2 Sheets—Sheet 1.

H. M. SMITH.

Thrashing Machine.

No. 232,080. Patented Sept. 7, 1880.

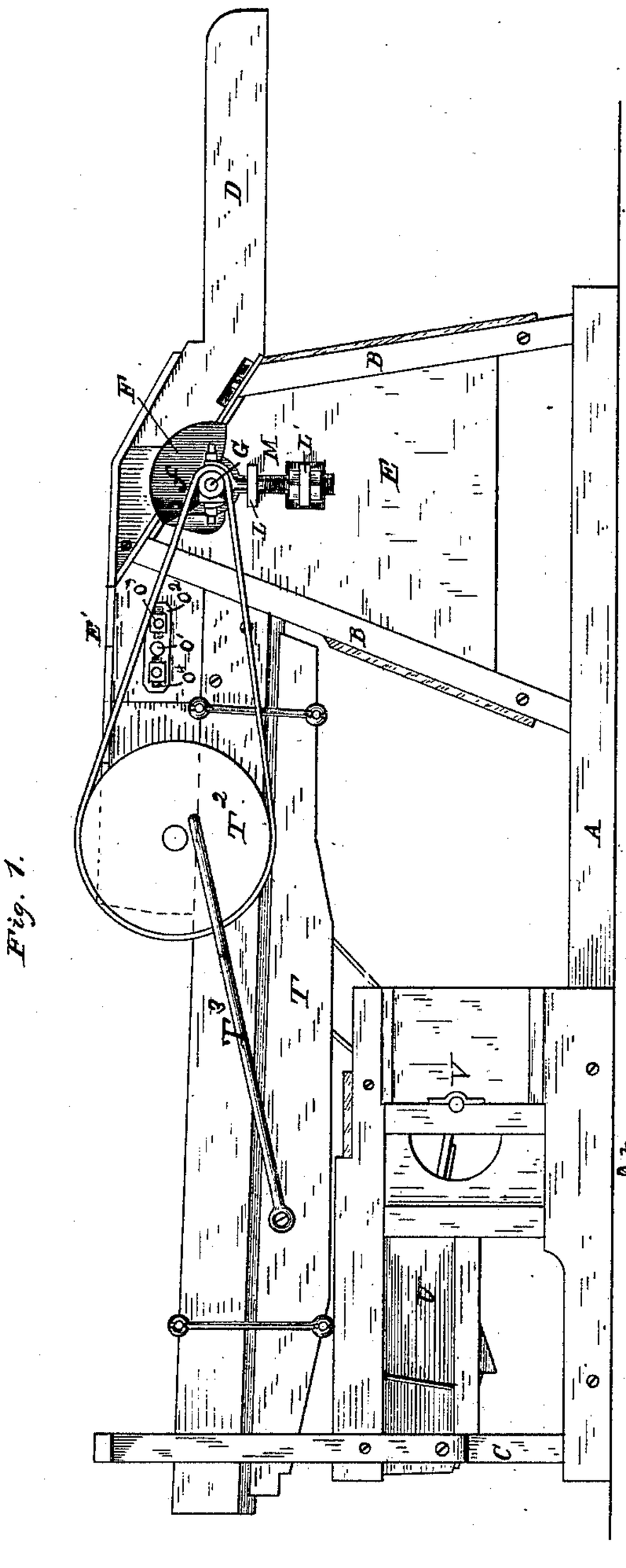

Fig. 1.

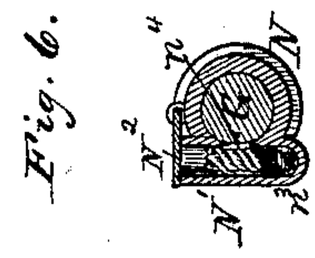

Fig. 6.

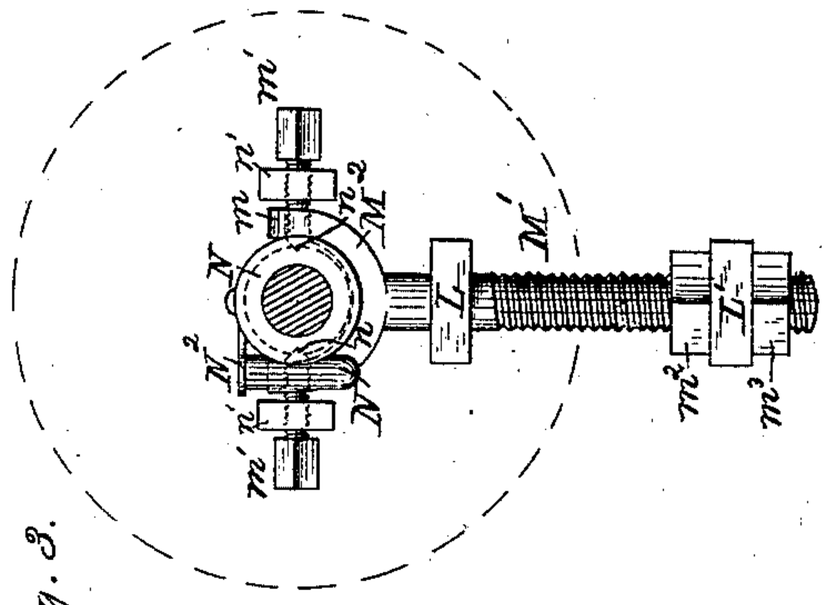

Fig. 3.

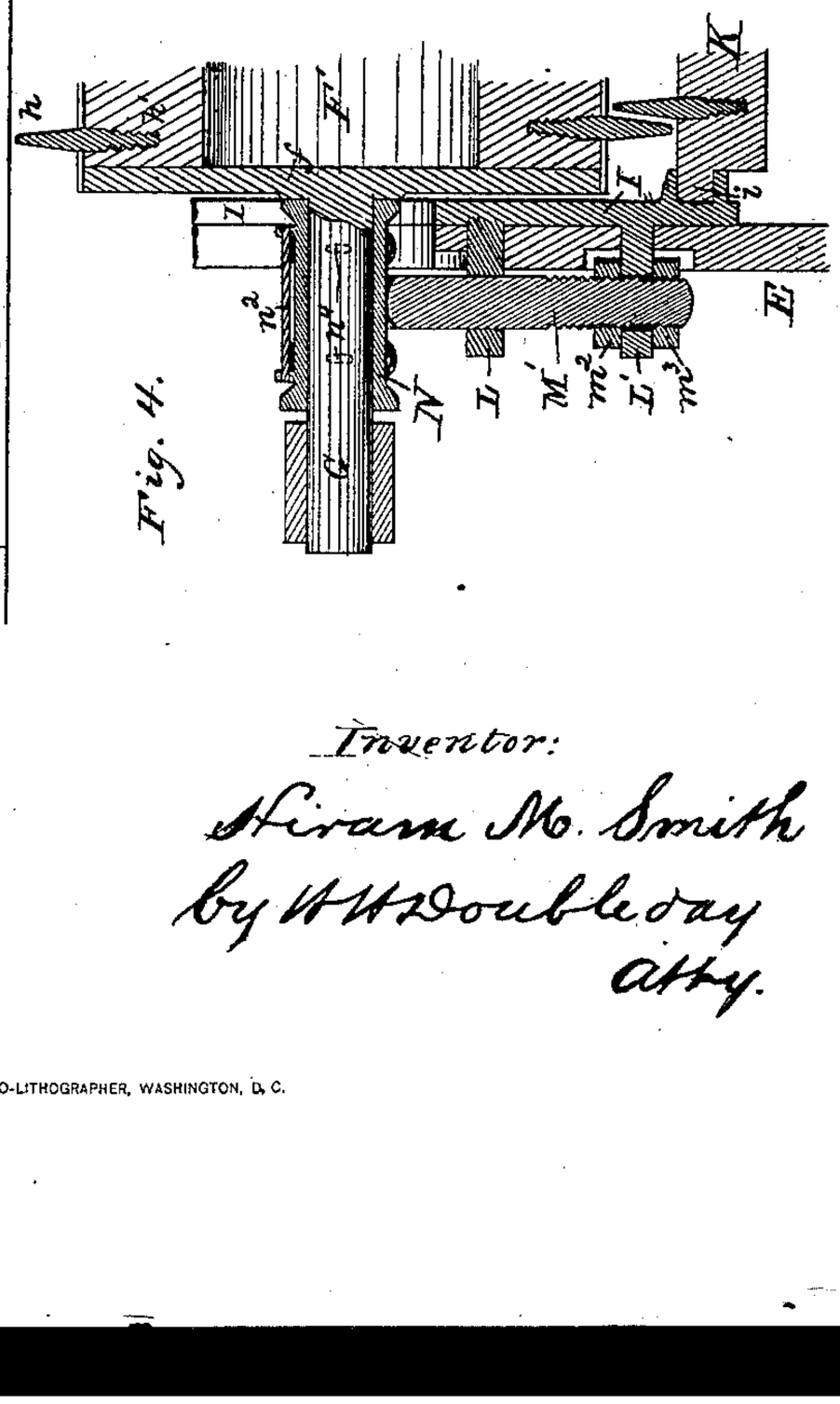

Fig. 4.

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2 Sheets—Sheet 2.

H. M. SMITH.

Thrashing Machine.

No. 232,080. Patented Sept. 7, 1880.

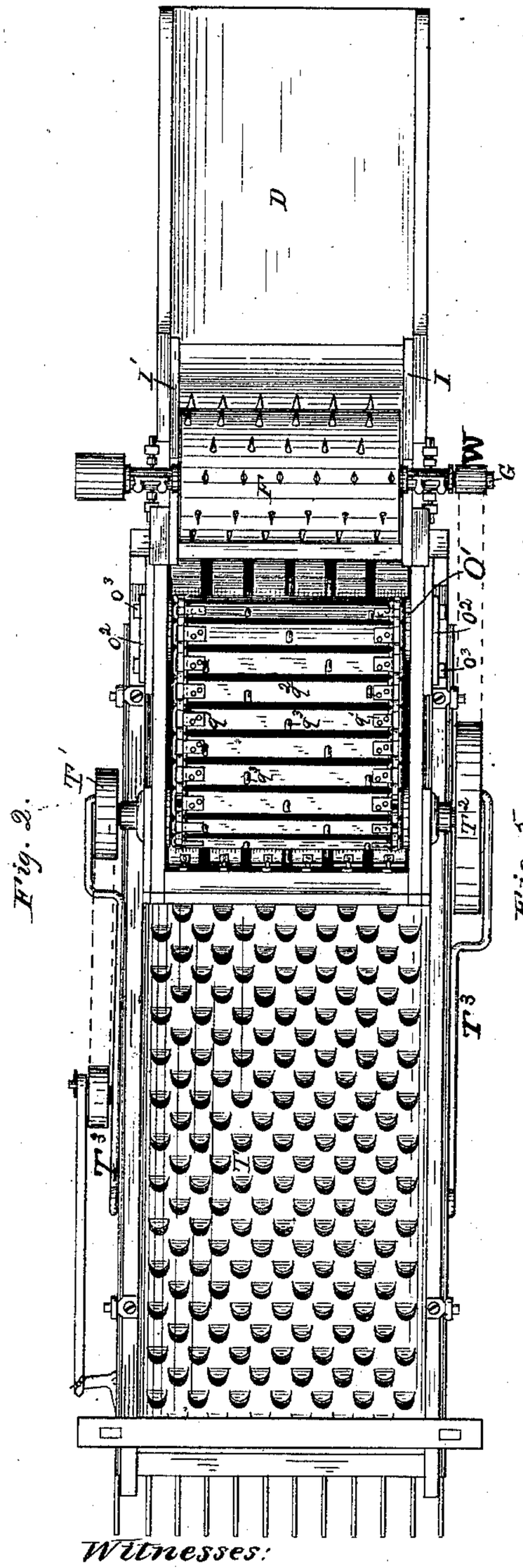

Fig. 2.

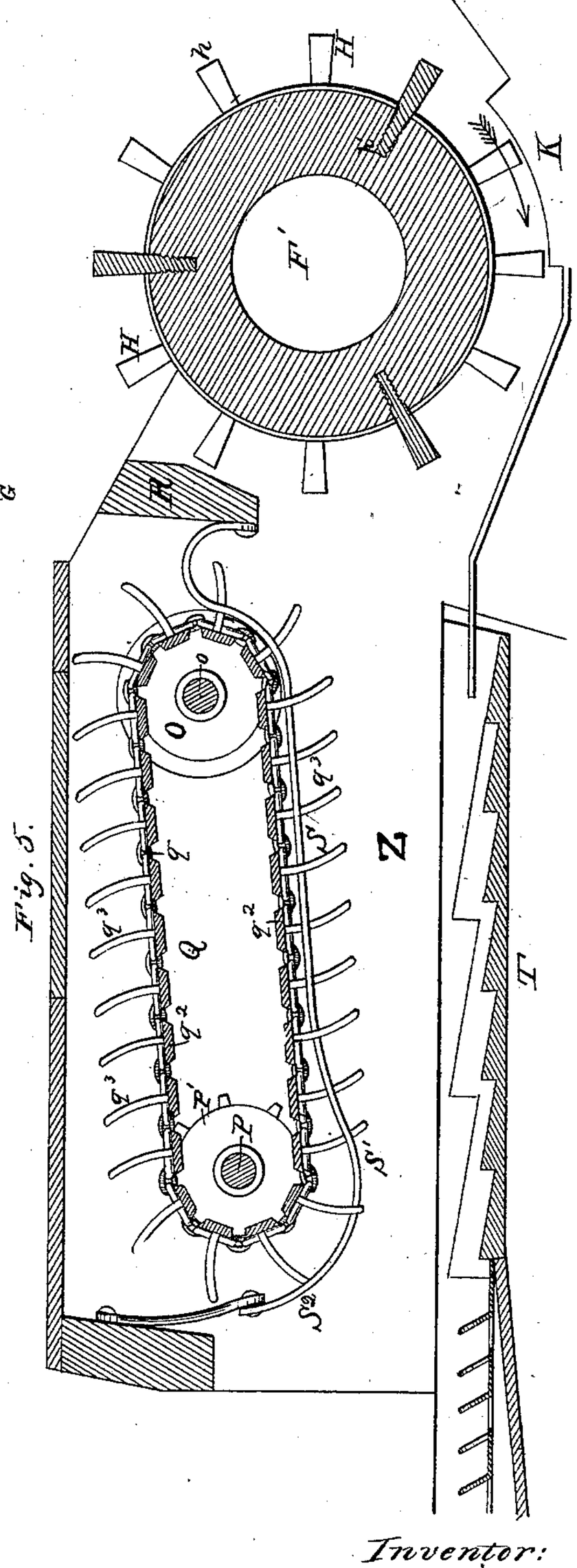

Fig. 5.

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UNITED STATES PATENT OFFICE.

HIRAM M. SMITH, OF RICHMOND, VIRGINIA.

THRASHING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 232,080, dated September 7, 1880.

Application filed February 6, 1880.

To all whom it may concern:

Be it known that I, HIRAM M. SMITH, of Richmond, in the county of Henrico and State of Virginia, have invented certain new and useful Improvements in Thrashing-Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

Figure 1 is a side elevation of thrasher and separator embodying my inventions. Fig. 2 is a top-plan view of the same, the top part of the casing being removed. Fig. 3 is a side elevation of the devices for supporting the cylinder-axle and its box, the axle being shown in transverse section. Fig. 4 is a partial view of the cylinder and the devices for mounting the same, it being a vertical longitudinal section. Fig. 5 is a longitudinal section of the apron-rake on line *x x*, Fig. 2, parts of the cylinder and vibrator being shown to illustrate the relative positions. Fig. 6 is a transverse section of one of the boxes in which the cylinder-shaft is mounted.

In the drawings the machine is represented as being supported upon a frame-work consisting of longitudinal sills A, uprights B B, for supporting the cylinder-frame, and uprights C C′, for supporting the outer end of the separator-frame.

The material is fed to the machine from a table, D, of any desired character.

A casing, E E′, is placed around and above the operative devices, of substantially the ordinary construction.

F represents the thrashing-cylinder, which is constructed in the following manner: It is formed of solid wood, preferably about fifteen inches in diameter, and is bored at the center to form an aperture about eight inches in diameter, as shown at F′. At each end the cylinder is fitted with cast-iron heads *f*, which are secured to steel axles G. Holes to receive the teeth are bored in the face of the cylinder, and it is then covered with sheet-iron, through which holes are punched corresponding in position to the holes in the wooden portion.

I I′ represent cast-iron plates fastened upon the inside of the thrasher-frame at the respective ends of the cylinder and parallel with said ends. At or near the lower edges of these plates I I′ recesses *i i* are formed to receive and support the bars K, forming the bed or concave beneath the cylinder.

L L are tenons projecting outwardly from the plates I I′, respectively, through the casing or frame of the machine, they being cast with or rigidly attached to the plates I I′. L′ L′ are similar tenons projecting through the casing from the plates I I′, at or near the bottom of the plates. The tenons L L L′ L′ are provided with apertures, for a purpose to be shortly described.

M represents a fork-shaped or U-shaped support or mounting for the cylinder. It consists of a vertical shank, M′, which is screw-threaded at its lower end. At the upper end there is attached to the shank M′ the U-shaped part M^2, arranged to project upwardly on opposite sides of the cylinder-shaft. The upper ends, *m m*, of the U-shaped part M^2 are provided with screw-threaded apertures, through which pass pointed screws *m′ m′* in opposite directions, substantially on the central horizontal plane of the cylinder-shaft.

The mounting or fork M′ M^2 is supported upon the lower tenon by means of nuts m^2 m^3, arranged one above and the other below the tenon. These nuts engage with the screw-threaded part of the shank M′, and by means of them the support or mounting M′ M^2 may be raised or lowered, as will be readily seen.

N N represent the boxes surrounding the cylinder-axle. They are provided upon opposite sides with recesses at *n* to receive the pointed portions of the screws *m′ m′*. *n′ n′* represent lock-nuts or jam-nuts arranged to fasten the screws in any desired position.

It will now be seen that when the cylinder, its axles or shaft, and boxes are in the position shown in Figs. 3 and 4 they are supported upon the screws *m′ m′*, which are carried by the U-shaped mountings M′ M^2, and that these mountings, in turn, are supported upon the tenons L′. By means of these devices there is permitted an automatic adjustment of the cylinder and its boxes, as may be required by irregularities in the motion of the cylinder, or by any accidental bending of the shaft or axle, and

also an artificial adjustment vertically and laterally.

The automatic adjustment of the cylinder is one of great importance. By my construction the boxes are allowed to adapt themselves to any vibrations or irregular movements of the axles. The axles or shafts of thrashing-cylinders, as is well known by those acquainted with their operation, often become, by jars and otherwise, more or less bent or crooked, and the variations from truth thus produced cause great friction and heating in the boxes. The stationary boxes, (that have been heretofore used,) secured rigidly in position and arranged to fit the shaft or axle tightly, prevent an automatic adjustment of the parts and seriously interfere with the operation of the belt or driving devices, and even when driven become, from the variations above described, so hot as to often ruin both axles and boxes.

The boxes which I have shown and described are allowed to have a universal motion, they being suspended upon the machine by substantially universal joints. The screws m' m' allow the boxes to turn or oscillate vertically upon the line of the screws, and the shanks or stems M′ of the U-shaped supports allow the boxes to turn horizontally, so that the box can accommodate itself to any position that may be taken by the axle or shaft, and thus prevent any undue strain or friction upon it. It is found practically that the causing of bends or crooks in the axles is almost unavoidable, the belt of itself being sufficient to produce a variation from a proper line. The support which I have described permits the boxes to readily adapt themselves to the position of the axles or shafts even when making two thousand revolutions a minute. Moreover, when one end of the cylinder is raised relative to and without the other, both boxes would be cramped on the axle if there were not an automatic adjustment of the boxes.

When it is desired to adjust the position of the cylinder laterally or horizontally relative to its mounting, the adjustment can be accomplished by means of the screws m' m', and a vertical adjustment of the cylinder is accomplished by means of the nuts m^2 m^3 and tenon L.

The upper tenons, L L, serve to hold the upper parts of the mountings M′ M² firmly in position without interfering with the vertical adjustment of the same or interfering with the lateral vibrations of the boxes.

N′ N′ represent oil-receptacles formed with or attached to the boxes N. They are preferably tubular in form, the interior of the cavity being arranged to extend some distance below the bottom of the interior of the box, the aperture by which the oil passes from the receptacle N′ to the surface of the axle being, however, substantially on the central horizontal line of the axle, as shown at n^4. There is thus formed below the aperture n^4 a reservoir, n^3, into which is placed a feeding-wick extending from the bottom of the oil-receptacle to within a short distance of the top of the same. The feed-aperture n^4 is constructed to permit the wick to touch the axle at the aperture, whereby a rapid flow of oil is prevented, and yet the oil is evenly and uniformly supplied to the axle, the wick operating by capillary attraction to feed the oil even after the receptacle has emptied to a point below the feed-aperture n^4. By this arrangement a very small amount of oil may be utilized to thoroughly lubricate the axle for a long time, a spoonful being found to be sufficient for an hour or more while the machine is in operation. The wick is arranged to leave a small open space at the top of the receptacle N′, so as to conveniently guide the one who is filling the receptacle with oil.

N² N² are caps or covers for the oil-holders, secured to a rod, n^2, which is hinged upon the upper side of the box. The metal holders are arranged to lubricate the axle and boxes at or near each end, so as to evenly distribute the oil at all times.

Heretofore in operating thrashing and separating machines much difficulty has been experienced in properly separating the grain from the straw after they have left the cylinder, owing to the tendency of the straw to pile up on the vibrator which receives it from the cylinder. I have succeeded in overcoming the difficulties that have been met with by the following devices, adapted to control the velocity with which the straw and grain move at the instant they leave the cylinder:

O′ O′ represent wheels, situated respectively upon opposite sides of the machine and on the inside of the casing. They are mounted upon short stud-shafts o, Fig. 5, o', Fig. 1, projecting inwardly, which are attached to plates o^2 o^2, situated upon the outside of the casing. The stud-shafts o o' project through slots formed in the casing for their reception. The plates o^2 o^2 are held in place by means of nuts o^3, engaging with outwardly-projecting screws, the plates being provided with slots o^4, whereby the plates, the stud-shafts o o', and the wheels O O′ may be adjusted laterally.

P represents a shaft mounted in the frame or casing of the machine at a point some distance farther from the cylinder than the wheels O O′.

P′ P′ represent sprocket-wheels secured to the shaft P, said wheels respectively corresponding in position and size to the wheels O O′.

Q represents an endless revolving slatted apron-rake mounted upon the wheels O O′ P′ P′. This rake is preferably constructed in the following manner: q q' are endless chains, arranged to pass respectively around the wheels O P′ and the wheels O′ P′, the links of the chain being of suitable size to properly engage with the teeth upon the sprocket-wheels P′ P². q^2 q^2 represent wooden slats, arranged to form a traveling table or apron as tight as possible, the width of the slats

being substantially the same as the length of the links of the chains q q'. The slats are attached to the links of the chain by means of flanges projecting inwardly from the links and riveted to the slats at the respective ends. q^3 q^3 represent wire teeth attached to the slats of the apron-rake Q. R is a bar situated on the inside of the frame immediately in rear of the cylinder and firmly secured to the walls of the casing. R′ is a similar cross-bar situated on a line somewhat farther from the cylinder than the shaft P. A metallic slotted table or shield, S S′ S², is situated immediately below the endless revolving apron-rake Q. (See Figs. 1 and 5.) This metallic table is preferably made in sections, which at the ends are respectively secured firmly to the cross-bars R R′, each section being bent at a point near the shaft P downward, as shown at S′, then outward and upward, as shown at S², to bar R, the sections being placed apart sufficiently to permit the teeth q of the apron-rake to pass freely between them. By examining the drawings it will be seen that the teeth q^3 of the rake in passing backward away from the cylinder gradually withdraw above the lower slotted table as they pass those portions of the table represented by S′ S², and that they ultimately are entirely withdrawn from below or outside of the table, remaining so until they are again brought down at the end nearest the cylinder.

The operation of these last-described devices is to receive the straw as it leaves the cylinder, partially check it in its movements, reduce it from the high rate of speed imparted to it by the cylinder, and uniformly spread and distribute it over the inner end of the vibrator, the teeth of the rake being somewhat bent backwardly to assist in this operation.

From an examination of the drawings it will be seen that the apron-rake is situated as near as practicable to the cylinder itself, so that the straw shall be thrown by the cylinder directly against the rake, or within instant reach of its teeth, and also that the heel or inner end of the vibrator is located as near as possible to the cylinder. The apron-rake does not operate to entirely stop the straw while under momentum from the cylinder, but reduces its rate of speed, so that it can be effectually operated upon by the inner end of the vibrator, where much difficulty has been heretofore experienced, from the fact that the great difference between the speeds of the cylinder and of the vibrator results in a doubling or piling up of the straw upon the vibrator at the point where the straw is received from the cylinder.

As it is necessary to have between the endless rake and the vibrator as much space as possible for the free passage of straw, the peculiar shape of the slotted shield which I have devised is required in order that the comparatively short teeth of the rake may work upon the straw as long as possible before being withdrawn therefrom. Therefore the slotted shield throughout the greater part of its length is as near as possible in the path of the body of the apron, and is not bent to permit the withdrawal of the teeth until they have traversed nearly the whole of their lower path.

By means of the slotted plates o^2 o^2 the position of the stud shafts o o' and the wheels O O′ can be adjusted relative to the shaft P as may be desired to compensate for wear or straining of the chains q q', or for any other reason.

T represents the vibrator, upon which the grain and straw are received after leaving the cylinder, and which, by its agitating action, causes the separation of the grain from the straw.

I have shown and will describe an improved method of imparting reciprocating motion to the vibrator.

I have found much difficulty with thrashing-machines having undershot cylinders similar to that shown and described herein, and having vibrators reciprocated by devices receiving power at a point below the vibrator, there being many occasions, while practically operating such machines, to repair the driving machinery of the vibrators. A machine similar to the one herein shown has no means nor space for imparting motion to the vibrator from below, and therefore to operate it from below requires the addition of supplemental parts.

With my improved machine a reciprocating movement is imparted to the vibrator by means of the shaft which drives the apron-rake, said shaft carrying outside the casing pulleys T′ T², which are connected, by pitmen T³, with the vibrator. This arrangement for driving the vibrator by pitmen receiving power above the vibrator makes said pitmen at all times accessible for repairs and places them at all times within the view of the operator, who can instantly detect anything that may be going wrong. Moreover, by thus combining the moving devices of the apron-rake and the vibrator, the motion of the one can be conveniently regulated relative to the movement of the other, so that the straw shall be properly delivered and distributed by the rake upon the vibrator.

A large unobstructed space is left between the vibrator and the lower ends of the teeth of the rake, as shown at Z, so that the teeth shall act, not to drag the straw directly over the surface of the vibrator, but to prevent the straw from piling so much that the vibrator cannot properly convey it.

I am aware that thrashers have been constructed with sieves and endless straw-carriers to convey the straw to the rear end of the machine, and having teeth moving so close to the sieves as to drag the straw over them for the purpose of conveying and separating the same, and I do not claim such construction.

The grain, after leaving the vibrator, is conveyed to a reciprocating sieve, U, and a fan, V, operating in substantially the usual manner.

In this patent I do not claim any of the features of construction or attachment of the cylinder-teeth, as I have embodied that subject-matter in another application.

What I claim is—

1. In a thrashing-machine, the combination, with the cylinder and the plates I I′, carrying tenons projecting through the casing of the machine, of boxes or bearings for the cylinder supported on said tenons and arranged to be vertically adjusted thereon, substantially as set forth.

2. The combination, with the cylinder, the cylinder-boxes, and the downwardly-projecting arms or shanks M′ M′, carrying the cylinder-boxes, of the plates I I′, situated on the inside of the machine and arranged to support the arms or shanks M′ M′, substantially as set forth.

3. The metallic plates I I′, constructed with the recesses *i i*, for supporting the concave, and with the tenons L L′, which are arranged to project laterally through the casing, and are perforated on vertical lines to receive the supporting devices of the cylinder, substantially as set forth.

4. In a thrashing-machine, a universally and automatically adjustable mounting for the cylinder, consisting of a movable box supported upon two screws which permit oscillation on a horizontal line, and an adjustable rod arranged longitudinally on a vertical line, which supports said horizontal screws, and is supported upon the frame of the machine and is arranged to oscillate about a vertical line, substantially as set forth.

5. The combination, with the cylinder of a thrashing-machine and the supporting-projections L′, attached to the frame-work, of the downwardly-projecting support M′ M², which carries the cylinder, and which is arranged to be supported upon the projections L′ and to be horizontally oscillated thereon, substantially as set forth.

6. The combination, with the frame-work of the machine, the cylinder, and the downwardly-projecting supporting-arm M′, of the tenon L′, which supports the arm M′ vertically, and the tenon L, having a smooth perforation, wherein the arm M′ is supported laterally, substantially as set forth.

7. The combination, with the cylinder, the vibrator receiving the straw from the cylinder, and the apron-rake Q, arranged above the vibrator to distribute the material thereon, of the slotted shield below the rake, having the parts S contiguous to and parallel with the apron throughout the greater part of its length, and the curved and depressed parts S′ S² at the outer end of the apron, substantially as and for the purposes set forth.

In testimony that I claim the foregoing I have hereunto set my hand.

HIRAM MOORE SMITH.

Witnesses:

ALEX. COKE,

JNO. B. GRANT.