No. 794,687. PATENTED JULY 11, 1905.

C. J. SMITH.

THRESHING AND STRAW CUTTING MACHINE.

APPLICATION FILED AUG. 11, 1904. RENEWED JUNE 15, 1905.

3 SHEETS—SHEET 1.

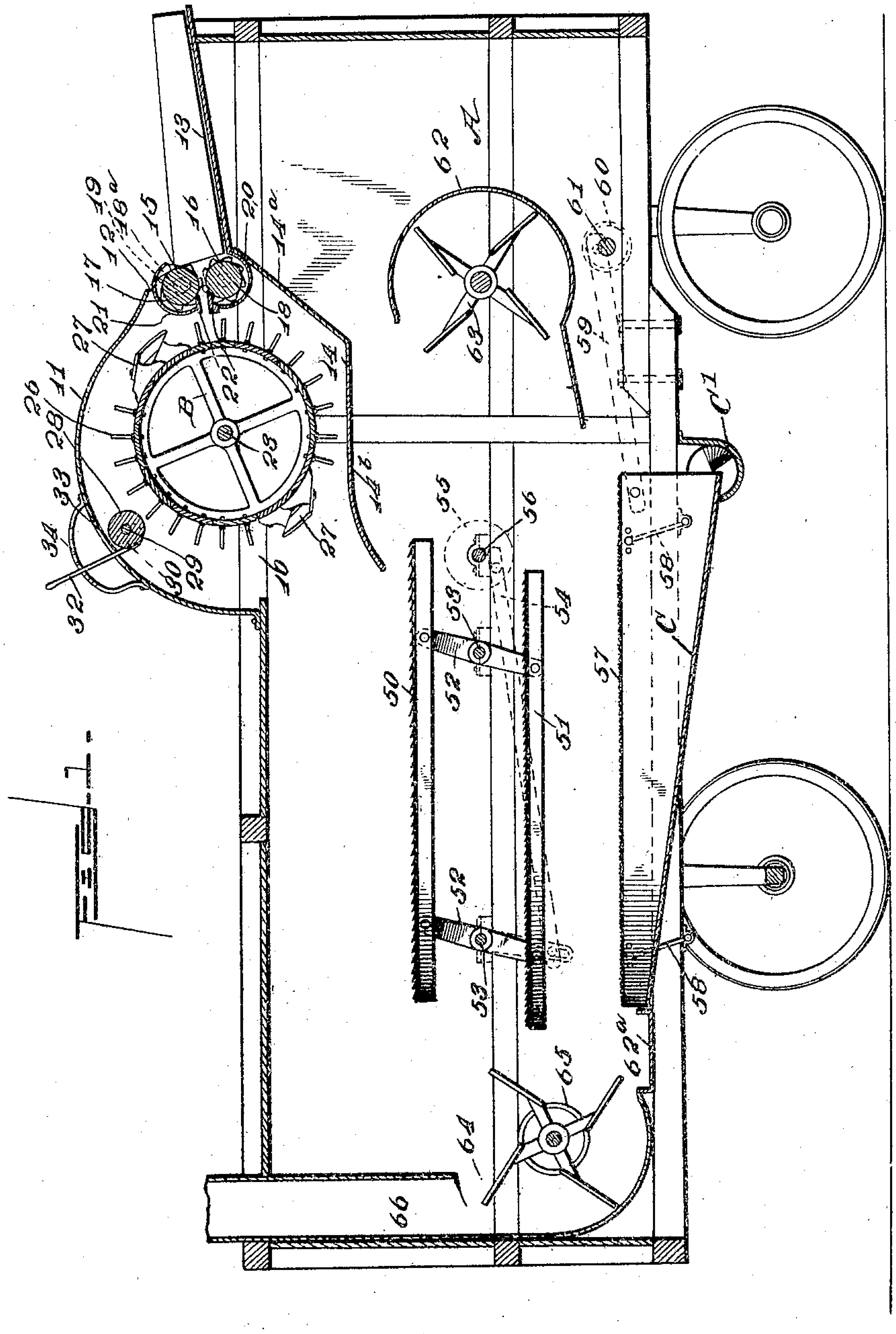

Fig. 1

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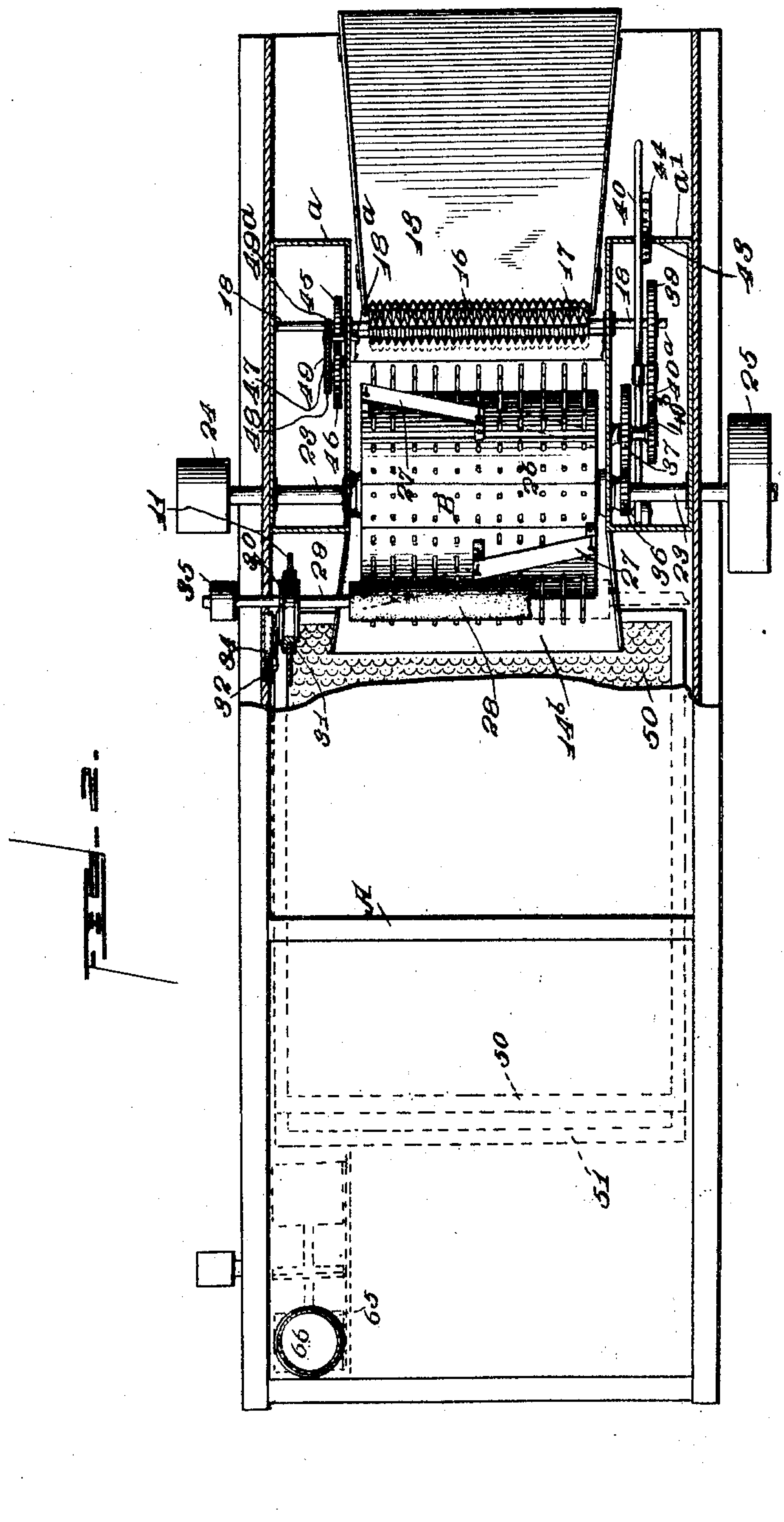

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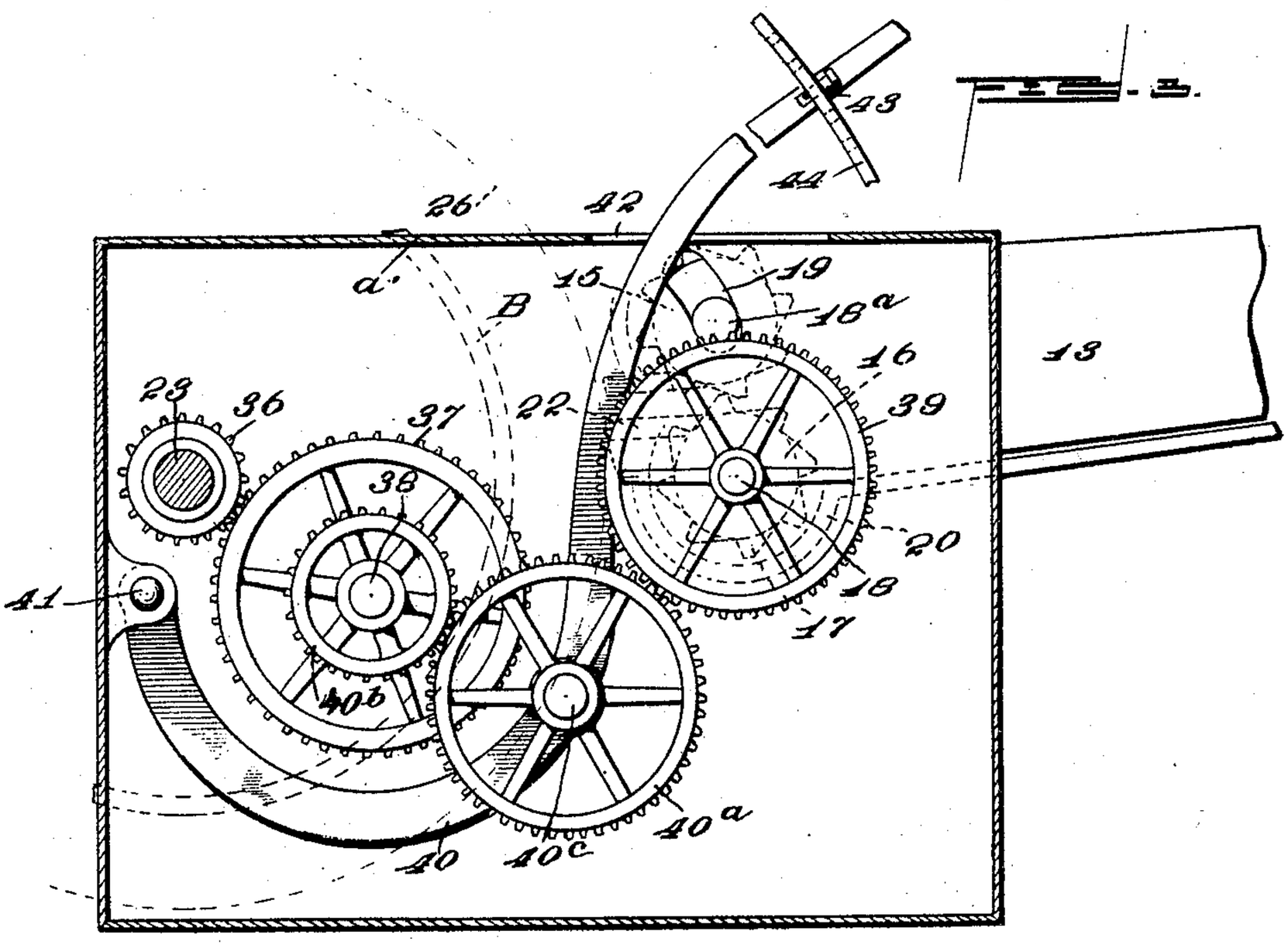

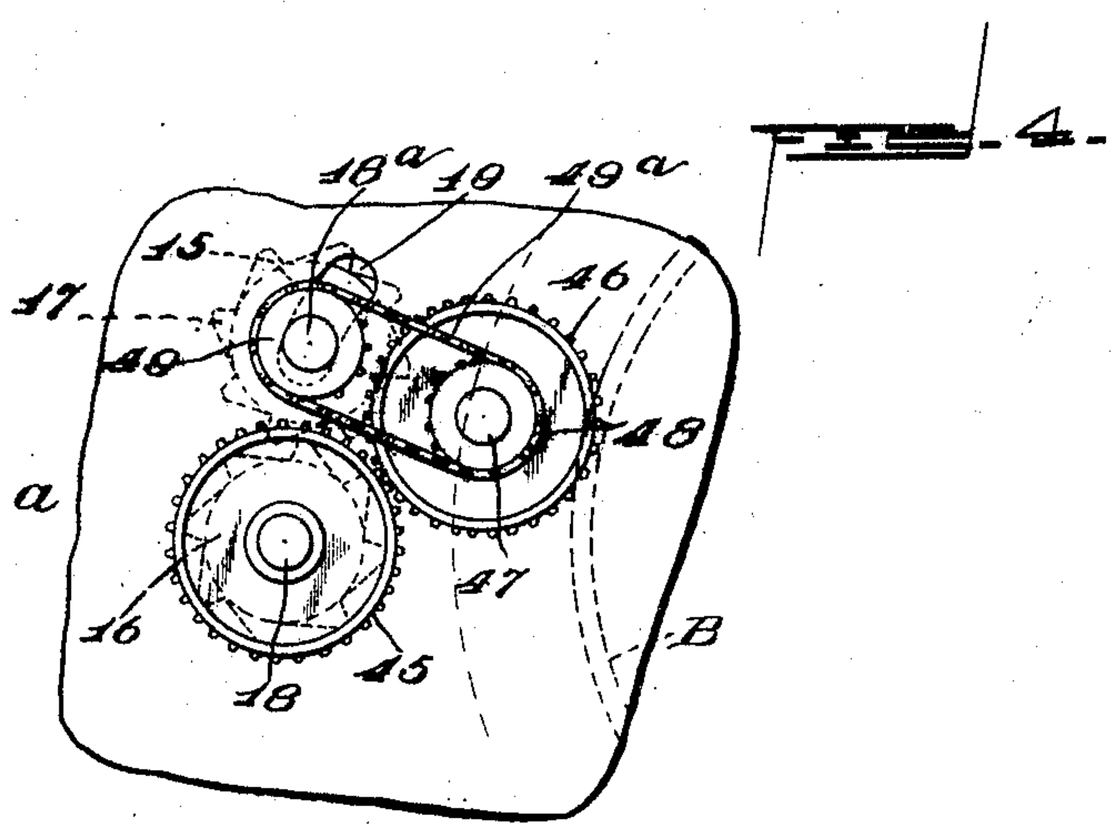

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No. 794,687. Patented July 11, 1905.

UNITED STATES PATENT OFFICE.

CHARTER JACKSON SMITH, OF DURHAM, CANADA.

THRESHING AND STRAW-CUTTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 794,687, dated July 11, 1905.

Application filed August 11, 1904. Renewed June 15, 1905. Serial No. 265,433.

To all whom it may concern:

Be it known that I, CHARTER JACKSON SMITH, a subject of the King of Great Britain, and a resident of Durham, in the Province of Ontario and Dominion of Canada, have invented a new and Improved Threshing and Straw-Cutting Machine, of which the following is a full, clear, and exact description.

The purpose of the invention is to provide a threshing-machine in which the concave is dispensed with and wherein the cylinder is provided with diametrically-opposing diagonally-located knives which act in conjunction with ledger-plates and feed-rollers behind said plates and the cylinder not only serves to thresh out the grain, but also to cut the straw in fine particles.

Another purpose of the invention is to provide means for separating the chopped straw from the grain and for blowing the chopped straw from the machine.

A further purpose of the invention is to provide a means whereby one feed-roller will automatically move to or from the other, according to the thickness of the bed or spread of the material passing between them, and to provide a convenient means for controlling the speed of the feed-rollers.

The invention consists in the novel construction and combination of the several parts, as will be hereinafter fully set forth, and pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a central vertical section through the machine. Fig. 2 is a sectional plan view of the machine. Fig. 3 is an enlarged section through a casing located at the left-hand side of the machine and a side elevation of the elements contained in the casing adapted for regulating the speed of the feed-rolls; and Fig. 4 illustrates a portion of a casing located at the right-hand side of the machine, showing a means employed for driving the upper feed-roller.

A represents the body of a threshing-machine, which at its top portion near the front is provided with an opening 10 at its transversely-central portion, since the said opening 10 does not extend to the sides of the body, and this opening 10 is covered by a hood 11, having an opening 12 at its forward end. A feed board or table 13 is located at the upper forward end of the said body A, which feed board or table 13 is given a downward and rearward inclination and terminates quite close to the aforesaid front opening 12 of the hood.

At each side of the hood a casing is located within the body, being suitably secured, and these casings extend above the top of the body and are designated as *a* and *a'*, being best shown in Fig. 2. An upper feed-roller 15 and a lower feed-roller 16 are mounted to turn at the opening 12 of the hood 11, being adapted to receive between them the material which is pushed downward on the feed table or board 13.

A delivery-board 14 is located below the feed-rollers 15 and 16, and this delivery-board 14 extends well to the rear and is of angular formation, comprising a rear, downwardly, and rearwardly-inclined section 14^a, connected, for example, with the rear bottom edge of the feed board or table 13, and a rear section 14^b, which is mainly horizontal; but the rear or delivery end of this section 14^b is curved downwardly and rearwardly to a greater or lesser extent. The feed-rollers 15 and 16 are provided with longitudinal corrugations or teeth 17, as is shown in Figs. 1 and 2, and the trunnions 18 of the lower feed-roller 16 are journaled in the casings *a* and *a'*, as is shown in Fig. 2. The trunnions 18^a of the upper feed-roller 15 are likewise journaled in the said casings *a* and *a'*; but the trunnions 18^a of the upper feed-roller 15 extend into curved slots 19, produced in the walls of the said casings, as is shown in Figs. 3 and 4.

A shield 20 is located at the bottom portion of the lower feed-roller 16, extending from the delivery end of the feed board or table 13 upward at the rear of the said roller, and a similar shield 21 is located above the upper feed-roller 15, extending downward at the rear portion of the same, as is shown in Fig. 1.

Ledger-plates 22 are secured to the opposing edges of the shields 20 and 21, as is also shown in Fig. 1, and a space intervenes

between these ledger-plates, the said space being opposite the point where the rollers most closely approach each other, and the material passed from the feed board or table to the rollers is carried rearward by said rollers and is more or less straight between the ledger-plates and passes out between said plates. These ledger-plates 22, however, are adapted to act in conjunction with knives to be hereinafter described.

A cylinder B is secured upon a shaft 23, and this shaft is journaled in the casings *a* and *a'* and likewise in the sides of the body A, extending beyond said sides. The shaft 23 at its right-hand end is provided with a pulley 24, adapted to transmit power to other parts of the machine, while at the opposite or left-hand end of the shaft 23 a driving-pulley 25 is secured.

Teeth 26 are arranged in rows on the periphery of the said cylinder; but sundry of the teeth are omitted in order that knife-blades 27 may be located on the exterior of the cylinder. These knife-blades, as is shown in Figs. 1 and 2, are diagonally placed and are alternately located at opposite sides of the cylinder—as, for example, a knife-blade at the right-hand end of the cylinder will extend from said end to a central point and the blade at the opposite side from the left-hand end to a central point in line with the inner end of the blade first mentioned. These blades in addition to being diagonally placed are given a longitudinal inclination, the inclination of the right-hand blade, for example, being from the edge of the cylinder downward and inward, while the blade at the opposite end of the cylinder is inclined downward and outward from its inner end to its outer end. This cylinder is located over the delivery-board 14; but the curved end of the rear section 14^b of the said delivery-board extends beyond the cylinder.

In order that the knives may be kept sharp, an emery or corundum roller 28 is located within the hood 11 in such manner that it may be made to bear more or less against the cutting edges of the knife-blades 27 as the cylinder revolves, thus keeping the blades perfectly sharp. The trunnions 29 of the corundum roller 28 are eccentrically mounted in disks 30, having, preferably, peripheral flanges, as shown in Fig. 2, and these disks are mounted to turn in bearings 31, secured to the inner faces of the sides of the body A.

Handles 32 are secured to the disks 30, as is shown in both Figs. 1 and 2, and these handles 32 extend out through openings 33 in the hood 11 and engage with suitable racks 34, carried either by the hood or attached to the sides of the body A of the machine. By moving the handles 32 forward or rearward the corundum roller 28 may be made to bear with more or less force on the cutting edges of the knife-blades 27.

As the material is fed rearward between the ledger-plates 22 and extends out beyond said plates during the revolution of the cylinder B the teeth will strike the exposed heads or exposed portions of the straw and will beat off the grain, and after this beating or separating action has taken place a knife will be brought into action and by engagement with said ledger-plates 22 will cut the straw into small particles, and the straw and grain together will drop upon the delivery-board 14. This operation is continued until all the grain has been beaten from the straw and all of the straw has been cut into small particles.

A small pinion 36 is secured upon the cylinder-shaft 23 within the left-hand casing *a'*. This pinion 36 engages with a gear-wheel 37, likewise located in the casing *a'* and mounted to turn upon a stud-axle 38, and in the same casing a gear 39 is secured to the left-hand end of the lower feed-roller 16. A curved arm 40 is pivoted at its rear end to the rear wall of the said casing *a'*, and the said arm 40 is so curved that it extends beneath and up at the forward side of the gear 37, the pivot-point of the said arm being designated as 41 in Fig. 3. This arm 40 is carried out through an opening 42 in the top of the casing *a'* and is provided with a clamping device 43 of any suitable or approved construction adapted for engagement with a rack 44, suitably supported, as is also illustrated in Fig. 3. A shaft 40^c is secured to the arm 40 near its lower end and a gear-wheel 40^a is loosely mounted upon said shaft, and said gear-wheel 40^a meshes with the pinion 40^b on the stud-axle 38, which pinion is removably connected with the gear 37, and the gear 40^a likewise meshes with the gear 39 on the left-hand lower end shaft. By this manner of gearing the speed of the cylinder can be made about five hundred revolutions to sixty revolutions of the feed-rollers.

It will be observed that by adjustment of the arm 40 the gear carried thereby may be moved to or from the gears 37 and 39. Thus if the speed of the rollers needs to be increased or decreased this can be done by changing the size of the gear 40^a, substituting a larger one, for example, and at the same time substituting a smaller pinion 40^b and adjusting the arm 40 to bring the gear 40^a into mesh with the pinion 40^b and the gear 39. It will be noted that the pivot of the arm 40 is at a point above the axial center of the gear 40^a, thus enabling the above-mentioned change to be readily made.

It will be remembered that owing to the slots 19, in which the trunnions 18^a of the upper feed-roller extend, this feed-roller can move to and from the lower feed-roller to accommodate itself to a thin or a thick mass of straw. The upper feed-roller 16 is driven in the manner shown in Fig. 4, wherein it will be observed that at the right-hand end of the trunnion 18 of the lower feed-roller 16 a gear

45 is secured located within the right-hand casing *a*. This gear meshes with a gear 46 of the same size mounted to turn loosely upon a stud-axle 47, secured to a wall of the casing *a*, and a pinion 48 is secured to the gear 46, while a pinion 49 of similar size is secured to the left-hand trunnion 18ª of the upper feed-roller 15. The two pinions 48 and 49 are connected by a belt 49ª.

The grain and cut straw upon leaving the delivery-board 14 fall upon a top deck 50, which is connected with a lower deck 51, the two decks being fin-back decks and reticulated or perforated. The two decks 50 and 51 may be termed "screen-decks" and are pivotally connected by links 52, which links are mounted at their central portions on shafts 53, held to turn in suitable bearings carried by the body A. The screen-decks 50 and 51 are rocked through the medium of a rocker-arm 54, pivotally attached to one of the links 52 and connected by a suitable wrist-pin with a disk 55, mounted upon a shaft 56, suitably driven, as is shown by dotted lines in Fig. 1. A grain-shoe C is located below the decks 50 and 51, the said shoe being provided with the usual upper screen 57, and the delivery end of the shoe, which is inclined downward, is carried to a communication with a screw conveyer C′. The shoe is given a rocking movement and is therefore supported by links 58, pivoted to the frame A, as is shown in Fig. 1, and the shoe is given movement through the medium of a rocker-arm 59, connected with the shoe, and by means of a wrist-pin with a disk 60, mounted on a shaft 61, rotated in any approved manner.

A fan-casing 62 is located within the body between the bottom of the body A and the delivery-board 14. This fan-casing 62 has an opening directed toward the two decks 50 and 51 and likewise to the screen 57 of the grain-shoe, and a fan 63 is located in the casing 62, mounted on a shaft driven in any desired way. This fan serves to blow off the exceedingly light material or chaff from the decks and from the screen 57 of the shoe, and the fin-backs on the decks gradually work the straw rearward until it drops down to an engagement with the fan 65, suitably driven, which fan is mounted to turn in the lower open portion 64 of a flue 66, extending through the upper portion of the body. Thus it will be observed that as the cut straw is driven from the decks 50 and 51 and the chaff from the screen 57 of the shoe C the straw and chaff are taken up by the fan and blown out through the flue, while the grain passes down through the openings in the decks and onto the screen 57, the fine grain passing through the screen 57 to the conveyer C′, while the coarser grain is worked off into a gutter 62ª, from whence it may be worked off in any suitable or approved manner as a second grade of grain.

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

1. In threshing-machines, the combination with the body of the machine having an opening in its upper portion, a cylinder mounted to revolve at said opening, provided with exterior threshing-teeth and exterior diagonally-arranged alternating and opposing knives, longitudinally inclined in opposite directions and carried by the cylinder between the teeth, and a hood covering the said opening and extending over the top of the cylinder, which hood has an opening at its rear and an opening at its forward end, of feed-rollers mounted to revolve one above the other at the forward opening of the hood, shields for the rear portions of the rollers, a space intervening between the rear open ends of the shields, opposing ledger-plates secured to the rear ends of the shields, a corundum roller eccentrically mounted in the hood at its rear opening, an adjusting-handle for the roller, extending through the hood, and a locking device for the handle.

2. In a threshing-machine, the combination with a body-casing having an opening therein, a cylinder mounted to revolve at said opening, provided with series of meshing teeth, and alternately-located knives between series of the teeth, which knives extend from opposite ends in direction of the center and are diagonally located with respect to the axis of the cylinder, a hood for the cylinder, covering said opening in the body and having an opening at its forward end, and a delivery-board extending downward from the front opening in the hood and horizontally beneath the cylinder, the inner end of which board is downwardly curved, of feed-rollers mounted one above the other at the front opening in the hood, a shield for the upper roller extending over the top from a point without the hood and at the rear of the roller, a second shield for the lower roller, extending from the feed-board beneath the roller and up at the rear, ledger-plates carried by the opposing rear ends of the shields, and a corundum roller within the hood in the path of the knives, disks mounted to turn in bearings secured to the body-casing, trunnions for the roller eccentrically mounted in the disk, and means for operating and locking the disks.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CHARTER JACKSON SMITH.

Witnesses:
JOHN P. TELFORD,
W. H. BEAN.