(No Model.)

4 Sheets—Sheet 1.

C. H. SINDERSON.

MIDDLINGS PURIFIER.

No. 327,607. Patented Oct. 6, 1885.

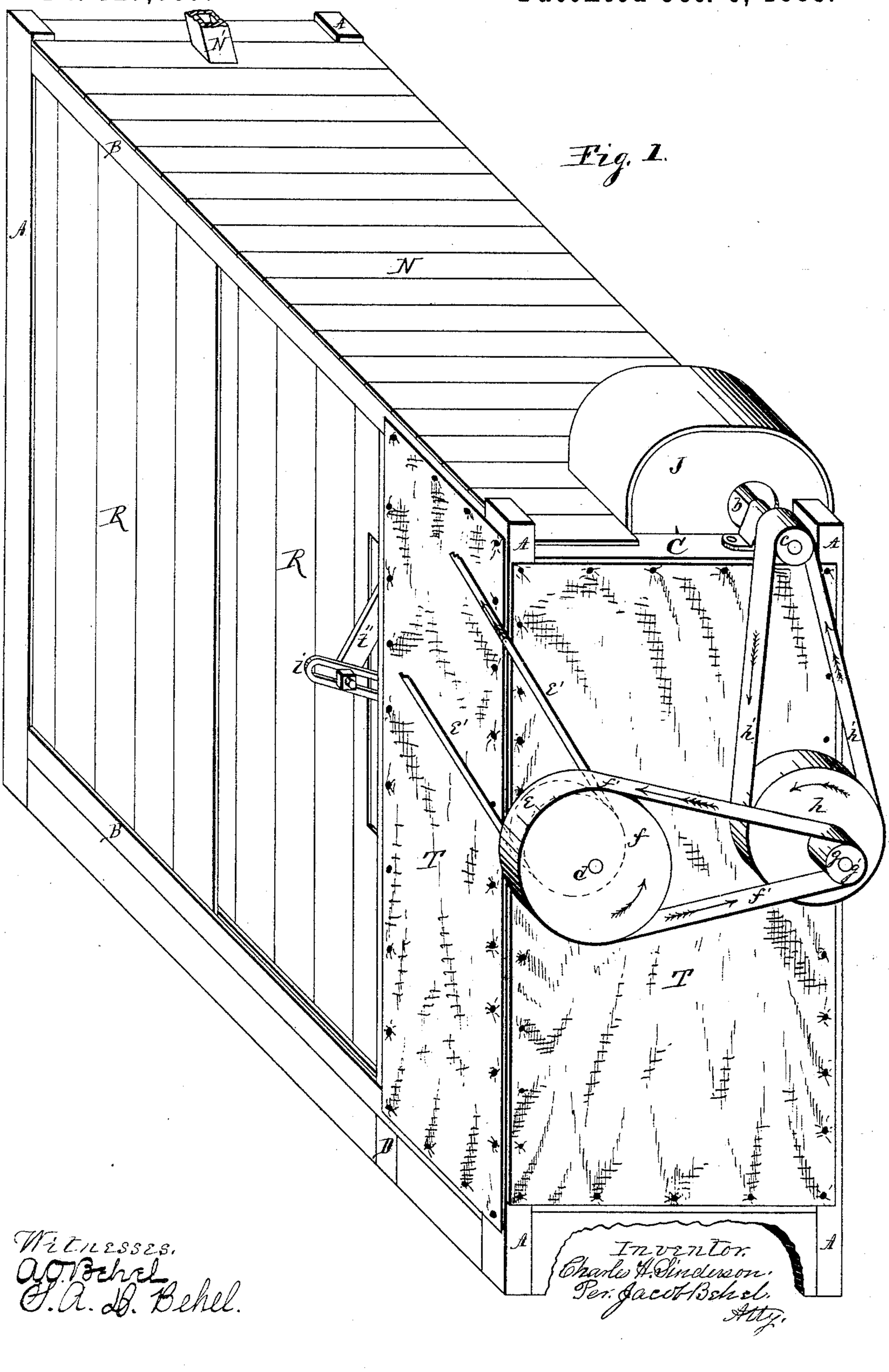

Fig. 1.

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(No Model.) 4 Sheets—Sheet 2.

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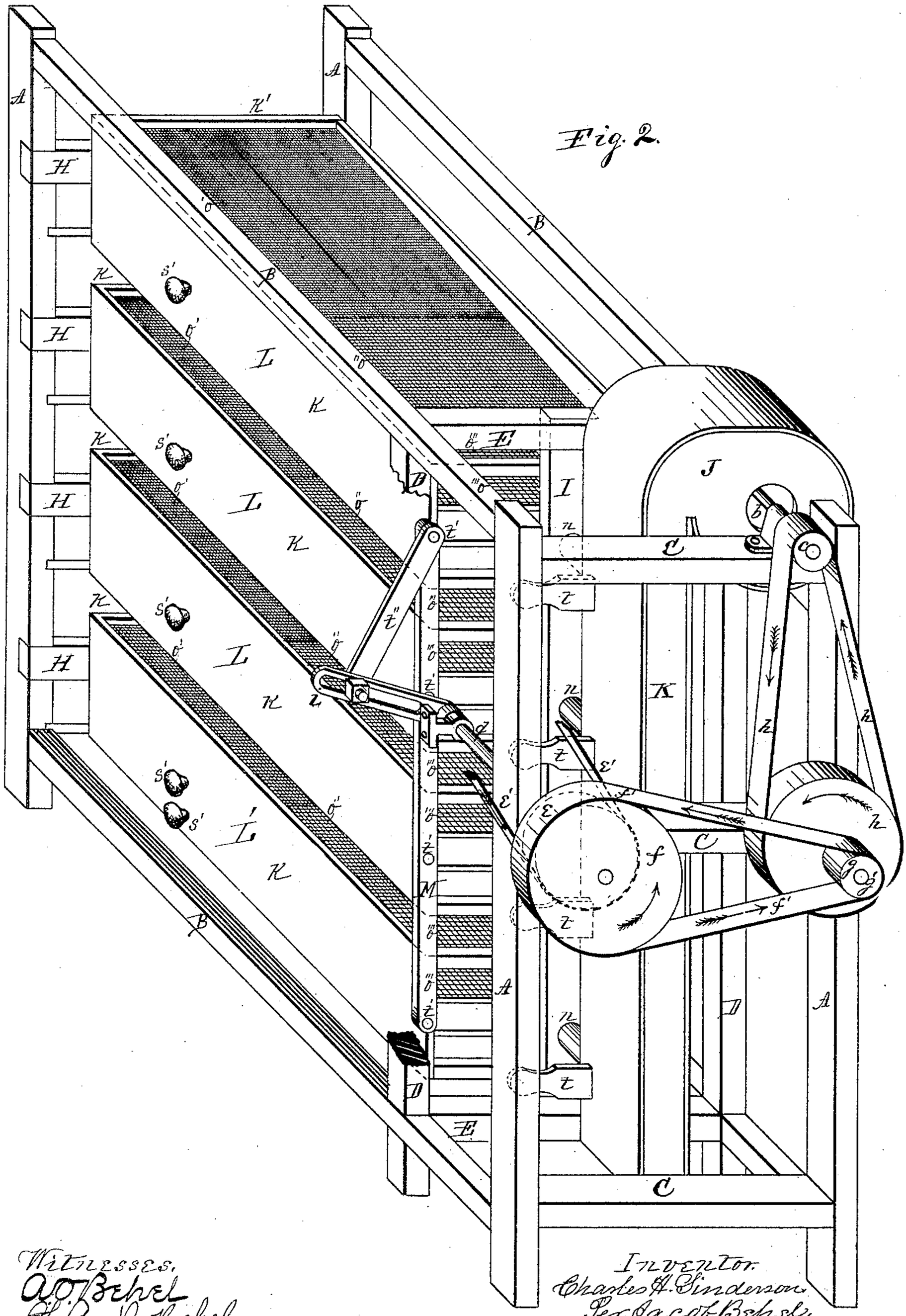
MIDDLINGS PURIFIER.

No. 327,607. Patented Oct. 6, 1885.

Fig. 2.



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(No Model.) 4 Sheets—Sheet 3.

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MIDDLINGS PURIFIER.

No. 327,607. Patented Oct. 6, 1885.

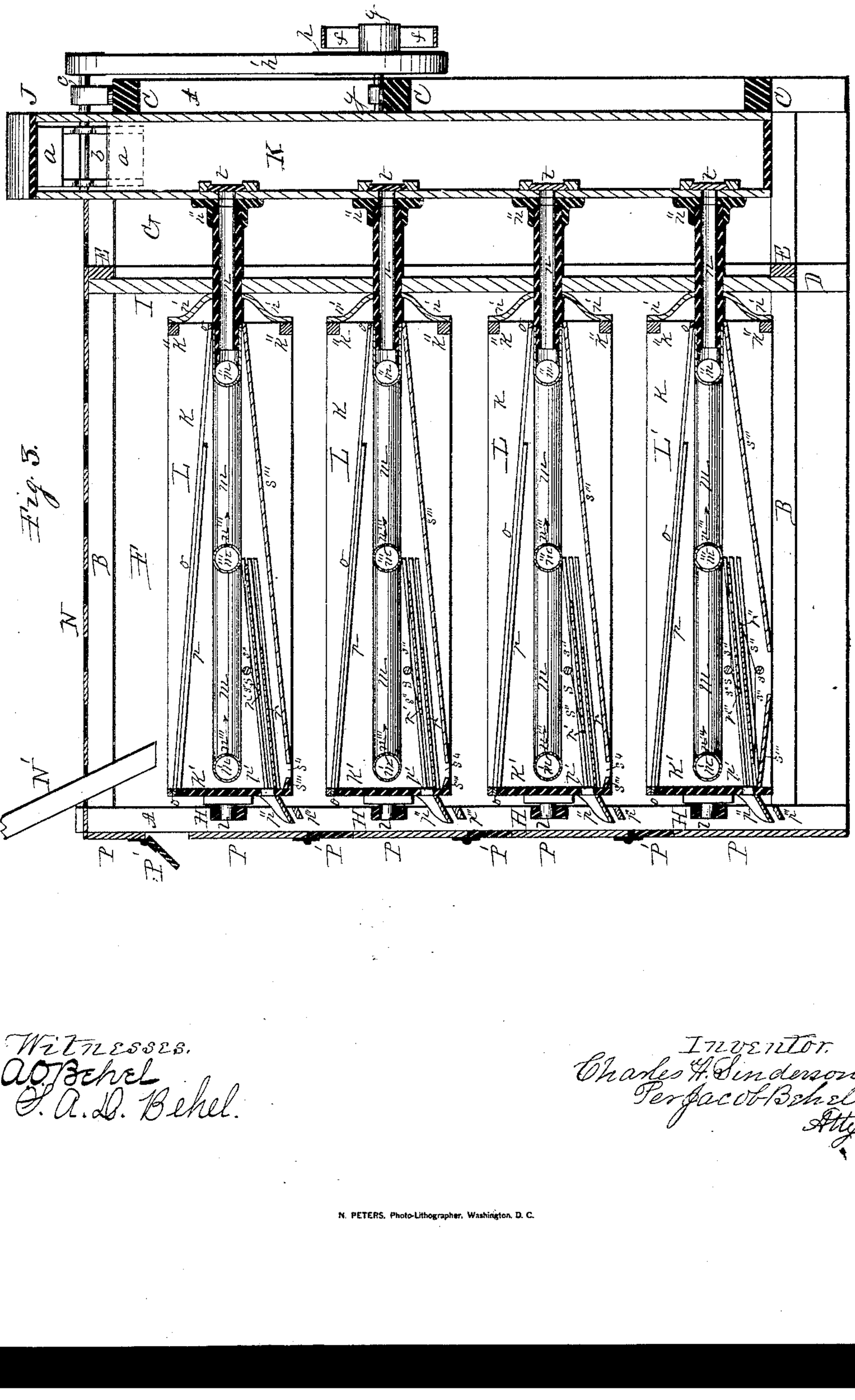

Fig. 5.

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(No Model.) 4 Sheets—Sheet 4.

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MIDDLINGS PURIFIER.

No. 327,607. Patented Oct. 6, 1885.

Fig. 5.

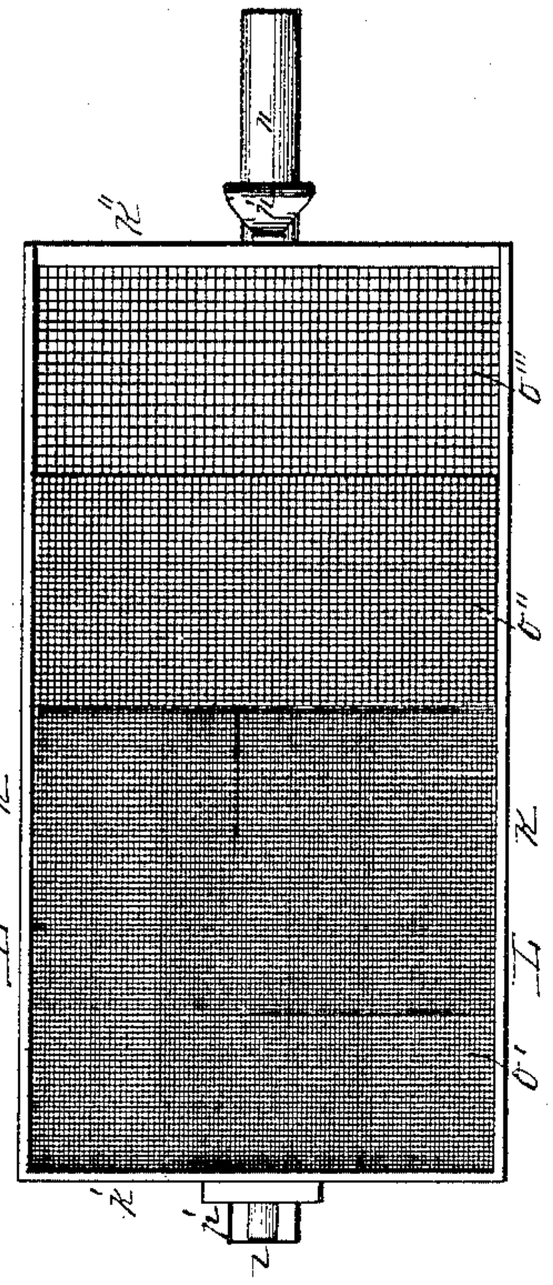


Fig. 6.

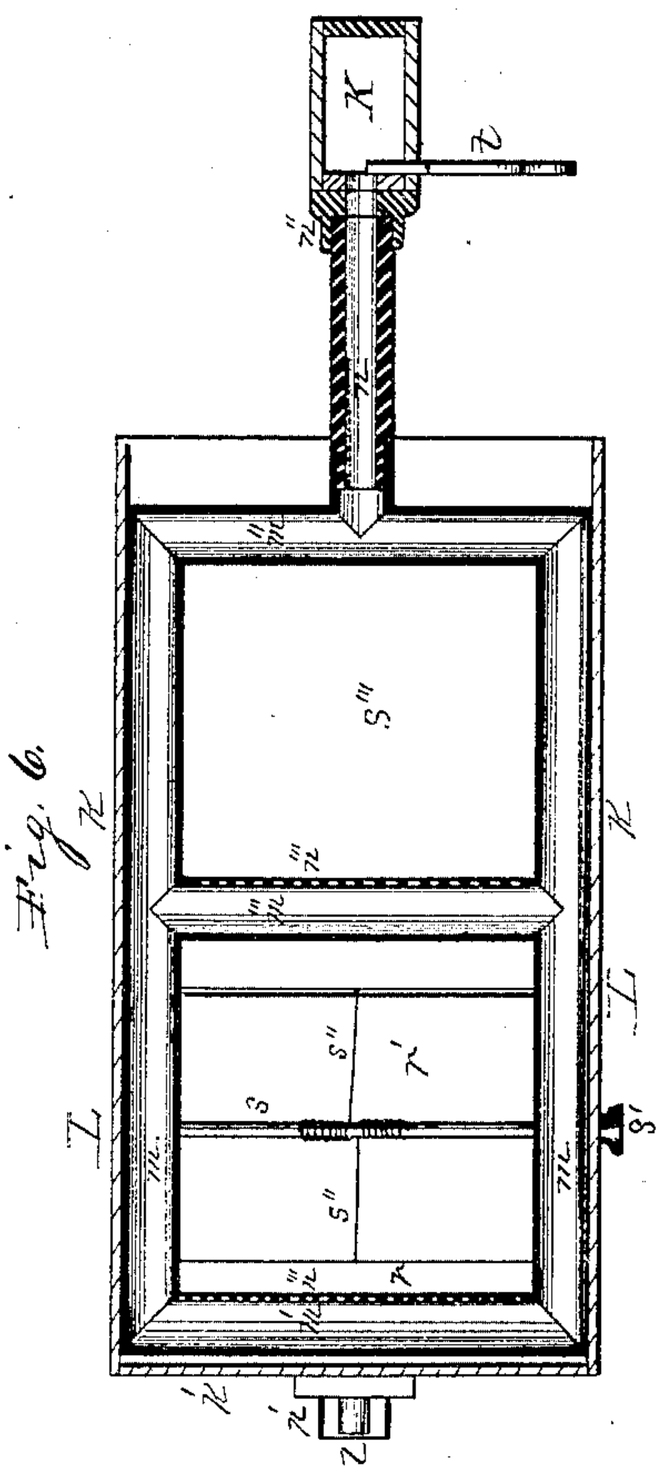
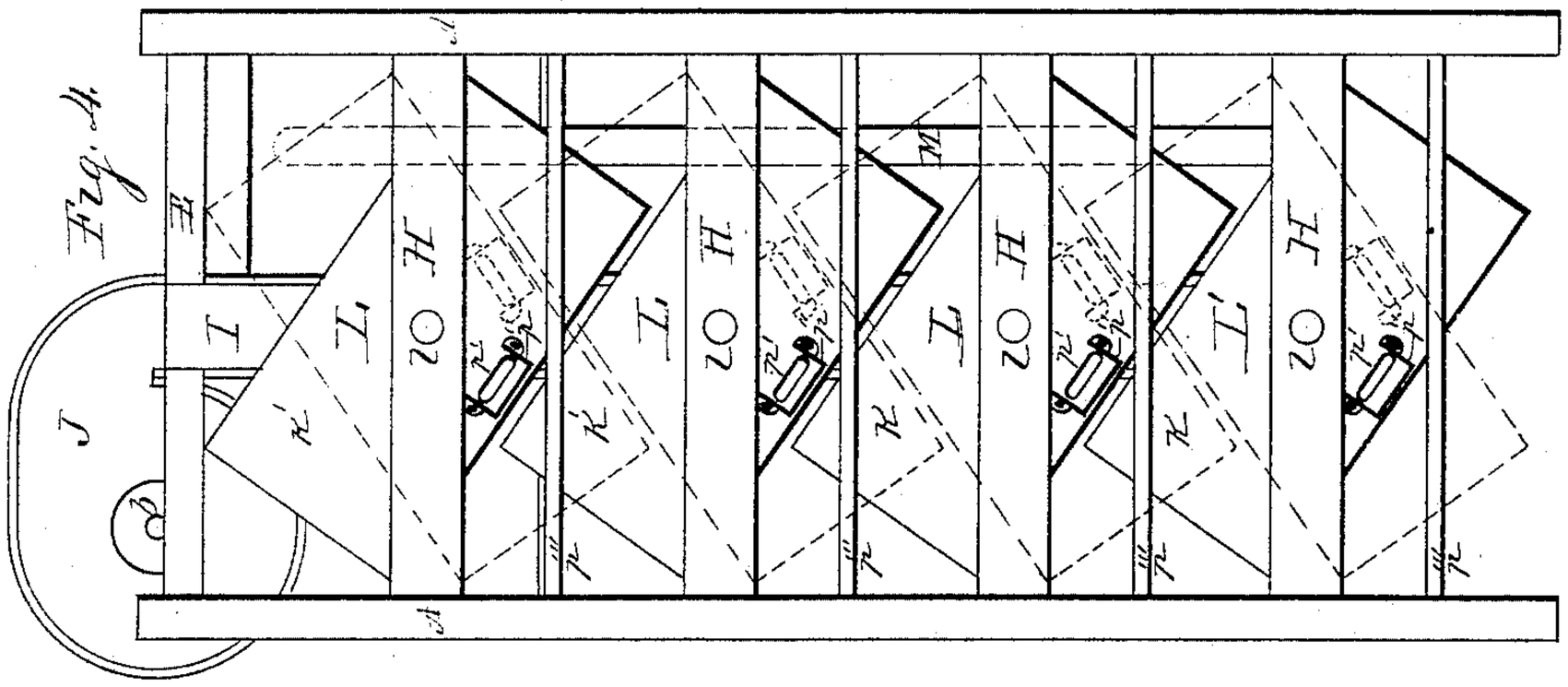


Fig. 4.



Witnesses.
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J. A. L. Behel.

Inventor:
Charles H. Sinderson.
Per. Jacob Behel.
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UNITED STATES PATENT OFFICE.

CHARLES H. SINDERSON, OF ROCKFORD, ILLINIOS.

MIDDLINGS-PURIFIER.

SPECIFICATION forming part of Letters Patent No. 327,607, dated October 6, 1885.

Application filed February 9, 1883. Serial No. 84,452. (No model.)

To all whom it may concern:

Be it known that I, CHARLES H. SINDERSON, a citizen of the United States, residing in the city of Rockford, in the county of Winnebago and State of Illinois, have invented a new and useful Middlings-Purifier, of which the following is a specification.

This invention relates to that class of middlings-purifiers in which sieves or bolts and air-blasts combined are employed to purify the middlings preparatory to regrinding. The object of this invention is to produce a machine which, in proportion to its dimensions and amount of power consumed, will be capable of an increased amount of work in a given time, and to dispense with the dust room or house usually required in connection with this class of machines. To this end I have designed and constructed the machine represented in the accompanying drawings, in which—

Figure 1 is an isometrical representation of a middlings-purifier embodying my invention. Fig. 2 is also an isometrical representation in which the outer casing is omitted. Fig. 3 is a central vertical section lengthwise of the machine. Fig. 4 is an end elevation with casing omitted. Fig. 5 is a plan view of one of the sieves or bolts. Fig. 6 is a horizontal section of one of the sieves or bolts cut centrally through the air-tubes.

In the figures, A represents the corner-posts, B the side beams, C the end beams, D inner posts, and E the transverse beams of inner frame, all of which are rectangular in cross-section, of suitable dimensions, and are framed or otherwise suitably joined to each other in such a manner as to produce a rectangular frame, in this instance having a length and height substantially equal, and a width less than half the length or height, and by means of the transverse frame placed toward one end thereof the inclosure is divided into to two compartments, F and G, differing in size.

The outer end frame of the larger compartment F is provided on its inner side at proper intervals with transverse bars H, gained into the corner-posts, and the inner transverse frame is provided with a vertical bar, I, placed centrally on the inside of the larger compartment G, gained into the transverse bars of the frame.

At J is represented a fan-case of suitable dimensions, supported on the upper corner portion of the frame within the smaller chamber in such position that the position of the air-chamber K, of spout form, depending from the fan-case, shall be substantially central in the width of the chamber and supported in position therein on the end beams of the frame.

At *a* is represented a blast-fan of ordinary construction, mounted to revolve within the fan-case, having its supporting-shaft *b* supported to revolve in suitable bearings fixed on the main frame or to the fan-case. The outwardly-projecting end portion of this fan-shaft is provided with a belt-pulley, *c*.

At *d* is represented the driving-shaft of the machine, supported to revolve in suitable bearings on the main frame. On the outer end of this shaft is fixed a driven pulley, *e*, which receives the main driving-belt *e'*, that connects with the prime mover. This driving-shaft *d* is also fitted with a larger pulley, *f*, to receive a belt, *f'*, to connect with the small counter-pulley *g* on the counter-shaft *g'*, supported to revolve in suitable bearings on the main frame. This counter-shaft *g'* is also fitted with a larger counter-pulley, *h*, which receives the belt *h'*, to connect with the pulley *c* on the fan-shaft. From this system of pulleys and belts moving in the direction indicated by the arrows, it will be seen that a rapid motion will be given to the fan to fill the air-chamber. The inner end of the driving-shaft *d* is provided with a crank-arm, *i*, slotted lengthwise, for a purpose to be hereinafter described.

At L and L' are represented a series of sieve-supporting or bolt frames, which are constructed in rectangular-box form having vertical sides *k*, and head end, *k'*, and the sides are joined at their tail ends by transverse bars *k''*. These several frames are provided with journals *l*, projecting centrally from the vertical ends *k'*, and are fitted to oscillate in bearings formed centrally in the transverse bars H in the main frame. These sieve-supporting frames are provided with a system of air-tubing consisting of the longitudinal side tubes, *m*, connected by the transverse end tubes, *m'* and *m''*, and a central transverse tube, *m'''*, joined in proper manner in plan rectangular and of such dimensions as to enter snugly within the sieve-

supporting frame in which it is placed in a horizontal position about centrally in the height thereof.

To the central portion of the tail end transverse tube, *m''*, is joined a central longitudinal tube, *n*, from which it extends outward through the tail end of the sieve-supporting frame, through a bracket-support, *n'*, fixed to the transverse tail-end bars, *k''*, and through suitable bearings in the central vertical end bar, I, on the central transverse frame in such a manner as to oscillate therein. This central longitudinal tube extends beyond its bearing-support, and its end portion enters a tubular bearing, *n''*, fixed to the vertical spout-like air-chamber K in such a manner as to communicate with the interior of the air-chamber and to oscillate in its bearings. The head-end tube, *m'*, and the central transverse tube, *m'''*, on the side thereof toward the tail end of the machine, are perforated on a horizontal line, as shown at *n'''*. These several sieve-supporting frames, as seen in the drawings, are placed at proper intervals in a vertical series within the main frame supported on their end bearings to oscillate on their lengthwise axis, and in such a manner that the air forced into the vertical spout-like air-chambers by the blast-fan will pass through the several tubes in the frames, and will be discharged through the perforations on their tail sides, *n'''*, in a line or sheet always parallel to the horizontal transverse plane of the frame.

At *o* are represented sieve-frames, rectangular in plan, of proper dimensions to snugly enter the sieve-supporting frames. On these frames are stretched and properly fixed suitable grades of bolting-cloth, preferably in the order shown in Fig. 5, in which the finest grade of cloth, as at *o'*, is placed at the head of the sieve-frame, and the central section, as at *o''*, is of a coarser grade, and the tail portion, as at *o'''*, is of a still coarser grade; but instead of the three grades, but two may be employed, in which, instead, the coarser grades *o''* and *o'''* may be of a like grade of cloth coarser than the head section, *o'*. This same order of grades in the cloth of the several sieves I prefer to maintain throughout the series, but prefer that the grades of cloth shall vary in the respective sieves of the series in such a manner that the upper sieves of the series shall contain the finer grades of cloth, and each succeeding sieve in the descending series shall contain a coarser grade of cloth; but they may be varied in any proper manner to meet the requirements of the user. These several sieves are placed in the upper portion of their respective sieve-frames in a removable manner, in an inclined position on battens *p*, fixed to the inside of the sieve-supporting frames in such a manner as to support the sieve in an inclined position, being higher at the head of the sieve than at its tail end. These several sieve-supporting frames are provided with end openings, *p'*, and spouts *p''*, projecting outward therefrom above the inclined bars *p'''*, placed between the inner faces of the end posts. The three upper sieve-frames in the series are each provided with a fixed inclined board, *r*, connecting with the inner face of the head end at the under side of the openings *p'* in the head ends of the sieve-supporting frames. These boards *r* in this instance are fixed in position between battens fixed to the sides of the frame. Immediately above these fixed boards are represented other like boards, *r'*, placed in grooved ways between battens fixed to the sides of the sieve-supporting frames parallel with the fixed board. These upper boards, *r'*, are supported in their grooved ways in such a manner as to slide freely therein.

At *r''* and *r'''* in the lowest sieve-frame, L', are represented boards substantially the same as those at *r* and *r'*, above described, and are supported in the sieve-supporting frame in the same relative position in grooved ways, but in this instance both boards *r''* and *r'''* are capable of a sliding movement in their grooved-way supports.

At *s* are represented rod-like shafts placed contiguous to the sliding boards, crosswise of the sieve-supporting frames, having their supports on the sides of the frames, and on one side thereof projecting through the side, and are provided with enlargements *s'*, by means of which they may be turned or made to oscillate in their bearings. These several rod-like shafts are connected to the sliding boards by means of cords *s''*, or other suitable device, wound round the shafts and connected to the outer edges of the boards in such a manner that the oscillatory movements of the shaft will cause the boards to move in their grooves. These boards are designed to receive the headings or purified portion of the middlings and conduct them through the head-end openings, *p'*, and spouts *p''*, to descend at the end of the machine, to be conducted to the regrinders, and by means of their adjustments more or less of the headings may be thus separated to be reground.

At *s'''* are represented inclined boards fixed in the sieve-supporting frames underneath the sieve, and the inclined boards at the head-end portion of the frame. These fixed inclined boards are arranged so as to form an outlet opening, s^4, near the head end of the frame. These inclined boards, thus arranged, are designed to receive such grades of the middlings as are passed through the sieve in the same frame and not otherwise cared for, and conduct and discharge them through the openings s^4 onto the head of the sieve in the frame next below until they have reached the inclined board in the lower sieve-frame, L', when they will be discharged into the space below the sieve-frames, from which to be conducted to the regrinders and again subjected to the separating process or otherwise cared for.

In the arrangement of the lower board, *r''*, supported in the grooved ways in the head

end of the lower sieve-frame, L′, and made adjustable therein by means of the shaft placed below it, it will be seen that when it is moved toward the tail end of the frame, as shown in Fig. 3, all the middlings that pass through the sieve will pass through the opening s^4 to the space below.

At *t* are represented slides fitted to move in suitable guides in the vertical air-chamber past the open ends of the air-tube journals of the sieve-frame, by means of which the quantity of air admitted to the air-tubes of the sieve-frames may be regulated.

At M is represented a connecting-bar of suitable dimensions, having pivotal connections at *t′* with the outer ends of the several sieve-supporting frames in such a manner that an endwise up-and-down movement of the bar will cause the sieve-frames to oscillate about their axes.

At *t″* is represented a pitman having a pivotal connection with the connecting-bar M, and a wrist-pin connection with the slotted crank-arm in such a manner that a rotary movement of the crank-arm will impart an oscillatory movement to the sieve-supporting frames and to the sieves supported therein. The wrist-pin has a screw-clamping bolt connection with the slotted crank-arm in such a manner as to permit adjustment to or from its axis of motion, by which the throw of the crank and the rising motion of the sieve-frames and the sieves supported therein may be varied. The main portion of the supporting or main frame of this machine is provided with an outer casing having its upper surface at N sheeted with boards.

At N′ is represented an induction-spout, which extends through the sheeting at the head end of the machine, in position to deliver the middlings onto the head end of the sieve as they flow through the spout.

The vertical wall of the head end of the machine is formed of alternate boards P and hinged doors P′, in such relation with the sieve-supporting frames that the hinged doors P′ shall be opposite the sieves in the supporting-frames to permit them to be withdrawn through the opening of the hinged doors.

The side beams, B, of the frame are grooved on the upper face of the lower beams and on the under face of the upper beams in a manner to receive the side walls, R, constructed as doors in such a manner as to slide past each other in a manner to open one-half of the frame when either of the doors is moved in its grooved ways. That portion of the frame which is below the side and beams is closed by boards or otherwise.

The vertical outer walls of the tail-end division of the main frame consist of a suitable fabric or open webbing of a character to prevent the passage of the dust from the middlings and still permit the passage of air. This fabric is represented in place on the frame at T, having its edges tacked or otherwise fixed to the beams and posts of the frame.

In the use of my improved machine the middlings to be operated upon will be admitted through the induction spout N′ onto the head end of the sieve, and motion being imparted to the driving-shaft will be imparted to the several parts in the direction indicated by the arrows, causing the sieve-frames and the parts contained therein to oscillate, which movement will produce a sieving action, causing the finer particles to pass through the sieve or bolting cloths, which will be in grades in proportion to the grade of cloth through which they have passed, and the coarser particles will be carried over the tail end of the sieve, and will be deposited in the small compartment G of the frame.

In the movements of the machine the blast-fan will be made to revolve and fill the air-chamber with compressed air, which will be forced into the air-tubes of the sieve-supporting frames, and will be discharged through the perforations of the transverse tubes under the sieves rearward, which action will carry the dust and impurities rearward out of the tail end of the sieve into the compartment G, where, by means of the distribution of the air in the compartment in escaping through the canvas or fabric walls on the three sides of the compartment, the impurities will descend and mix with the tailings. In this operation the several grades of the middlings not deposited as tailings will be disposed of, as hereinbefore described.

In the foregoing I have described my improved separator as a middlings purifier or separator, for which purpose it is especially designed, and have represented the sieves as composed of bolting-cloth; but instead thereof other fabric, such as wire cloths or webbings may be employed, and the machine may be employed as a grain or seed separator, or for other like purposes to divide articles requiring a graded separation, and for this purpose the discharges through the spouts at the head end of the sieve-frame may be into independent conductors to be conveyed to independent receptacles.

In the above-described machine I have employed a blast-fan as a convenient device for producing a current of compressed air; but instead thereof other known devices capable of use for the purpose may be employed.

I claim as my invention—

1. The combination, with a sieve and its oscillating supporting-frame, of air-tubes mounted to oscillate with said supporting-frame, whereby the points of discharge are maintained in their fixed relation to the sieve, and the blast kept uniform under the various movements of the same, substantially as described.

2. The combination of a sieve-supporting frame mounted to oscillate about its axial center, a sieve supported in said frame, air-tubes

fixed in the frame below the sieve to discharge the blast rearward, and an inclined bottom arranged below the air-tubes, provided with an opening at or near the head end, whereby the middlings are carried toward the head of the frame while the dust is carried backward by the blast, substantially as and for the purpose set forth.

3. The combination of the oscillating sieve-supporting frame, mounted to oscillate about its axial center, a sieve supported therein, the air-tubes fixed to oscillate with the frame and arranged under the sieve, and an air-supply pipe and a blast-fan, substantially as described.

4. The combination of a series of sieves, a bar connected thereto for oscillating the same, a slotted crank-arm and pitman, and a wrist-pin having a pivotal connection with the pitman and made adjustable in the slotted crank-arm by means of a clamping-bolt connection, substantially as and for the purpose set forth.

5. The combination, with the sieve-frame having the sieves supported therein, of a dust-receptacle arranged at the tail end of the sieve-frame and extending out beyond the sieves, said dust-compartment having its side and end walls covered with a woven fabric or pervious material to permit the escape of the air from said dust-chamber while preventing the escape of the dust therefrom, substantially as and for the purpose set forth.

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