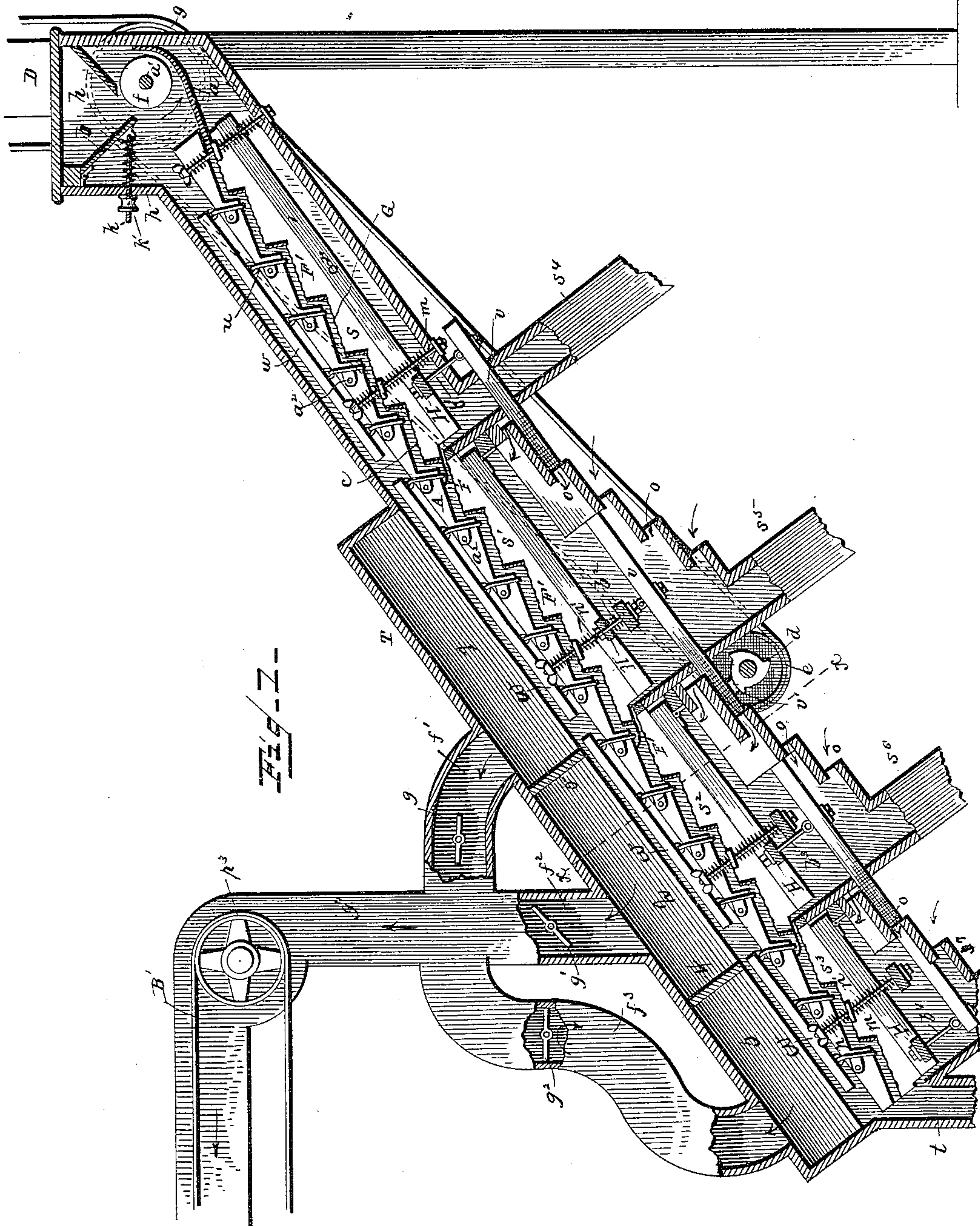
(No Model.)

2 Sheets—Sheet 1.

H. C. McKEEN.
GRADER AND PURIFIER.

No. 362,766.

Patented May 10, 1887.



Witnesses:
Edwin L. Yewell,
Albert J. Kelley

Inventor,
Henry C. McKen

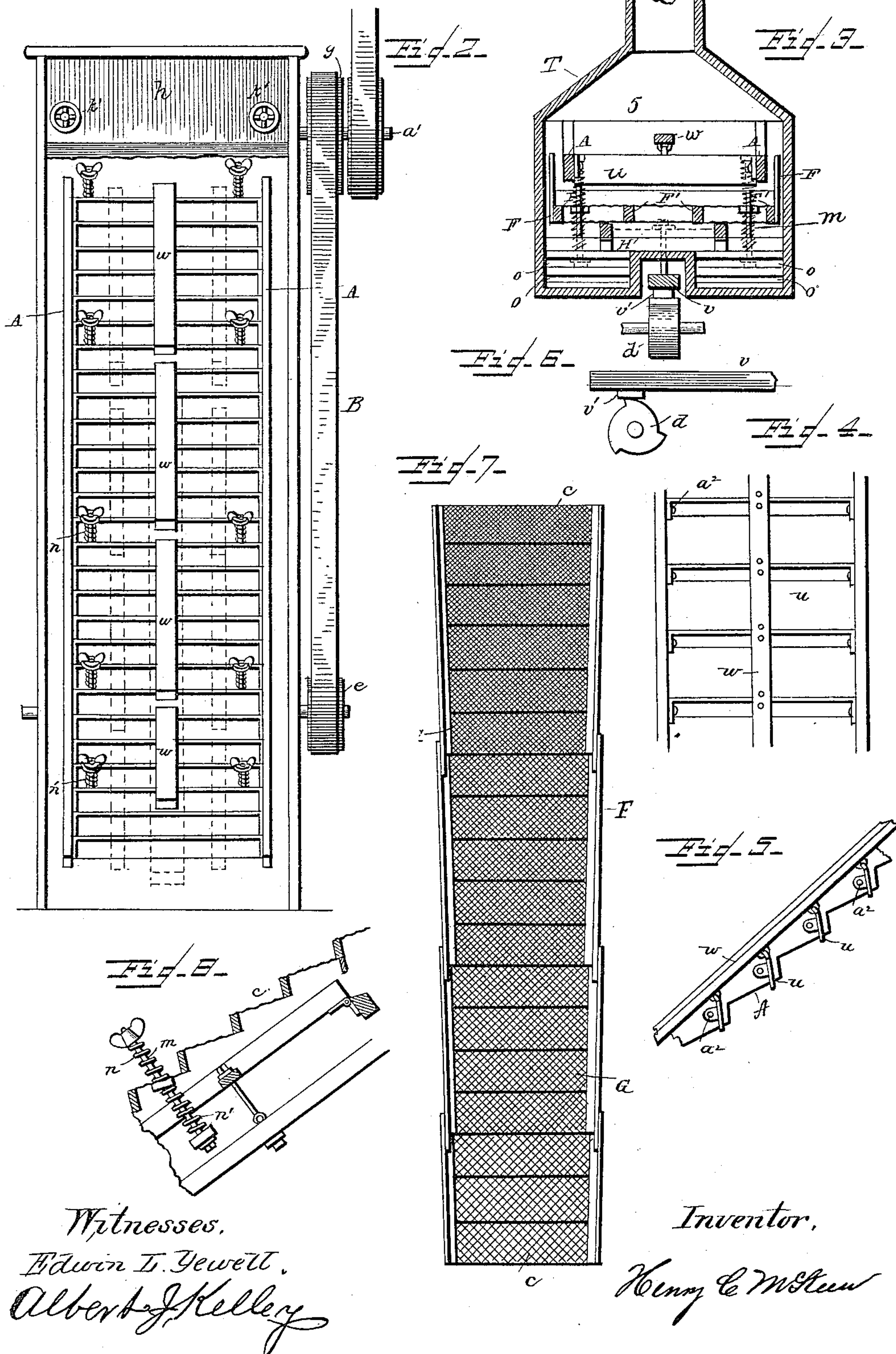
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UNITED STATES PATENT OFFICE.

HENRY C. McKEEN, OF TERRE HAUTE, INDIANA.

GRADER AND PURIFIER.

SPECIFICATION forming part of Letters Patent No. 362,766, dated May 10, 1887.

Application filed February 9, 1886. Serial No. 191,378. (No model.)

To all whom it may concern:

Be it known that I, HENRY C. McKEEN, a resident of Terre Haute, Indiana, have made certain new and useful Improvements in Graders and Purifiers, a description of which is set forth in the following specification, reference being made to the accompanying drawings, in the several figures of which like letters refer to like parts.

My invention relates to an improvement in machines for grading, separating, and purifying the products delivered from the reduction-rolls in making flour; and it consists in novel features hereinafter more fully described, and pointed out in the claims.

In the drawings, Figure 1 is a side elevation, partly in section, of my improved machine; Fig. 2, a front view having the cover removed; Fig. 3, a transverse section, looking toward the feed end, on the line $x x$, Fig. 1; Fig. 4, a plan view of part of the arresting mechanism; Fig. 5, a longitudinal section through a part of the arresting mechanism; Fig. 6, an enlarged detail view of the cam and a portion of the vibrating rod; Fig. 7, a plan view of the entire series of sieves, showing the relative sizes of mesh of each sieve; and Fig. 8 an enlarged detail view of the means for adjusting the throw of the sieves.

Referring to the drawings, D is the spout which receives the product from first break of reduction-rolls. It is connected directly with the hopper h , in which a feed-roll, f , is mounted on an axle, a' , journaled in the ends of the hopper-frame. The mouth of the hopper opens directly on the feed-roll, and may be widened or narrowed by means of the screw-rods k , passing through one of the side walls of the hopper and secured to a lug on the back of the hinged feed-board b , pressure-springs p being coiled on the rods k inside the hopper, so that the board may give to permit the passage of any hard substance too large to pass through the opening when in working position. The rods are adjusted by thumb-nuts k' , screwed on the same.

The product falls from the feed-roll f upon an inclined shelf, a , which is connected with or empties on the upper end of the sieve s , which is the first in the series. This sieve, like all the succeeding ones in the series, is

formed of the side pieces, F , and the stepped supports F' , having the steps or treads covered by fine wire or silk bolting-cloth c . The succeeding sieves, $s' s^2 s^3$, of the series are in all respects similarly constructed, with the exception that they are progressively of coarser mesh of bolting-cloth, as clearly shown in Fig. 7. The sieve s terminates immediately above a spout, s^4 , which is secured to the bottom of the machine and receives the fine particles of flour from this sieve.

The sieves $s' s^2 s^3$ are each provided with a spout, $s^5 s^6 s^7$, respectively, to receive the material which passes through them, and a tailings-spout, t , opens directly under the end of sieve s^3 , to receive and carry all the coarser material which does not pass through the last sieve away to the next series of reduction-rolls.

The first sieve-section, s , is pivoted on a rod, r , which is located centrally in the side of the sieve-frame and in the side boards of the frame of the machine, so as to form an axis for and permit a free oscillation of the sieves thereon, while the sieves $s' s^2 s^3$ are hinged at their upper ends, from beneath, to cross-bars of the main frame beneath the sieves. The lower end of sieve s is connected, by means of a bolt, b' , secured to a cross-piece, H , hung in the sieve-frame, with the upper end of a vibrating rod, v , which extends nearly the whole length of the frame, and which is also connected by bolts $b^2 b^3 b^4$ with similar cross-pieces, H , in the lower ends of each of the other sieves of the series.

A projection, v' , is formed on the rod v near its center, as shown in Fig. 1, which is located directly over a cam-wheel, d , the latter being mounted on the shaft of a pulley, e , said shaft having bearings in a suitable frame-work below. A belt, B , runs from this pulley to the pulley g , mounted on the shaft a' of the feed-roll, alongside which, on the same shaft, is mounted a driving-pulley, from which leads a belt to the shaft of the driving mechanism.

The revolution of cam-wheel d imparts an up-and-down movement to the rod v , and, by means of the connecting-bolts $b' b^2 b^3 b^4$, to the series of sieves to which it is connected. The first sieve of the series, s , is oscillated or its ends given an up-and-down motion on its central pivoting-rod, r ; but each of the other se-

ries has a somewhat different movement, owing to its being hinged at its upper end to the frame, causing it to have its greatest movement at its lower end, or increasing in its vertical movement as its lower end is approached. If desired, however, all the sieves may be pivoted upon rods, as in the first section. This up-and-down movement of the sieves of course has the effect of sifting the material which falls on the sieves through the same. The vertical movement of the sieves may be increased or diminished within certain limits by means of the adjusting mechanism represented by the thumb-screw rods m , which pass through the corners of the sieves into the cross-sills of the frame below, each of said rods being provided with two springs, n n' , the former above the sieves and the latter below and resting on the sills. The springs n' operate as a buffer or cushion against washers placed on the under side of the sieves. By tightening the thumb-screw the spring n is compressed and the sieve forced downward toward the sills, and its rise or vertical movement shortened or limited.

T is the top or cover of the machine, which rises at the beginning of the second sieve, as shown in Fig. 1. This top has three compartments, 1 2 3, formed therein by the partitions 4 5, which open directly over the sieves s' s^2 s^3 , and three flues, f' f^2 f^3 , having suitable valves, g' g^2 g^3 , lead from said compartments to the main spout or flue g^4 , which leads to the exhaust-fan. The latter is driven by a belt, B' , running over pulley p^3 on its shaft. The top is removable at pleasure, and has paneled sides, which may also be removed. A secondary frame, A , having steps or risers, is suitably secured in the machine and provides bearings in its sides above the sieves for the pins or axles a^2 of a series of detaining-slats, u , so arranged that the lower ends or edges of the latter fall just below the upper surface of the treads of the sieves.

A rod, w , is connected to the upper edges of each series of detaining-slats, after the manner of ordinary window-blind slats, to actuate the same. It is intended by a proper adjustment of these slats to regulate the flow of material over the sieves by arresting or detaining the same on the sieves a longer or shorter time by moving the slats inward or outward on the steps of the successive series of sieves. The rod w may be easily reached from the outside through openings formed in the top, and is preferably operated by hand. The discharge-spouts, as above stated, are connected directly with the under side of the frame, and above these spouts, except spout s^4 , the frame recedes in steps or shoulders, between which are left openings o , for the admission of air-currents, whose movement is indicated by the curved arrows below the frame in Fig. 1, there being none provided for the first sieve, which it will be observed, also, has no connection with the fan.

My machine operates as follows: The pro-

duct which is delivered from the feed-roll in the hopper passes downward upon the curved shelf a and falls in a thin stream, and is distributed upon the top step of the upper sieve-section, which, being oscillated on its rod r by means of the vibrating mechanism, sifts the fine particles of flour through the same onto the bottom of the machine, and thence into the spout s^4 , and is carried away to its proper place, and it may either go directly to the packer or it may be carried to another machine for re-dressing, if desired. The coarser material, which will not pass through the first series of sieves, passes onward and is delivered directly upon the top step of the next succeeding sieve, which is also vibrated by means heretofore indicated, the material being, as in the former and each succeeding instance, detained a suitable time upon the steps of these sieves by means of the arresters u , and a portion of this material, which is middlings, will pass through this grade of the cloth and into the spout s^5 , and be carried thence to its proper place. The coarser material which will not pass through the sieves s' passes to the next section, and such of it as is fine enough, falling through those sieves, is carried through the spout s^6 to its proper place, and the still coarser material passes on to the last of the series of sieves, and such of it as is fine enough passes through those sieves and is carried away by the spout s^7 , while the still coarser material passes over the sieves into the tailings-spout t and is carried away for further reduction. As the material enters the second series of sieves, air-currents are drawn through the openings o , up through the cloth of the sieves, and with them the lighter impurities, which, adhering to the broken grain, have passed the first sieve, and thence into the appropriate flues connected with such sieve-sections and are carried away by the fan, and this draft is regulated in the spouts by means of the valves g' g^2 g^3 , so that the current may be increased or diminished, as desired.

In summing up the result accomplished by my machine it will be seen that what passes through the upper sieve section is flour, and what passes through the second, and, in fact, all the lower sections is a finer or coarser grade of middlings, and in the last of the series the germs, being about the same size as the coarser middlings, also pass through the sieve, so that I combine in this machine means for taking the flour out of the chop in the first instance, grading the several sorts of middlings, separating them into their appropriate grades, and carrying them away, as graded, into proper receptacles, and aspirating them by means of currents of air drawn up by the exhaust of the fan, while in the last instance the coarser particles, which are too coarse to pass through any of the sieves, are ready to be delivered to the next set of rolls.

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

1. In a machine for separating, grading, and purifying chop, the combination of a feed device, an inclined frame, a series of sieves of different degrees of fineness, each pivoted in said frame, the uppermost being centrally pivoted and the others hinged at their upper ends, means, substantially as described, for vibrating each of said sieves, separate discharge-spouts for material passing through said sieves, an inclosing-case, air-flues connected with the top thereof, and an exhaust-fan adapted to draw air up through all the sieve sections except the first one, substantially as and for the purpose set forth.

2. The combination of a series of vibrating sieve-sections successively increasing in coarseness, an inclosing-casing formed with a depressed portion inclosing the first section of the sieves and an elevated portion forming an air-trunk over the succeeding sections of the sieves, an exhaust-fan adapted to draw the air up through all the sieve-sections except the first, and valves whereby the force of the air-currents may be regulated, substantially as and for the purpose described.

3. The combination of a supporting-frame, a movable bar, means for agitating said bar, a series of sieve-sections, each pivoted to the supporting-frame, connections between the sieve-sections and the agitating-bar, and an adjustable spring-support for the free portion of each sieve, whereby the amount of vibration of each sieve may be adjusted, substantially as and for the purpose set forth.

4. The combination of a series of inclined vibrating sieves, an inclosing-case, and devices for producing an upward current of air through said sieves, with a series of detaining-slats arranged above the sieves, and means for separately adjusting said detaining-slats above each sieve, substantially as and for the purpose set forth.

5. The combination, with an inclined sieve consisting of a series of steps, of a series of detaining-slats arranged above the sieve and having their lower edges near to and below the upper edge of each tread or step, and means for adjusting the same with or against the flow of material, whereby said flow may be regulated, substantially as described.

6. The combination of an inclined frame and a series of sieves successively increasing in coarseness from above downward, means for vibrating said sieves, an inclosing-case, air-flues connected with the top thereof, an exhaust-fan adapted to draw air up through all the sieves except the first, and a series of adjustable detaining-slats, substantially as and for the purpose set forth.

In witness whereof I have hereunto set my hand this 5th day of February, 1886.

HENRY C. McKEEN.

Witnesses:

C. P. JACOBS,
HATTIE MURRY.