W. H. ATWOOD.

HEMP BREAKING MACHINE.

APPLICATION FILED NOV. 17, 1909.

986,538.

Patented Mar. 14, 1911.

3 SHEETS—SHEET 1.

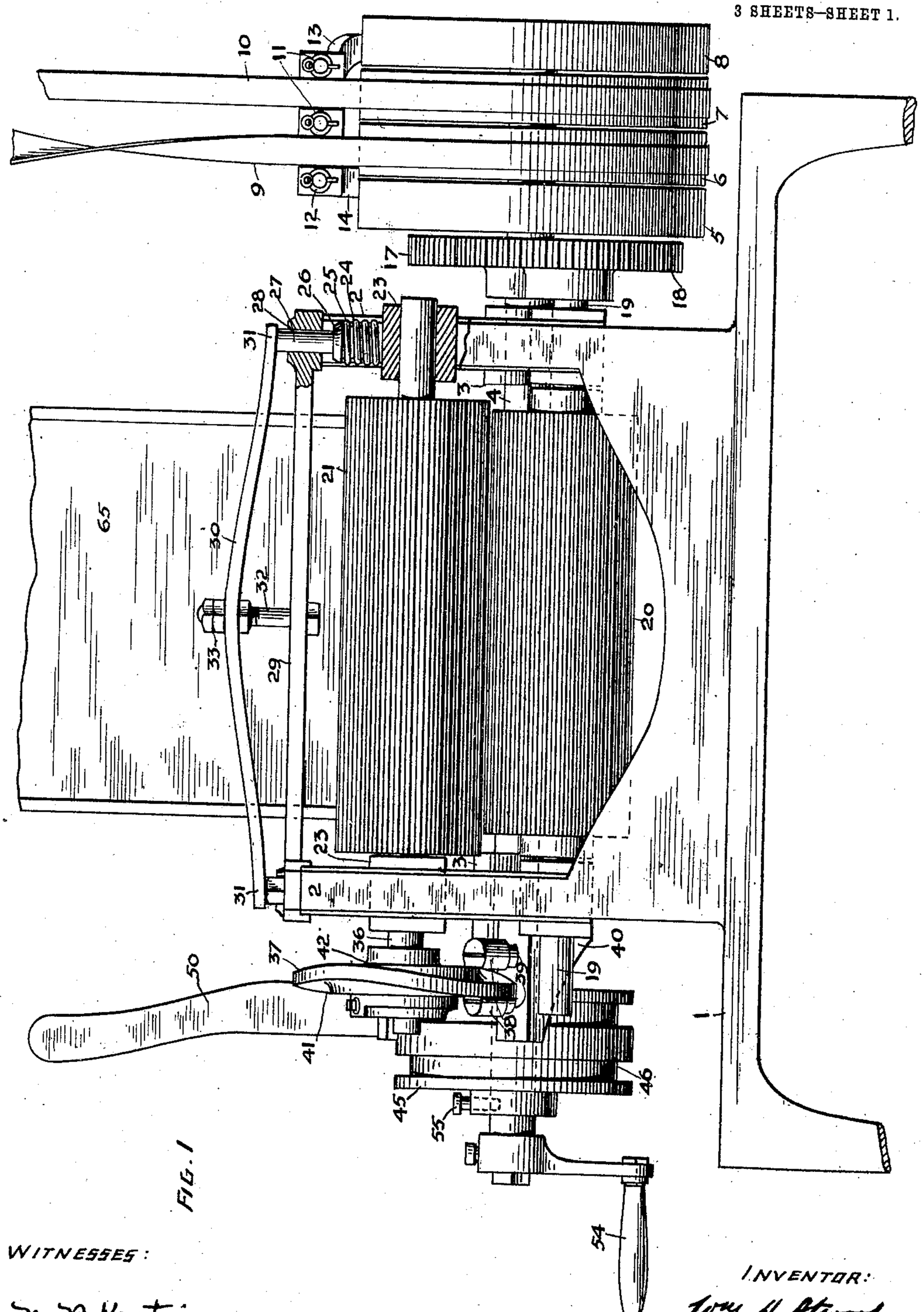

FIG. 1

WITNESSES:

N. B. Keating.

Leon Bodler

INVENTOR:

Wm. H. Atwood

By Jno. Wright

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3 SHEETS—SHEET 2.

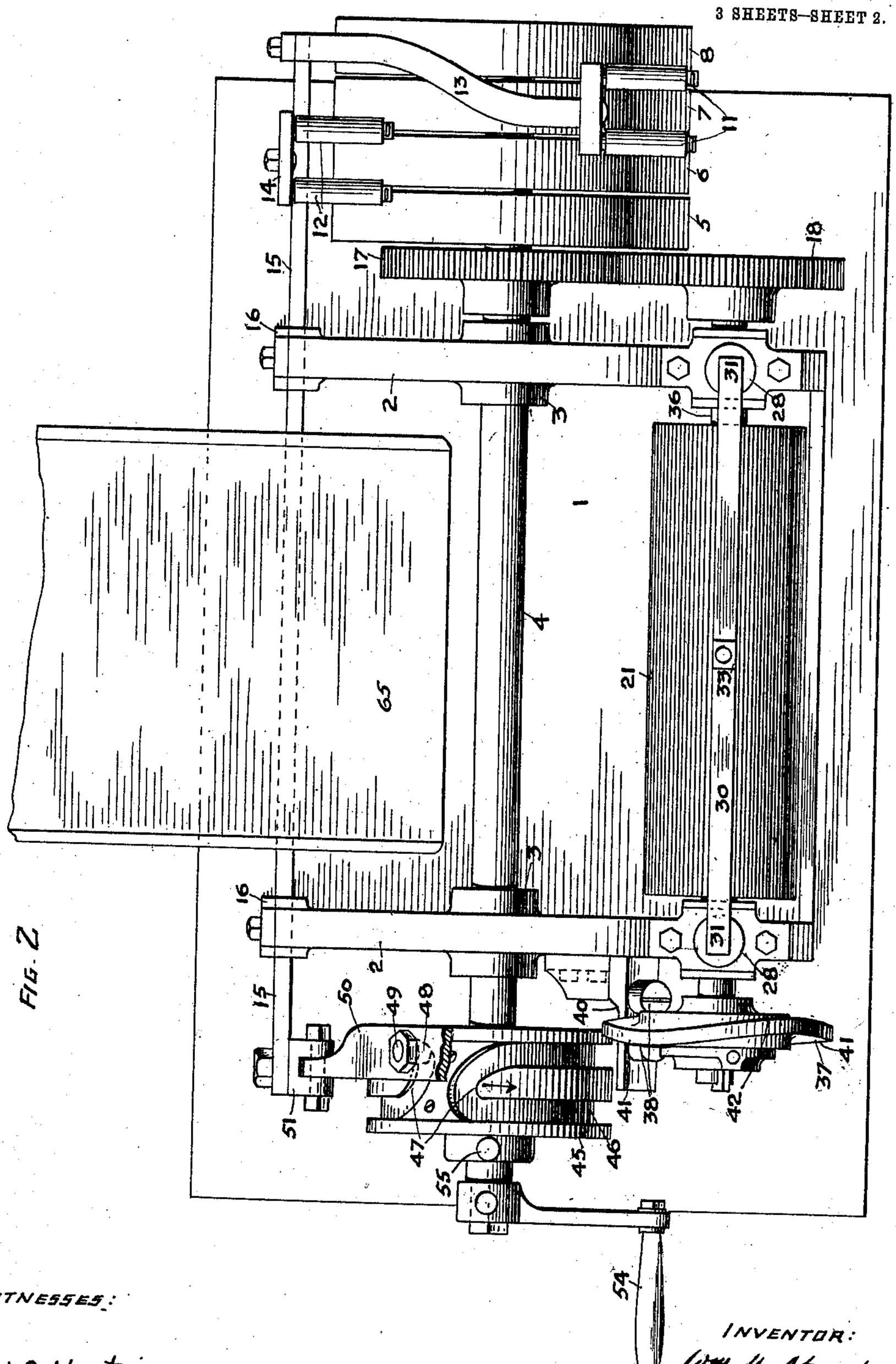

FIG. 2

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3 SHEETS—SHEET 3.

FIG. 3

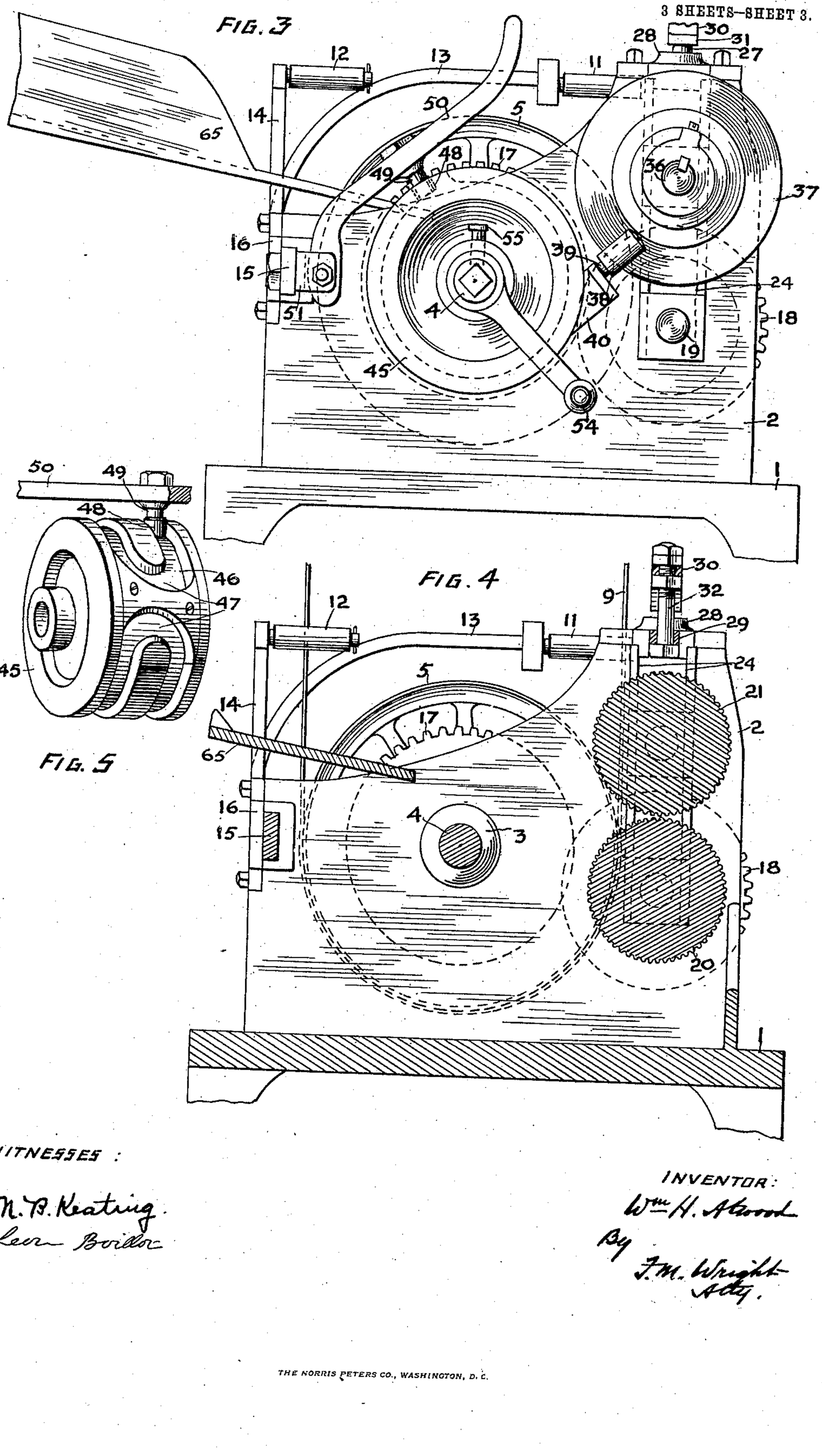

FIG. 5

FIG. 4

WITNESSES :

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UNITED STATES PATENT OFFICE.

WILLIAM H. ATWOOD, OF OAKLAND, CALIFORNIA.

HEMP-BREAKING MACHINE.

986,538. Specification of Letters Patent. **Patented Mar. 14, 1911.**

Application filed November 17, 1909. Serial No. 528,491.

To all whom it may concern:

Be it known that I, WILLIAM H. ATWOOD, a citizen of the United States, residing at Oakland, in the county of Alameda and State of California, have invented new and useful Improvements in Hemp-Breaking Machines, of which the following is a specification.

The present invention relates to improvements in machines for breaking hemp, flax and similar plants, and the object of the invention is to provide a machine of this character by which the fiber may be obtained from the stalk not tangled up, in pieces of considerable length, and without having to break them into short pieces.

A further object of the invention is to avoid the necessity of retting the stalk to obtain the fiber.

In the accompanying drawings, Figure 1 is a front view of my improved machine; Fig. 2 is a top plan view thereof; Fig. 3 is an end view; Fig. 4 is a cross section; Fig. 5 is a perspective view of the grooved cam.

Referring to the drawings, 1 indicates a suitable base, formed integral with which are upright end plates or standards 2, in which are the bearings 3 for the main driving shaft 4. Upon one end of said shaft 4 are placed four pulleys 5, 6, 7, 8, the pulley 6 being fixed upon the shaft, and the pulleys 5, 7 and 8 being loose thereon. Either of the pulleys 5, 6 and 7 is adapted to be engaged by a crossed driving belt 9, and either of the pulleys 6, 7 and 8 by a straight belt 10. These belts can be shifted by pairs of rollers 11, 12, carried respectively by arms 13, 14, upon a shifter bar 15, slidable in bearings 16 at the back of the machine, as will be hereinafter described.

Secured upon the driving shaft 4 is a gear wheel 17, which meshes with a gear wheel 18, upon a shaft 19, having its bearings in the end plates 2, and carrying the lower breaking roller 20. Above the lower breaking roller 20 is an upper breaking roller 21, the shaft 36 of which rotates in bearings 23 vertically slidable in guideways 24 in the end plates, said bearings being normally depressed by coiled springs 25 in said guideways, the upper ends of which are depressed by shoes 26 formed upon vertical slide bars 27, slidable in bearings 28 in the ends of a cross head 29, which cross head extends between, and is secured to, the tops of the end plates 2. A bow spring 30 also extends across between the end plates above the cross head, and its ends 31 bear upon the upper ends of the slide bars 27. Through the center of the cross head passes a bolt 32, the head of which is below said cross head and the threaded portion passes through the center of the bow-spring and has suitable adjusting nuts 33 screwed thereon. By screwing downward said nuts, any desired pressure can be imparted to the bow spring and transmitted therefrom to the upper ends of the slide bars 27, said pressure being thus resiliently transmitted to the bearings of shaft of the upper breaking roller, to press said roller down upon the lower roller.

The stalks of hemp or flax to be treated are, by means of a chute 65, fed between the two rollers, and, when the lower roller is rotating in the proper direction, are fed forward by the pressure between the two rollers, the upper roller rotating only by friction with said stalks. Upon the end, remote from the driving pulleys, of the shaft 36 of the upper breaking roller, is secured a cam wheel 37, the edge of which, in the rotation of the shaft of the upper roller, travels between two cam rollers 38 on suitable stud shafts 39 extending from a bracket 40 secured upon the corresponding end plate. Said cam has two high levels 41 and two low levels 42, so that, in each complete rotation of the shaft of the upper roller, said roller is given two complete reciprocations longitudinally. The longitudinal movement of the stalks between the rollers, due to the circumferential movement of said rollers, together with the rapid rotary or rolling movement of said stalks due to the longitudinal reciprocation of the upper roller, all under considerable pressure due to the pressure of the bow spring, has the effect of crushing the stalk, and rubbing and thoroughly separating the fiber from said stalk. However, I do not rely upon the movements which would be thus imparted to the stalk in a single passage of the stalk between said rollers, but, in order to thoroughly separate the fiber, I provide mechanism whereby such a passage can be repeated indefinitely until the separation has been completely effected. For this purpose, there is secured upon the main driving shaft 4 a cam 45 having in its periphery a cam groove 46. This groove is formed in the periphery of the cam for the most part in two parallel planes spaced from each

other, and transverse to said driving shaft, the groove extending in each plane nearly through a complete circle, but corresponding ends of the two parts of the groove in the two planes being connected with each other longitudinally of the machine as shown at 47. Engaging said groove is a cam roller 48 carried by a pin 49 on a handle 50, the lower end of which is pivoted in a forked block 51 secured to the shifter bar 15, so that any longitudinal movement of said cam roller produces a corresponding longitudinal movement of the shifter bar. The result of this arrangement is that, supposing the parts to be in the position shown in Figs. 1 and 2, in which the rollers are moving in the direction of the arrows, and in which the cam roller is at one end of the part of the groove in the inner plane, when the driving shaft has rotated through nearly a complete revolution, producing a corresponding movement in the breaking rollers, and the cam roller 48 arrives at the other end of the inner portion of the cam groove, it is then deflected outward in the connecting portion 47 of the groove, and, in doing so, correspondingly shifts outward or to the left the shifter bar 15, which then shifts the crossed belt 9 from the fast pulley 6 on to the loose pulley 5, and at the same time shifts the straight belt 10 from the loose pulley 7 on to the fast pulley 6. This immediately produces a return rotary movement of the driving shaft 4, so that the cam roller 48 now travels in the outer portion of the cam groove. It so travels for nearly a complete revolution, until it arrives at the end of said outer portion where it encounters the connecting portion of the cam groove, its engagement with which has the effect of returning the shifter bar 15 to its former position, throwing the cross belt 9 from the loose pulley 5 on the fast pulley 6, and the straight belt 10 from the fast pulley 6 on to the loose pulley 7 and again reversing the motion. It will thus be seen that the stalks will pass backward and forward an indefinite number of times between the two rollers, while all the time the upper roller is rapidly reciprocated longitudinally relative to the lower roller. When the part of the stalk thus engaged by the rollers has been sufficiently broken and the fibers separated, it is necessary to treat in the same way a succeeding portion thereof. For this purpose the cam roller 48 is lifted from the cam groove by the handle 50, the effect of which is to permit the rollers to advance the stalks without the return movement being given by means of said cam. When the portion of the stalk to be now treated has passed through the rollers, the handle 50 is dropped, so that the cam roller again engages the cam groove, and the stalks are moved backward and forward between the rollers in the same manner as before a sufficient number of times to thoroughly break the same.

Every time that this operation is performed, a certain definite length of the stalks is thus treated, and it will generally happen that the last unbroken portions of the stalks thus treated are less than the distance through which the stalks advance for such reciprocating movement. If said last portions were treated in like manner, the result would be that the ends of the stalks would move out of disengagement with the rollers and could not be reciprocated by them. For instance, if the stalks were seven feet long and the distance for which they were moved with each reciprocating movement were two feet, then they would require three treatments, leaving a length of one foot which could not alone be so treated because such short lengths of stalks would move out of disengagement with the rollers.

To provide for treating said terminal portions of the stalks a handle 54 is mounted on the driving shaft. Said driving shaft is first released from the action of the pulleys by lifting the shifter 50, and moving it as far as possible to the right, by which the two belts are shifted on to the loose pulleys 7 and 8. A pin 55 which secures the grooved cam 45 to the cam shaft is now withdrawn, and the handle 54 is operated to rotate the driving shaft 4 so as to move back the stalks to a distance from the ends of the stalks equal to the extent of the regular oscillating movement of the rollers. The pin 55 is now replaced; which secured the cam 45 to the driving shaft; the belts are, by means of the shifter handle, thrown back to the proper operative position, the cam roller 48 carried by the shifter handle is dropped into the cam groove 46 and the operation is repeated, so that the latter part of the stalks are completely broken and the fibers separated. The stalks having thus been thoroughly broken through their full length are now discharged by raising the shifter handle, and allowing the rollers to rotate continuously onward instead of to reciprocate. The next batch of stalks is then treated in the same manner.

I claim:—

1. In a machine for treating the stalks of hemp or the like, the combination of a pair of parallel rollers, means for pressing one of said rollers toward the other, means for reciprocating one of said rollers longitudinally relatively to the other, a driving shaft, an operative connection between one of said rollers and said driving shaft, whereby said roller rotates with the driving shaft, means for reversing said rotation automatically at two predetermined points each in one direction of rotation of said roller, whereby repeated reciprocations are imparted to stalks between said rollers so long as said revers-

ing means are operative, and means for rendering said reversing means inoperative when desired, whereby said roller then rotates continuously in the same direction, substantially as described.

2. The combination of a pair of parallel rollers, means for pressing one of said rollers toward the other, means for reciprocating one of said rollers relatively to the other, a driving shaft, means for operatively connecting one of said rollers and said driving shaft, fast and loose pulleys on said driving shaft, direct and cross belts for operating said pulleys, a shifter bar for said belts, a pivoted handle attached to said shifter bar, and movable therewith, a roller carried by said handle, and a rotary peripheral cam operatively connected with said driving shaft, said cam having in its periphery an endless groove in two parallel planes transverse to the axis of said cam, substantially as described.

3. The combination of a pair of parallel rollers, means for pressing one of said rollers toward the other, means for reciprocating one of said rollers relatively to the other, a driving shaft, means for operatively connecting one of said rollers and said driving shaft, reversing mechanism for said shaft, a shifter bar for said mechanism, a pivoted handle attached to said shifter bar, and movable therewith, a roller carried by said handle, and a rotary peripheral cam operatively connected with said driving shaft, said cam having in its periphery an endless groove in two parallel planes transverse to the axis of said cam, substantially as described.

4. The combination of a pair of parallel rollers, means for pressing one of said rollers toward the other, means for reciprocating one of said rollers relatively to the other, a driving shaft, means for operatively connecting one of said rollers and said driving shaft, reversing and stopping mechanism for said shaft, a shifter bar for said mechanism, a pivoted handle attached to said shifter bar, and movable therewith, a roller carried by said handle, and a rotary peripheral cam operatively connected with said driving shaft, said cam having in its periphery an endless groove in two parallel planes transverse to the axis of said cam, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

WILLIAM H. ATWOOD.

Witnesses:
FRANCES M. WRIGHT,
D. B. RICHARDS.