

No. 880,661.

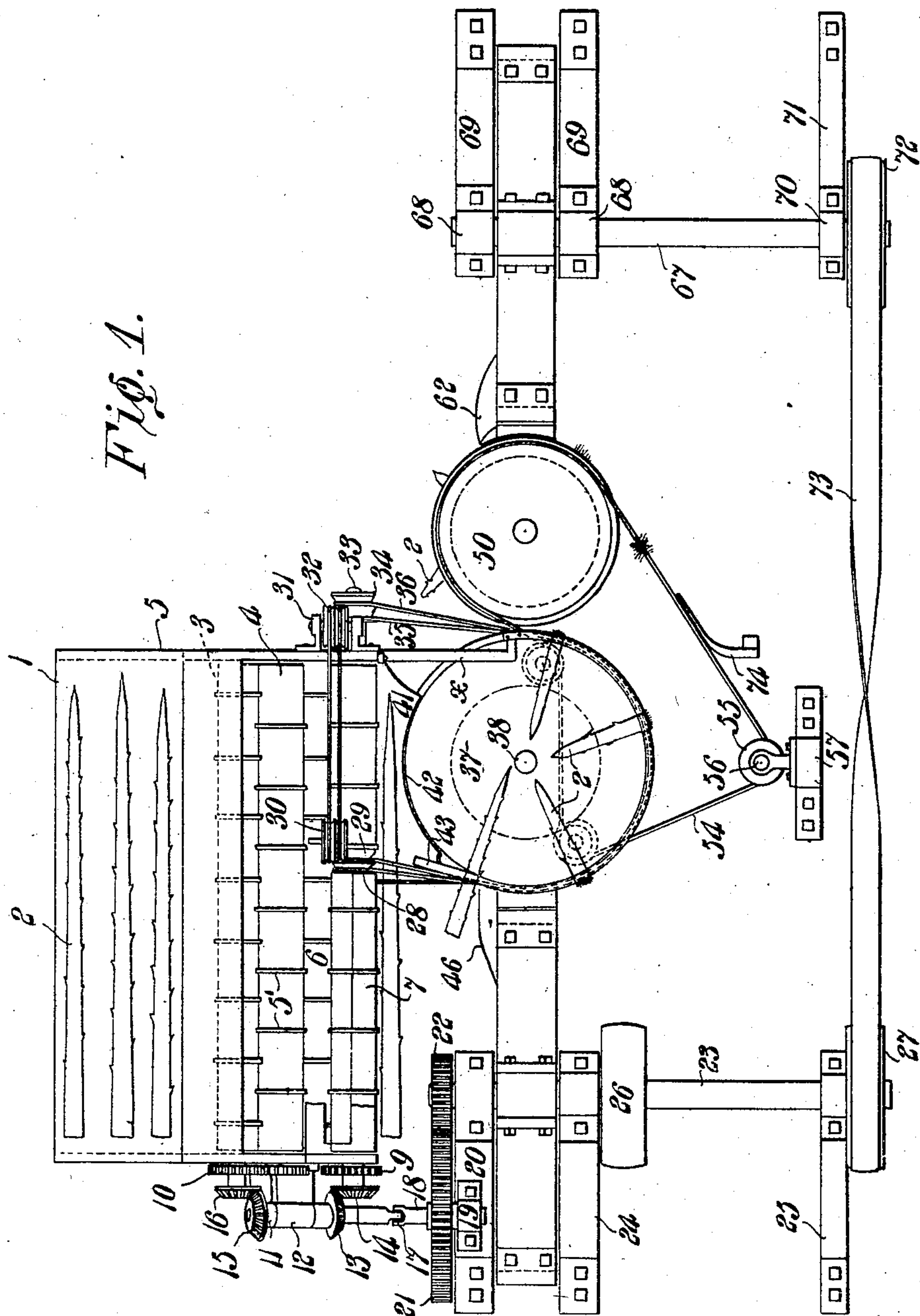
PATENTED MAR. 3, 1908.

E. HARTMAN.

MACHINE FOR DISINTEGRATING FIBROUS PLANTS.

APPLICATION FILED FEB. 2, 1907.

2 SHEETS—SHEET 1.



WITNESSES:

E. J. Stewart
F. J. Chapman

Emil Hartman,

INVENTOR

By

C. A. Snow & Co.

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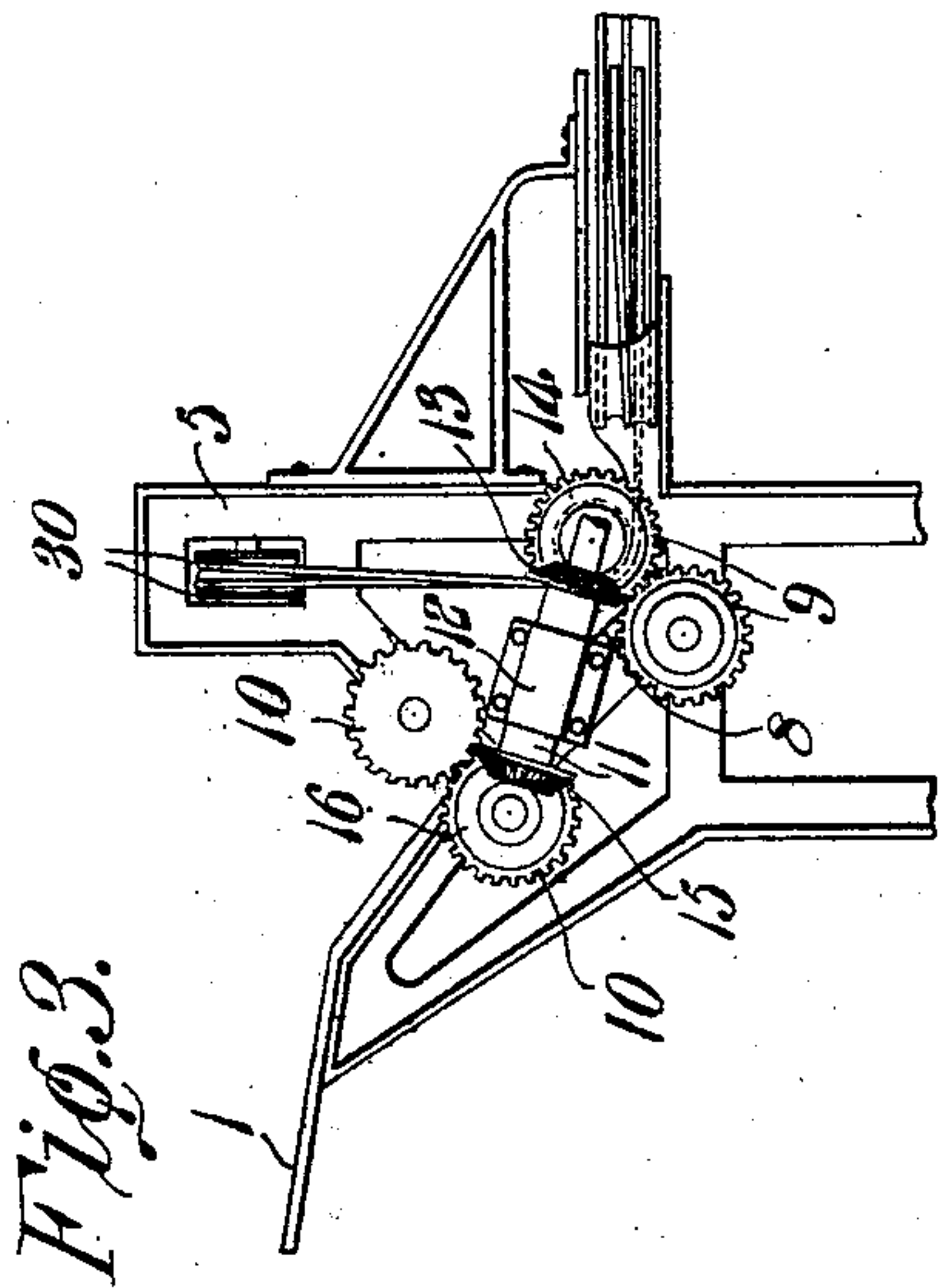
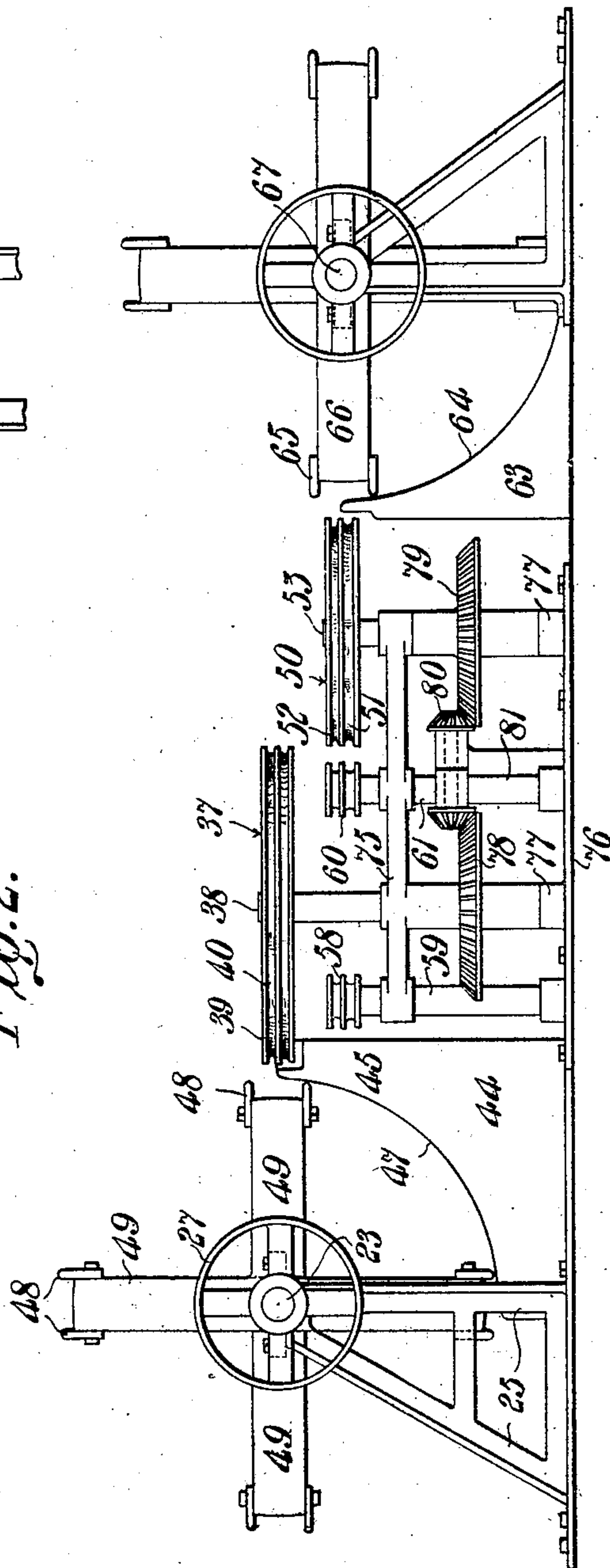


Fig. 3.

Fig. 2.



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UNITED STATES PATENT OFFICE.

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MACHINE FOR DISINTEGRATING FIBROUS PLANTS.

No. 880,661.

Specification of Letters Patent.

Patented March 3, 1908.

Application filed February 2, 1907. Serial No. 355,505.

To all whom it may concern:

Be it known that I, EMIL HARTMAN, a citizen of the United States, residing at Houston, in the county of Harris and State of Texas, have invented a new and useful Machine for Disintegrating Fibrous Plants, of which the following is a specification.

This invention relates to improvements in machines for disintegrating fibrous plants, and its object is to provide a means for removing the pulpy material from the leaves of fibrous plants in order to obtain the fiber in a cleaned condition, so that it may be employed for commercial purposes.

The machine is especially adapted for the extraction of fiber from the leaves of the henequen, maguey, lechugia, palma, and other similar fibrous plants.

The invention comprises essentially a series of feeding rolls receiving the leaves on a suitable support, and these feeding rolls act upon the leaves to initially crush or break them without, however, injuring the fiber. The leaves are grasped about midway of their length by a flexible carrier in such manner that approximately one half of a leaf will be carried to a point where it may be acted upon by scraping knives which will remove the soft pulpy material from the fiber, and from these knives the partially cleaned leaves are carried to other knives in such manner that those portions of the leaves which have been unacted upon by the first set of knives are then cleaned by the second set of knives, after which the cleaned fibers are removed from the machine and treated in any appropriate manner.

The invention will be fully understood from the following detailed description taken in connection with the accompanying drawings forming part of this specification, in which,—

Figure 1 is a plan view of the machine; Fig. 2 is an elevation of the same; and Fig. 3 is a detail view showing an elevation of one end of the feeding rolls and adjacent parts.

Referring to the drawings, there is shown a feeding table 1 upon which the leaves 2 from which the fiber is to be extracted are laid preparatory to feeding them to feeding and crushing or breaking rolls 3—4. These rolls are journaled in a suitable frame 5 and extend laterally across the feeding end of the table 1 and are provided with breaking ribs

5'. The leaves, after passing between these rolls, are received between another pair of rolls 6—7, also journaled in the frame 5, and extending across an extension 8 of the table 1. The rolls 6—7 are coupled together to turn in opposition by pinions 9—9, and the rolls 3—4 are also coupled together to turn in opposition by pinions 10—10, and these rolls are made to turn in unison in the proper direction by a short countershaft 11 carried by a journal bearing 12 fast to the frame 5 and having at each end a bevel pinion, one pinion 13 meshing with a bevel pinion 14 on the end of the shaft of the roll 7, which end is extended beyond the pinion 9 carried thereby for this purpose. The pinion 15 upon the other end of the countershaft 11 meshes with a bevel pinion 16 upon the shaft of the roll 3, which is extended at this point beyond its pinion 10 for the purpose of receiving the bevel pinion 16.

The countershaft 11 is extended beyond the pinion 13 and is there connected by means of a universal joint 17 with a shaft 18 having a journal bearing 19 in a standard 20 and carrying a gear wheel 21 meshing with a pinion 22 upon a main drive shaft 23 journaled in the standard 20 and also in another standard 24 adjacent to the standard 20 and having still another bearing in a third standard 25. Upon this drive shaft 23 is a main drive pulley 26, receiving power from any suitable source, and the drive shaft also carries beyond the journal bearing in the standard 25 another pulley 27, to be hereinafter referred to. It will be understood, of course, that the pinion 22 and gear wheel 21 may be replaced by a short belt drive, if so desired.

A little to one side of the middle of the roller 7, the latter is grooved, as shown at 28—29, Fig. 1, to form two adjacent parallel sheaves, and suitably journaled in the frame 5 above these sheaves 28—29 are other sheaves 30, adjacent and parallel, and arranged to rotate in planes at right angles to the planes of rotation of the sheaves 28—29. Journaled in suitable brackets 31 at the end of the frame 5 remote from the driving end of the rollers is another pair of sheaves 32, and below these sheaves 32 and idly rotating upon an extension 33 of the shaft of the roller 7 are other sheaves 34. Instead of extending the shaft of the roller 7 and utilizing this for the support of the sheaves 34, the

latter may be mounted upon a stud fast on the frame 5 in line with the axis of the said roller 7.

The sheaves 30, 32 and 34 are all idlers 5 and around them pass two endless ropes or bands 35—36, which also pass around the sheaves 28 and 29 and around a drum 37 mounted upon a vertical shaft 38 so that its periphery at one side is approximately in 10 line with the sheaves 28—29, before referred to. This drum 37 has two adjacent parallel grooves 39—40 in its periphery. The rope, cable or band 35 passes from the sheave 38 around the drum 37 in the groove 39, thence 15 to one of the idlers 34, thence upward over one of the idlers 32 to one of the idlers 30, and, finally, downward and under the sheave 28. The other rope, cable or band 36 passes from the sheave 29 around the drum in the 20 groove 40, thence to one of the idlers 34, and upward over one of the idlers 32, and, finally, over one of the idlers 30 and downward to the said sheave 29.

Extending across the discharge end of the 25 table extension 8 from a point near the sheave 28 to the frame 5 at that end where the idler sheaves 32 and 34 are mounted, is a guide plate 41 having the end nearest the middle of the roll 7 extended to a point ad- 30 jacent to the meeting point of the rope 35 with the groove 39 of the drum 37, and this plate is bent upward and over the periphery of the drum 37, as shown at 42, from near the point of contact of the ropes 35—36 with 35 the drum to near the end of the plate adjacent to the right-hand terminus of the plate as viewed in Fig. 1. Extending over the up- per surface of the drum 37, adjacent to its outer edge, is a guide bar 43. This guide 40 bar 43 extends from a point over the plate 41 where the latter begins to overlap the drum 37 to a point about coincident with the point on the drum 37 where the ropes 35—36 leave it, and at this point the guide bar is 45 supported by a bracket x fast on the frame 5. Now, when the broken leaves pass from between the rolls 6—7 one end, and, in the case shown, the outer or smaller ends of the leaves, are received upon the plate 41 and 50 are grasped between the same and the ropes 35—36, the other or butt ends of the leaves falling by gravity downward over the left-hand edge of the plate 41, as viewed from Fig. 1.

55 It being understood that the ropes travel from the sheaves 28—29 toward and around the drum 37, it will be seen that the leaves are carried by the ropes across the plate 41 until the smaller ends pass under the end of 60 the guide bar 43. As the leaves progress, the small ends are carried up by the up- turned edge 42 of the plate 41 where it over- hangs the drum 37 until these small ends pass from the upturned end of the plate 41 65 and drop and lie upon the top of the drum

37. The leaves are grasped between the ropes 35—36 and the bottoms of the grooves 39—40 of the drum 37, which grooves are preferably lined with some soft material, such, for instance, as rubber. After the 70 leaves have been firmly grasped between the ropes 35—36 and the drum 37, the pendent ends are carried over a block 44 having its upper end slightly overhung by the drum 37 and having a rib 45 on its upper end adjacent 75 to the groove 39 of the drum 37, and projecting from this block into the path of the advancing leaf butts is a guide 46 formed on said block. As the leaves reach the guide 80 46 the pendent portions are carried up to and over a quadrantal face 47 formed on said block 44 in the path of scraping knives 48 fast on each side of the outer ends of arms 49 mounted and fast on the shaft 23 between 85 the two standards 20 and 24.

As the leaves are carried across the face 47 of the block 44, which latter may be a heavy solid block, the softer parts of the leaves are scraped away from the tough fibrous portion, and the fibers are therefore freed from the 90 pulp and retain all their natural strength, being unaffected as they might be were they treated chemically for the purpose of re- moving the pulp. It will be seen, of course, that the feeding of the leaves across the 95 block 44 and the rotation of the arms 49 will be so timed that the fibers will be thoroughly freed from all adhering pulpy matter within the time occupied in carrying them across the block. 100

The partially cleaned leaves continue with the drum around the axis thereof to a point about coincident with the place where the ropes 35—36 leave the grooves 39—40 to pass around the loose sheaves 34. At this 105 point there is another drum 50 having grooves 51—52, also lined with rubber or other soft material, and this drum 50 is preferably made of less diameter than the drum 37. The drum 50 is mounted upon a vertical 110 shaft 53. Around the drum 50 and engaging in the grooves 51—52 are endless ropes 54 passing from the drum 50 to a pair of idle sheaves 55 mounted to turn on a vertical spindle 56 carried by a suitable standard 57, 115 thence to other idle sheaves 58 mounted upon a vertical axis carried by a standard 59 and located conveniently below the drum 37, thence over another pair of idlers 60 mount- ed beneath the drum 37 upon a suitable 120 standard 61, and from this latter pair of idlers the ropes again pass to the grooves of the drum 50. The idlers 60 are so placed that the ropes 54 will pass therefrom to the drum 50 in the path of the cleaned fibers de- 125 pending from the drum 37 approximately coincident with the release of the uncleaned smaller ends of the leaves from the drum 37 by the passage of the ropes 35—36 from the latter. 130

The drum 50 is located below the level of the drum 37, and, therefore, the cleaned fibrous ends of the leaves are grasped between the ropes 54 and drum 50 at a point 5 some little distance from the junction between the uncleaned ends and the fibers. As the drum 50 continues to rotate, the uncleaned ends are pulled off the drum 37 and fall so as to depend from the drum 50. 10 When the drum 50 has made nearly half a rotation from the point where it received the leaves, the latter are brought against a guide 62 formed on the advance side of a block 63 similar to the block 44 before described except that it is not so large as the said block 15 44. Like the block 44, this block 63 has a quadrantal face 64 in the path of soft metal scraping knives 65 fast on and projecting radially from the ends of radial arms 66 secured to and turning with a shaft 67 mounted in journal bearings 68 at the upper ends of standards 69 on each side of and close to the arms 66. The shaft 62 extends through a journal bearing 70 on the upper end of another standard 71, and beyond this journal bearing 70 the shaft 67 carries a pulley 72 which is connected by a belt 73 to the pulley 27 on the power shaft 23, the belt 73 being crossed so that the shafts 23 and 67 will rotate in opposite directions to cause the active scraping knives 48 and 65 to pass downward over the respective scraping surfaces 47 and 64 of the blocks 44 and 63. 30

In the path of the fibers as they leave the drum 50 there may be located a stripper 74, or these fibers, from which the pulp has been removed, may be taken off from the ropes 54 in any other appropriate manner. 35

The standards 59 and 61 and the vertical shafts 38 and 53 may all be coupled by a suitable supporting framework 75, and the standards 59 and 61 may be secured to a suitable bed-plate 76 upon which, also, there may be formed step bearings 77 for the shafts 45 38 and 53. Fast upon the shaft 38 below the frame 75 there is a bevel gear 78, and secured to the shaft 53 is a similarly located bevel gear 79, and these two gears are connected through bevel pinions 80—80 having a common journal mounted in a journal bearing on a standard 81 fast on the bed-plate 76. 50

Power is transmitted to the drum 37 by the ropes 35—36 which, in turn, are driven by the sheaves 28—29 on the power driven roller 7, and this drum 37 transmits motion 55

to the other drum 50 through the gears 78—79 and pinions 80.

If so desired, the leaf holding ropes or bands which, in this particular instance, may also be used as rope drives, may be reinforced 60 with wire for strengthening purposes.

I claim:—

1. In a machine for cleaning the fibers of leaves from pulp, a leaf carrier consisting of a drum mounted on a vertical shaft, endless 65 bands or ropes engaging grooves in the periphery of the drum, a deflector plate covering a portion of the periphery of the drum and shaped to guide a portion of each leaf on to the top surface of the drum, and a guide 70 bar above said drum and encircling a portion of the circumference thereof.

2. In a machine for cleaning the pulp from the fibers of leaves, feeding rollers for breaking the leaves, a horizontal drum adjacent to 75 the feeding rollers, a plate between the feeding rollers and drum and shaped to guide a portion of the leaves to the top of the drum, endless bands or ropes extending over the feeding rollers to and around the drum and 80 serving to clamp the leaves to the drum, a pulp-removing mechanism in the path of the ends of the leaves remote from those on top of the drum, another drum adjacent to the first drum and receiving the endless bands 85 passing around said first drum and arranged to engage the pulp-free ends of the leaves, and another pulp-removing mechanism in the path of the ends of the leaves unacted 90 upon by the first mechanism.

3. In a machine for cleaning the pulp from the fibers of leaves, feed rollers for breaking the leaves, a horizontal drum or carrier adjacent thereto, endless bands extending from the feed rollers to and around the periphery of the drum, a plate extending from 95 the feeding rollers to the drums and shaped to direct one end of the leaves up on to the top of the drum, a guide bar above the top of the drum adjacent to the periphery thereof, and pulp-removing mechanism in the 100 path of the leaves.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

EMIL HARTMAN.

Witnesses:

F. F. KENDALL,
A. SCHOLDER.