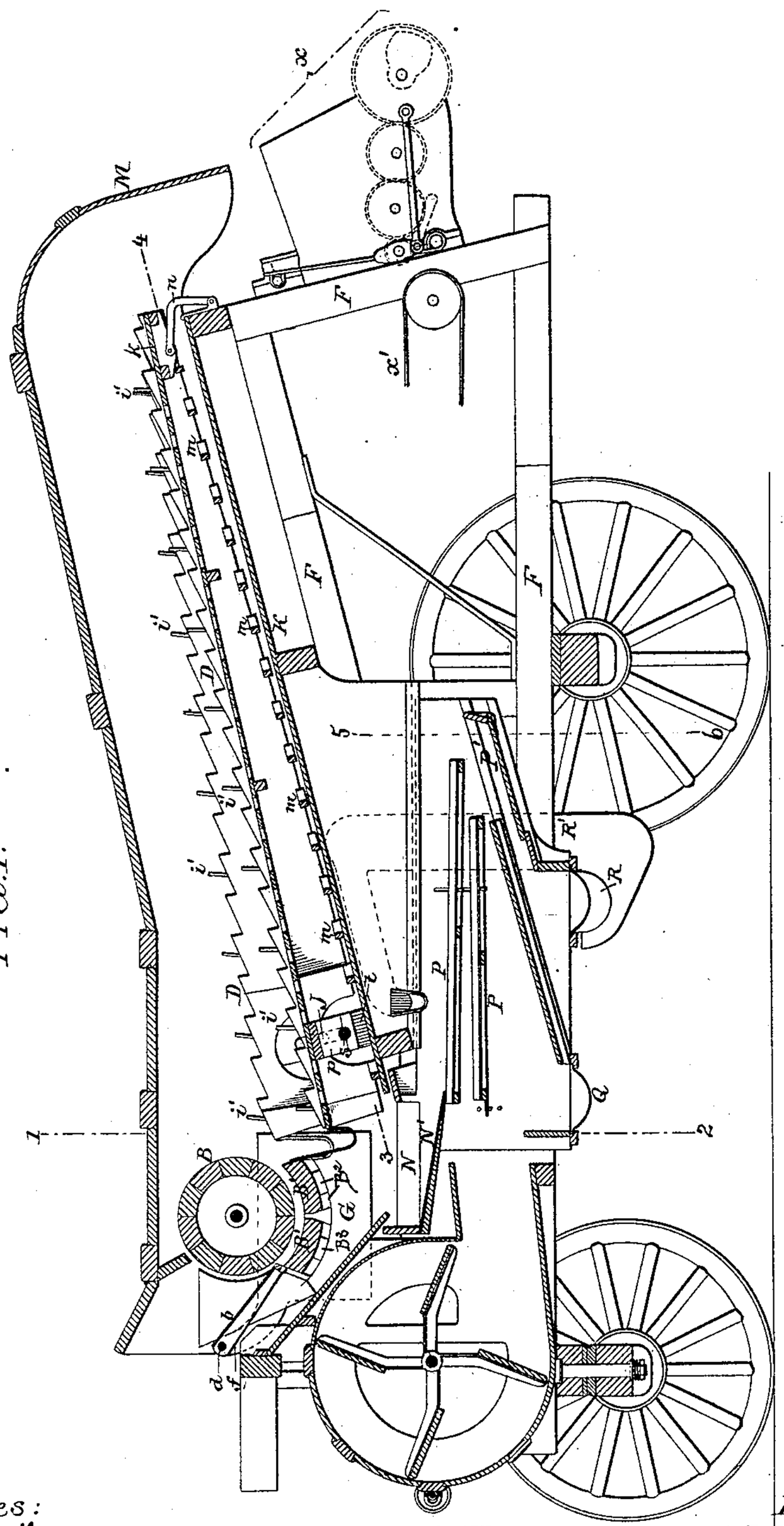
(No Model.) 5 Sheets—Sheet 1.

W. H. BUTTERWORTH & J. BUTTERWORTH, Jr.

THRASHING MACHINE.

No. 379,762. Patented Mar. 20, 1888.

FIG. 1.



Witnesses:
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William D. Conner.

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Howson and Howson.

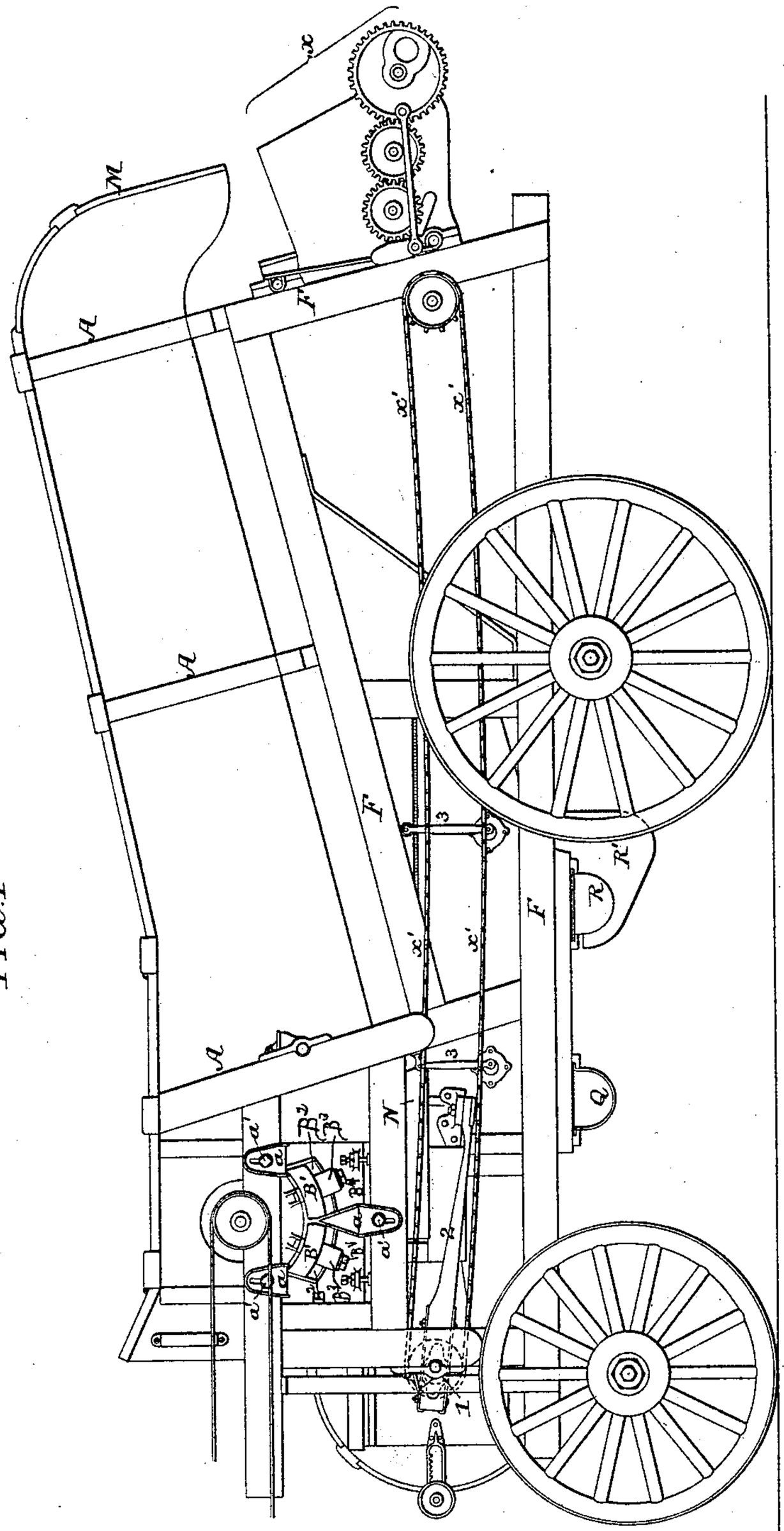
(No Model.) 5 Sheets—Sheet 2.

W. H. BUTTERWORTH & J. BUTTERWORTH, Jr.

THRASHING MACHINE.

No. 379,762. Patented Mar. 20, 1888.

FIG. 1.



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W. H. BUTTERWORTH & J. BUTTERWORTH, Jr.

THRASHING MACHINE.

No. 379,762. Patented Mar. 20, 1888.

FIG. 2.

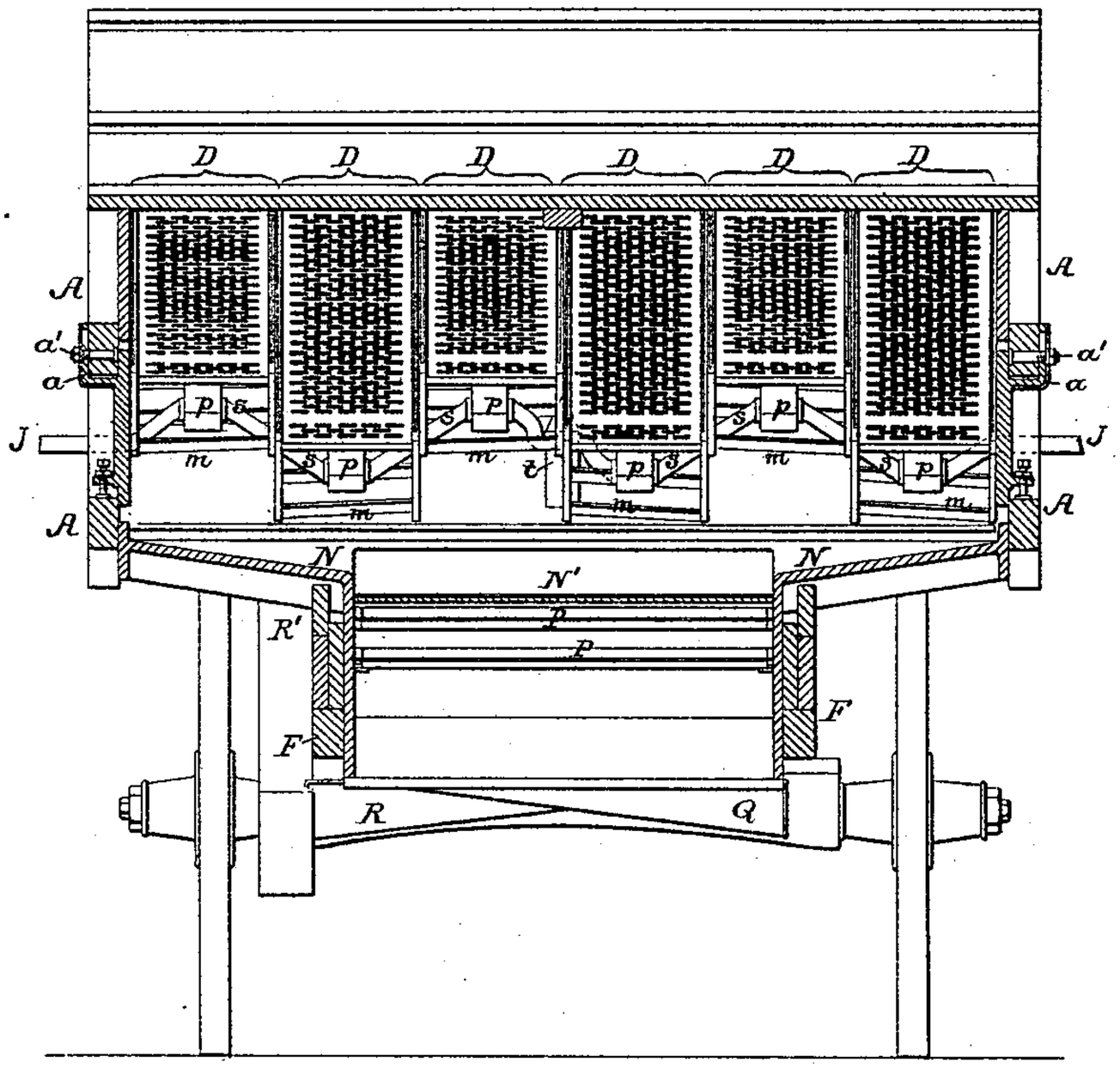


FIG. 3.

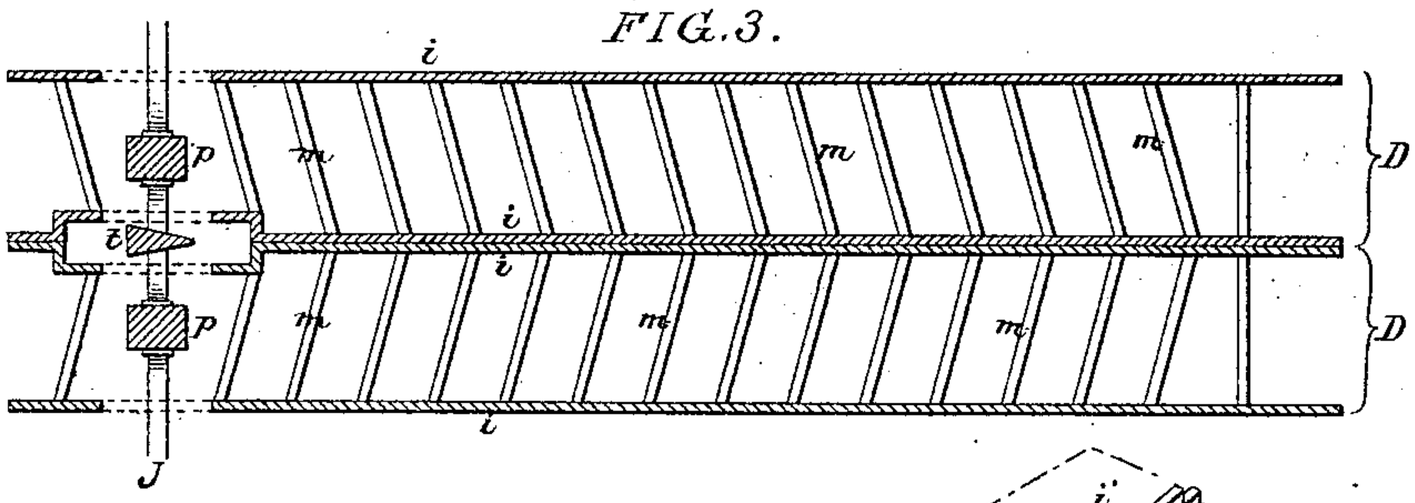
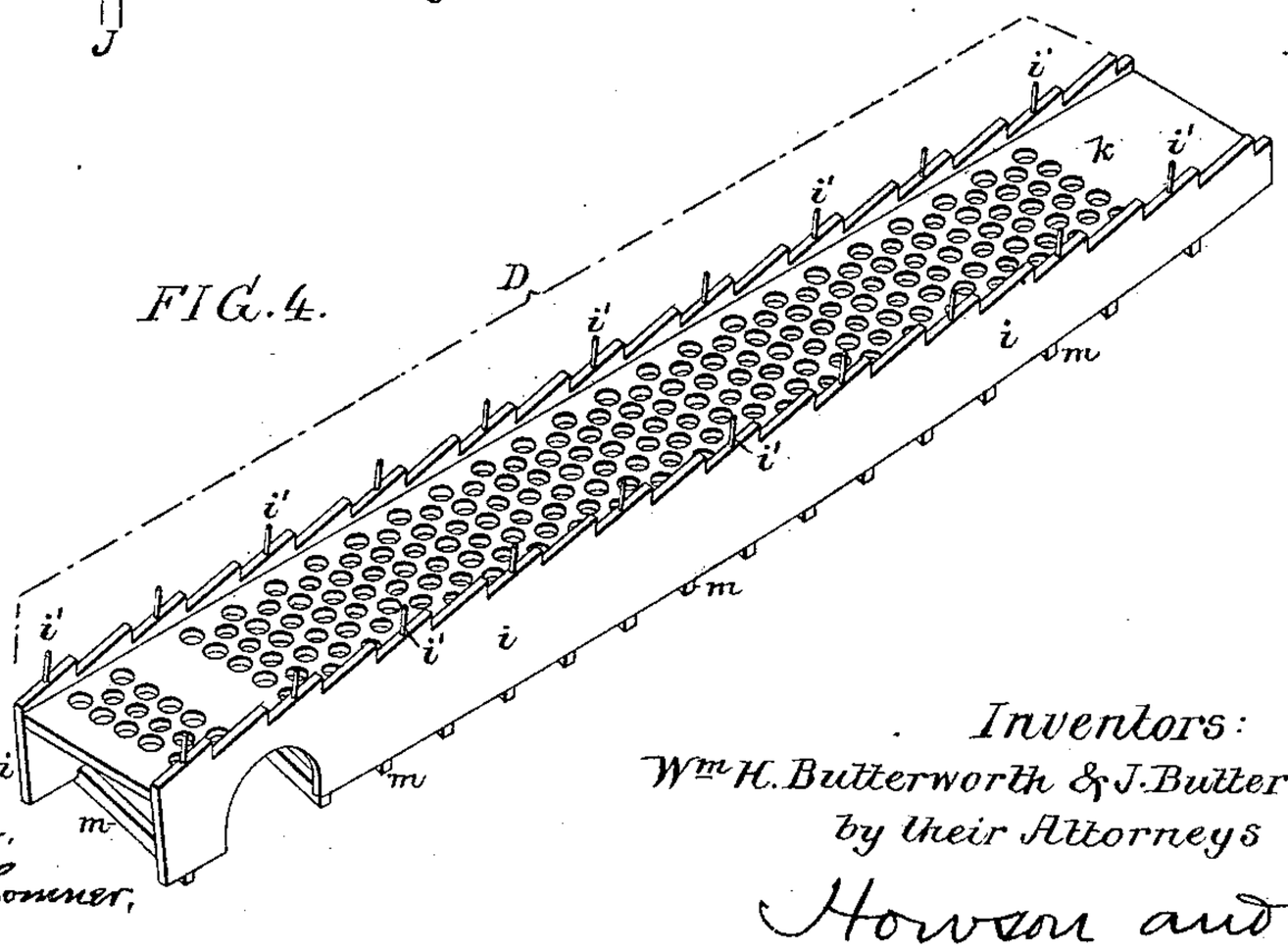


FIG. 4.



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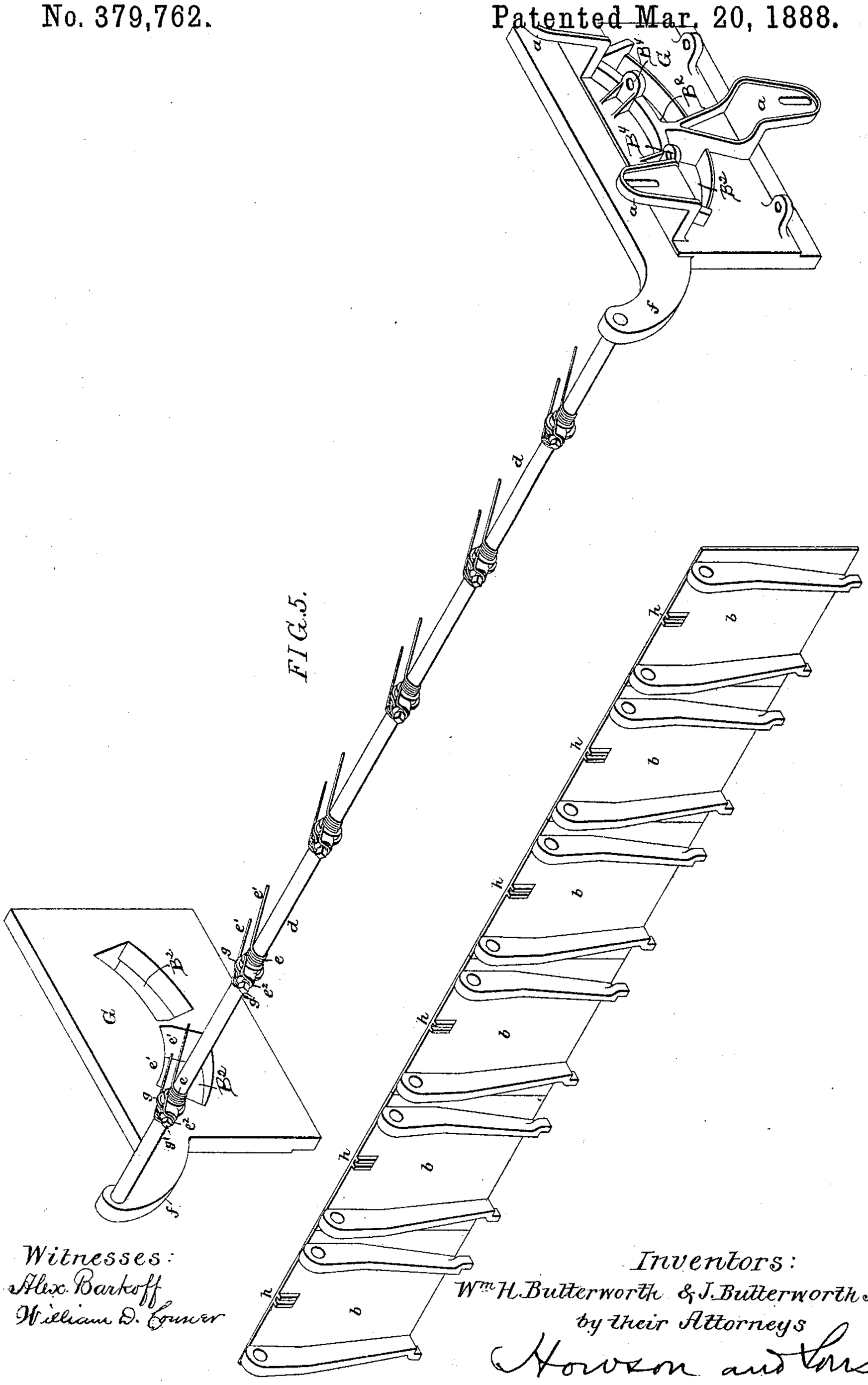
W. H. BUTTERWORTH & J. BUTTERWORTH, Jr.

THRASHING MACHINE.

No. 379,762. Patented Mar. 20, 1888.

FIG. 5.



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(No Model.) 5 Sheets—Sheet 5.

W. H. BUTTERWORTH & J. BUTTERWORTH, Jr.

THRASHING MACHINE.

No. 379,762. Patented Mar. 20, 1888.

FIG. 7.

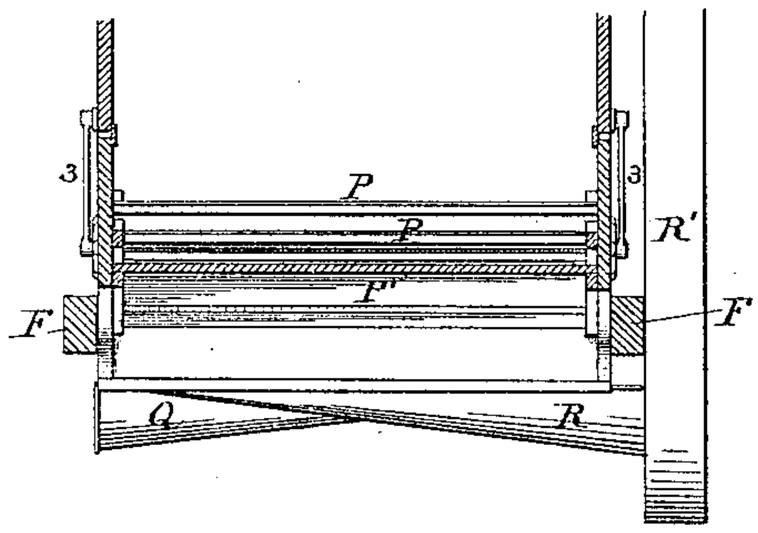
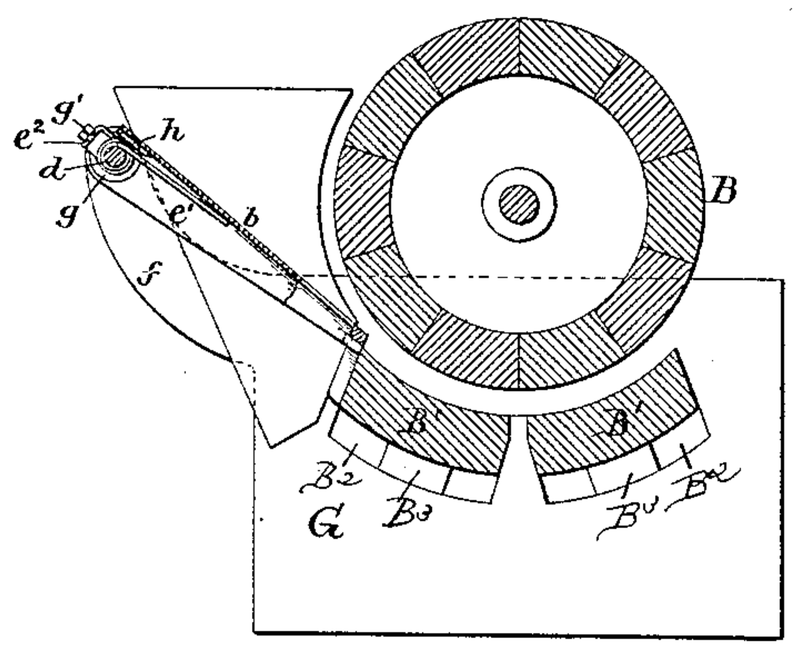


FIG. 6.



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John Butterworth, Jr.
by their Attorneys,
Howson & Sons.

UNITED STATES PATENT OFFICE.

WILLIAM H. BUTTERWORTH AND JOHN BUTTERWORTH, JR., OF TRENTON, NEW JERSEY.

THRASHING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 379,762, dated March 20, 1888.

Application filed May 8, 1886. Serial No. 201,538. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM H. BUTTERWORTH and JOHN BUTTERWORTH, Jr., both citizens of the United States, residing at Trenton, Mercer county, New Jersey, have invented certain Improvements in Thrashing-Machines, of which the following is a specification.

Our invention relates to that class of thrashing-machines known as "long-straw thrashers," in which the straw lies crosswise of the machine in its passage through the same and is not broken by the action of the thrashing-cylinder and concave bars, our invention comprising certain details in the construction of a machine of this class, as fully set forth and claimed hereinafter.

In the accompanying drawings, Figure 1 is a longitudinal section, partly in elevation, of a thrashing-machine of the character described with our improvements. Fig. 1ª is a side view of the machine; Fig. 2, a transverse section of the machine on the line 1 2, Fig. 1; Fig. 3, a sectional plan of part of the machine on the line 3 4, Fig. 1; Fig. 4, a perspective view of one of the sections of the grain-separator and straw-carrier of the machine; Fig. 5, a perspective view showing the opposite concave bar-holding plates, the feed-aprons, the rod for carrying the latter, and the springs for supporting them; Fig. 6, a longitudinal section of part of the machine on a larger scale than Fig. 1, showing the relation of the feed-aprons to the concave bars; and Fig. 7, a transverse section on the line 5 6, Fig. 1.

It may be well to state at the outset that in machines of the class to which our invention relates the cylinder and concave bars are provided with corrugated metal plates or otherwise so constructed as to dislodge the grain by a rubbing action, the object being to avoid the breaking or other mutilation of the straw, which on account of its length and soundness commands a good price. The straw is fed into the machine in a direction crosswise of the latter, and after passing the cylinder and concave bars is carried rearward and delivered onto a binding-table or to an automatic binding-machine, to be tied into bundles. In machines of this class it is necessary that the thrashing-cylinder and concave bars and that portion of the machine containing the straw-carrier and grain-separator shall be wider than the length of the straw, while the fan, cleaning-shoe, and cleaning-sieves need only be as wide as those of an ordinary wheat-thrashing machine. The machine has therefore what is practically a double frame, the upper frame, A, being of proper width to carry the cylinder B, concave bars B′, and straw-carrying and grain-separating frames D, while the lower portion, F, is contracted in width to the extent permitted by the contracted lateral dimensions of the fan-casing, cleaning-shoe, and sieves, as shown in Fig. 2.

The machine is provided with running-gear the gage of which is no greater than that of common farm vehicles, so that the machine can be readily transported on ordinary country roads or lanes. The concave bars B′ of the machine are carried by opposite plates, G, which have slotted lugs *a* secured by suitable bolts, *a′*, to the upper frame, A, of the machine, these plates being adjustable vertically, so that the distance between the cylinder and concave bars can be varied, as desired. The ends of the concave bars B′ pass through and beyond openings B^2 in the plates G, the projecting ends of the bars being supported by elastic blocks B^3 interposed between the bars and the heads of bolts hung to projecting studs B^4 on the plates. By detaching the fastenings either of the concave bars can be readily withdrawn laterally through the opening in the supporting-plate without disturbing the cylinder or other parts of the machine. The concave bars are generally adjusted nearer to the cylinder at one end than at the other, depending upon the direction in which the straw is laid, the concave bars being closer to the cylinder at the point where the grain-heads pass than at the opposite end. This adjustment is effected by a proper raising or lowering of one of the carrying-plates G.

Aprons *b*, hung to a transverse rod, *d*, serve to facilitate the feeding of the straw by directing the same to the space between the concave bars and cylinder, these aprons being

acted upon by springs tending to elevate them, but the inner ends of the aprons being free to yield to an extent permitted by the concave bars when hard foreign matters are fed into the machine with the straw.

In order that the adjustment of the aprons shall correspond with the adjustment of the concave bars and be effected simultaneously therewith, we secure the opposite ends of the rod *d* to the arms *f*, projecting from the opposite carrying-plates G, so that the elevation or depression of either of said plates will effect a corresponding elevation or depression of the adjacent end of the rod *d*.

Each of the springs for acting on the aprons *b* consists of coils *e e* and projecting arms *e'*, a loop, e^2, connecting the coils and passing over a collar, *g*. This collar has a set-screw, *g'*, which engages with the loop e^2, the collar being free to be turned on the rod *d*, so as to depress the loop e^2 and permit any desired degree of tension to be imparted to the spring, the set-screw being tightened after adjustment, so as to hold the collar in place. Each collar *g* fits between lugs *h* on the under side of the apron and serves to insure the proper lateral retention of said apron. After the straw has been subjected to the action of the thrashing-cylinder and concave bars, it is delivered onto the straw-carrying and grain separating and scraping frames D, each of which, as shown in Fig. 4, consists of opposite side bars, *i*, a perforated top plate, *k*, and transverse bottom bars, *m*, each frame being hung to an elbow-lever, *n*, at the upper end, and having at or near the lower end a box, *p*, which is adapted to a crank, *s*, on a shaft, J, the latter being free to turn in bearings on the upper frame, A, of the machine and in a central bearing, *t*, on the inclined grain-bottom K.

The cranks *s* are oppositely directed—that is to say, in a six-frame machine (such as that shown in Fig. 2 of the drawings) the first, third, and fifth cranks will be up, while the second, fourth, and sixth cranks are down, the consequence being that as one set of cranks rises and moves backward the other set drops and moves forward, a constantly-retreating movement or rearward thrust being thereby imparted to the straw, which is caught by the toothed upper edges of the side bars, *i*, of the frames, and by pins *i'*, projecting above said toothed edges, so that the straw is fed rapidly rearward and subjected to a thorough agitation in order to separate the grain therefrom.

While the use of alternately-acting straw-carriers which impart a forcible thrust to the straw is the best for effecting a thorough shaking of the straw and the complete separation of the grain therefrom, the tendency which this action has to throw the straw askew must be corrected before the straw is delivered onto the table of the binding-machine *x*, or onto a table on which the straw is bound by hand when the self-acting machine is not used. We therefore place at the upper or delivery end of the machine a hood, M, against which the straw is thrown by the reciprocating frames of the carrier, and by which the straw is leveled up before it drops onto the binding-table.

We prefer to use an automatic binder and to extend the frame F of the machine so as to afford a convenient means of supporting said binder in its proper position beneath the discharge-hood M, the driving-shaft of the binder being actuated by a belt, *x'*, from any suitable rotating shaft of the machine.

When the binder is supported by the contracted lower frame of the machine, the running-gear is exposed and readily accessible, whereas, if the wide frame of the machine were extended rearward and downward, so as to provide a support for the binding mechanism, this advantage would be lost.

The grain separated from the straw passes through the perforated plates or platforms *k* of the straw-carrying frames D onto the inclined grain-bottom K, down which it is fed by the scraping action of the transverse bars *m*, carried by said frames D, the bars of the frame on one side of the central longitudinal line of the machine being preferably inclined in one direction and those of the frames on the opposite side of said line being inclined in the opposite direction, as shown in Fig. 3, so that the tendency of the bars is to scrape the grain toward the center of the inclined grain-bottom K, from which it is delivered through the inclined hopper N onto the feed table or apron N' of the cleaner, the grain passing from said table onto the sieves P, and the cleaned grain being discharged directly to the spout Q, while the tailings pass onto the platform P', which directs them to the tailing spout R, the latter delivering the tailings to an elevator, R', whereby they are lifted and again deposited upon the upper sieve or screen, P, the tailings being thus subjected to the continuous action of the sieves until all the grain has been separated therefrom, and they are reduced to such condition as to be discharged from the cleaner by the blast of the fan. By delivering the tailings onto the upper cleaning-sieve, P, we are enabled to keep the elevator-spout within the limits of the contracted portion of the machine, and thus do not unduly increase the width of the same.

It will be seen on reference to Figs. 1 and 4 that the lower edges of the side bars, *i*, of the straw-carriers are curved, so that the scraping-face of each carrier, due to the transverse bars *m*, presents a longitudinal curve, and when the carrier is hung at the upper end to links and at the lower end to an operating crank we find that this curved longitudinal contour of the scraping-face is necessary in order to insure the action of all the scraping-bars upon the straight grain-bottom K; or if the scraping face is straight longitudinally, the contour of the grain-bottom must be curved longitudinally in order to effect the same result.

The roof or top covering of our machine is partly inclined to accord with the inclination of the straw-carriers; but that portion of the

roof above the cylinder and forward end of the straw-carrier is flat, so as to form a platform for the attendant, who receives the bundles of straw from the stack, removes the bands therefrom, and hands them to the feeder, who stands in front of the machine.

The adjacent side bars of the central pair of carrying-frames D are offset for the reception of the central bearing, *t*, of the crank-shaft J, and the latter is made in the form of a wedge with its point at the rear, so that it offers no material obstruction to the forward flow of grain down the inclined grain-bottom K.

When an automatic binder is used, it is essential that it shall be some distance above the ground, in order to insure the necessary clearance for the discharge of the bound bundle; hence the rear or discharge end of the straw-carrier must be at a considerable elevation. The cylinder and feed-aprons of the machine, however, should be as low as possible, in order to facilitate the handing of bundles of grain from the ground to the attendant who is feeding the machine. These results are attained in our machine by reason of the inclination of the straw-carrier.

We secure the hopper N to the casing of the cleaning-shoe, so that it partakes of the shaking motion of the latter, this motion being imparted from cranks or eccentrics 1 of the fan-shaft acting on connecting-rods 2, and the casing of the shoe being guided in the fixed frame and hung thereto by means of links 3, so as to permit the shaking movement. (See Fig. 1ª.)

It will be observed that the cleaning devices are located at the front end of the machine, and that a space of considerable length intervenes between the same and the binder at the rear end of the machine. By this means the chaff discharged from the cleaner is not projected onto the bound bundles of clean straw delivered by the binder, but falls to the ground before reaching said bundles. The hood M being closed at the top, the escape of straw and dust at this point is prevented, and said straw is compelled to pass downward to the binder.

It will be observed that the withdrawal of either of the concave bars and the replacing of said concave bar can be effected without disturbing the general position of the concave bars in respect to the cylinder, due to the adjustment of the plates G.

We claim as our invention—

1. The combination of the cylinder and concave bars of the machine, the feed-aprons, and the pivot-rod therefor, with concave carrying-plates having arms or projections which support said rod, all substantially as specified.

2. The combination of the cylinder and concave bars of the machine, and feed-aprons having lugs on their under sides, with the rod to which said aprons are pivoted, said rod having collars which engage with the lugs of the aprons, whereby lateral displacement of the latter is prevented, all substantially as specified.

3. The combination of the cylinder and concave bars of the machine, the feed-aprons, and the pivot-rod therefor, with the springs acting on said feed-aprons, and adjustable collars having set-screws forming bearings for said springs, all substantially as specified.

4. The combination, in a thrashing-machine, of the cylinder, a series of concave bars located side by side, opposite plates secured to the side frames of the machine, means for supporting the concave bars on said plates, and means for adjusting the plates so as to move the bars carried thereby from and toward the cylinder, said supporting-plates having such opening or openings that the lateral insertion and withdrawal of the concave bars are permitted, all substantially as specified.

5. The combination of a grain-separating straw-carrier, an operating-crank, and hangers for said carrier, as described, whereby one end of the carrier has a circular movement and the other a rising-and-falling and longitudinal movement, bars connected to the under side of the carrier and forming a grain-scraping surface thereon, and a grain-bottom forming a surface along which the grain is scraped, one of said surfaces being curved longitudinally, all substantially as specified.

6. The combination of the binder-table at the rear of the machine, a straw-carrier consisting of a series of toothed straw-supporting frames, means for reciprocating said frames in series, so that the series act alternately to carry the straw rearward, and a hood against which the straw is projected by the reciprocating frames and by which it is straightened prior to delivery to the binder-table, said hood being closed at the top, all substantially as specified.

7. The combination, in a long-straw thrasher, of the upper wide frame, the thrashing devices and straw-carrier contained therein, the lower contracted frame, the grain-cleaning devices therein, and an elevator extending from the tailing-spout to the upper sieve of the cleaner and located outside of the contracted lower frame, but within the lateral limits of the upper wide frame, all substantially as specified.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

WILLIAM H. BUTTERWORTH.
JOHN BUTTERWORTH, JR.

Witnesses:
E. T. DIGNAN,
J. W. DIGNAN.