(No Model.) 4 Sheets—Sheet 1.

J. O. ATKINSON.

ENSILAGE MACHINE.

No. 500,181. Patented June 27, 1893.

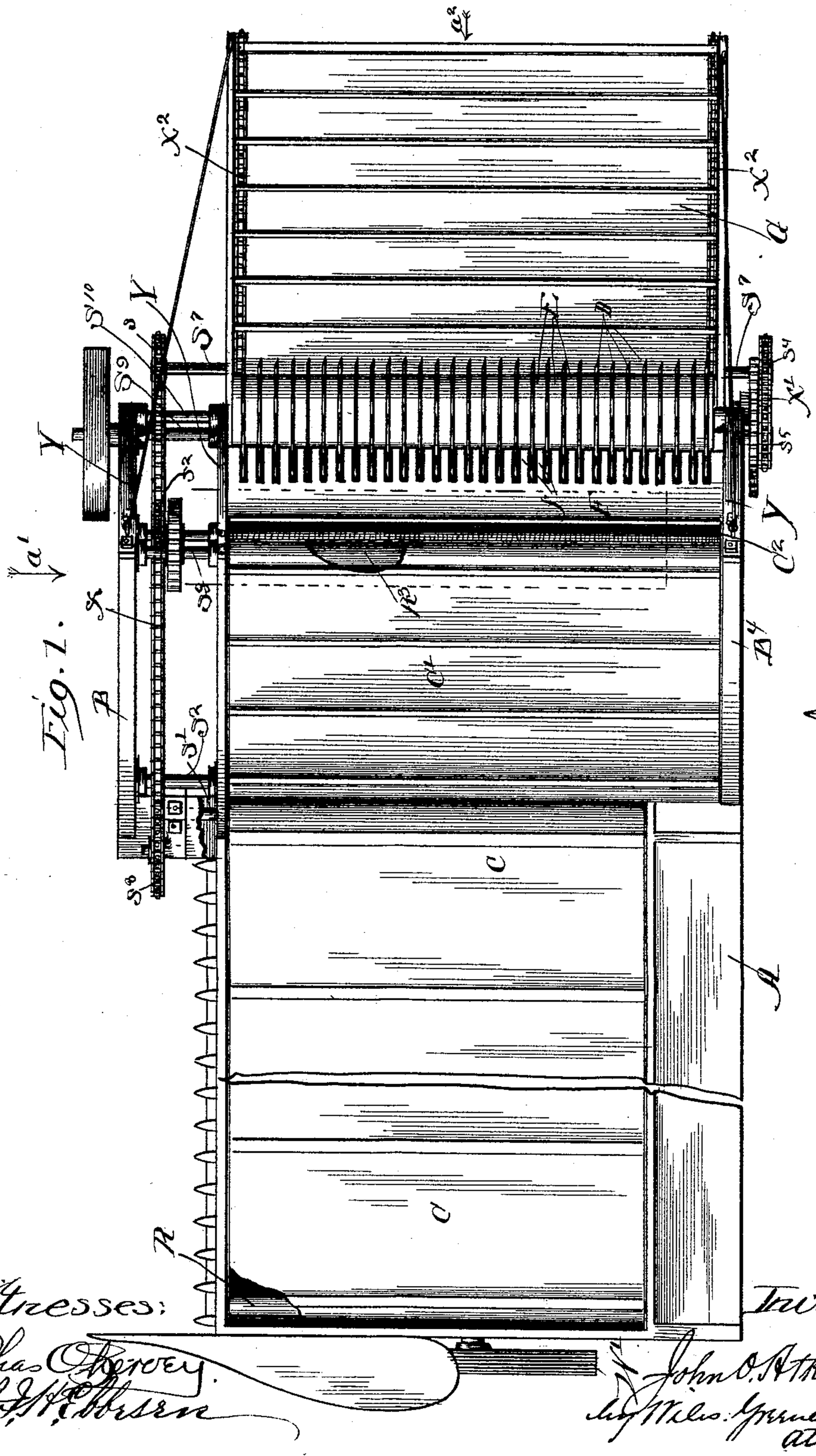

Fig. 1.

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J. O. ATKINSON.

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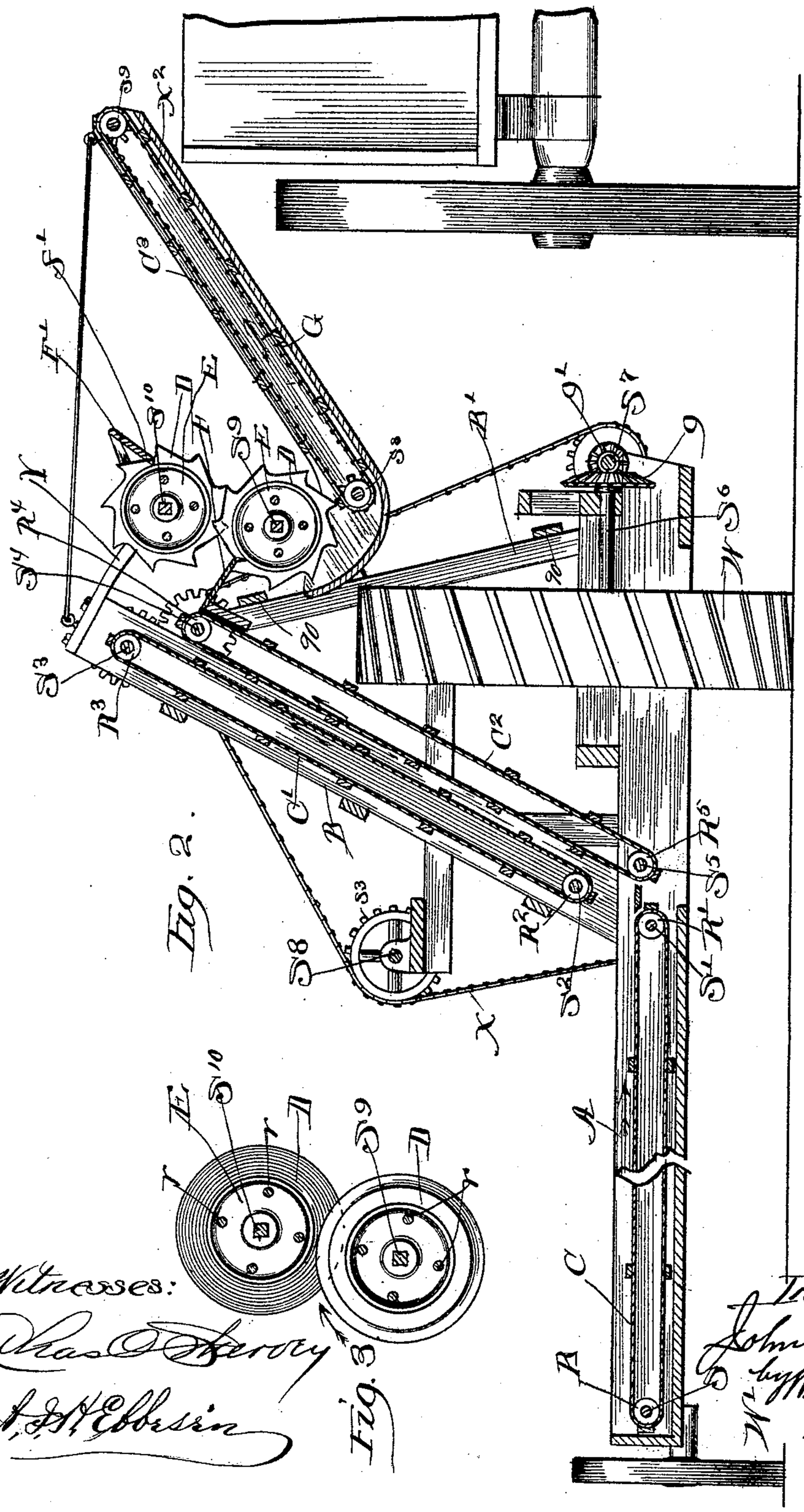

Fig. 2.

Fig. 3.

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J. O. ATKINSON.

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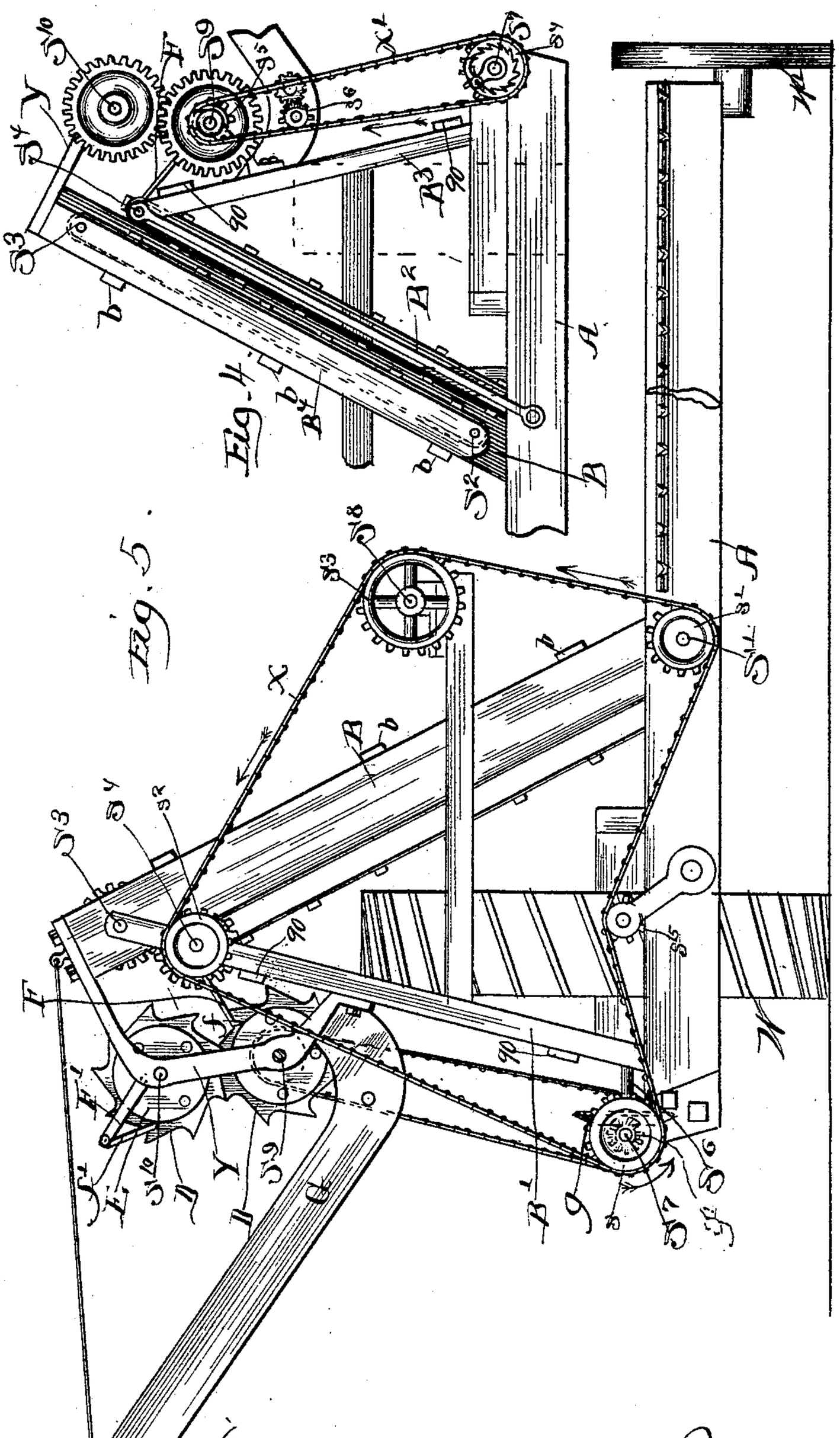

Fig. 4.

Fig. 5.

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ENSILAGE MACHINE.

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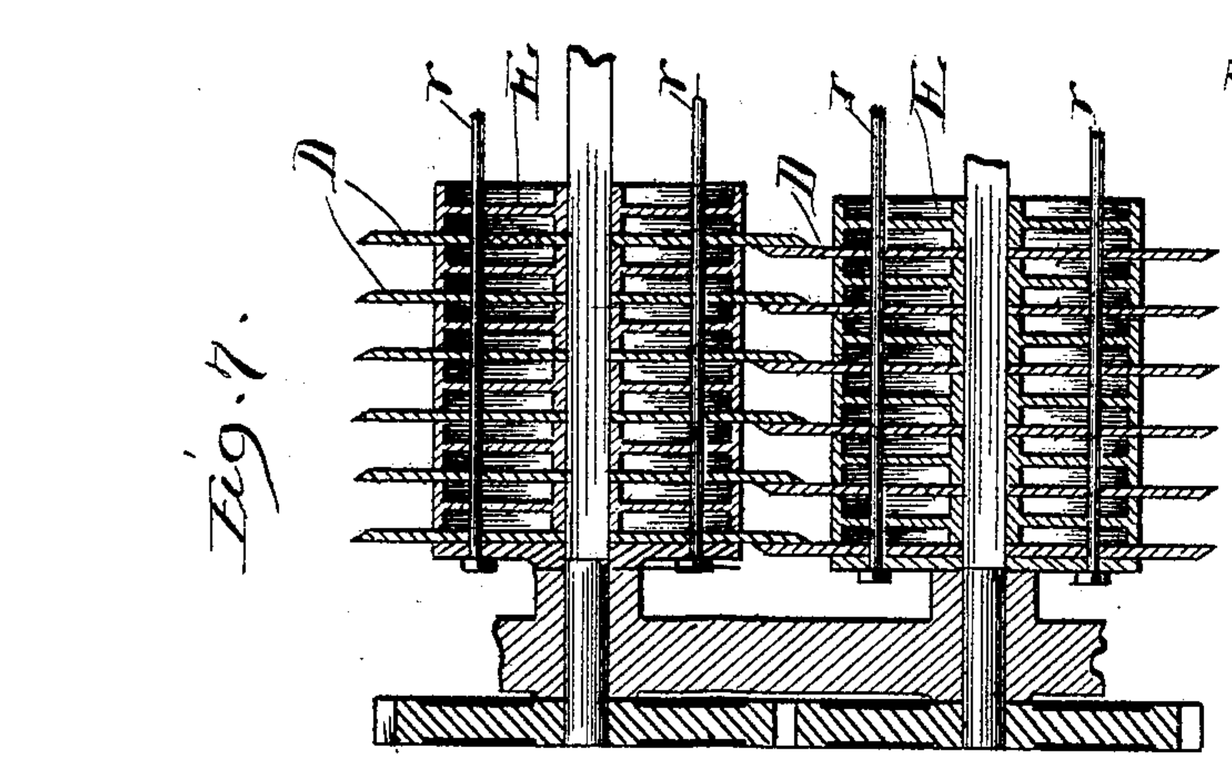

Fig. 7.

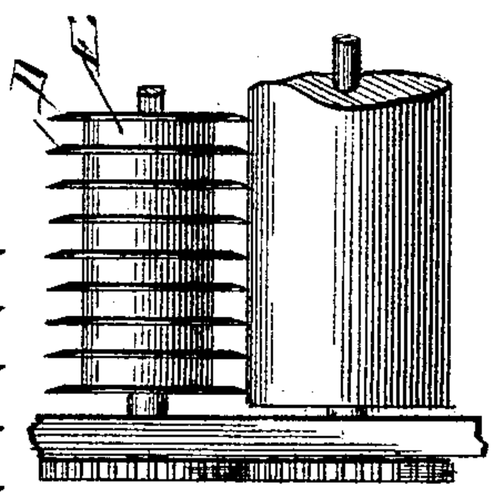

Fig. 9.

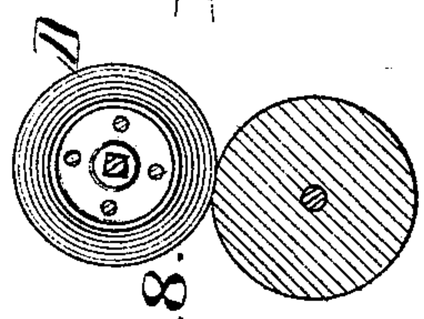

Fig. 8.

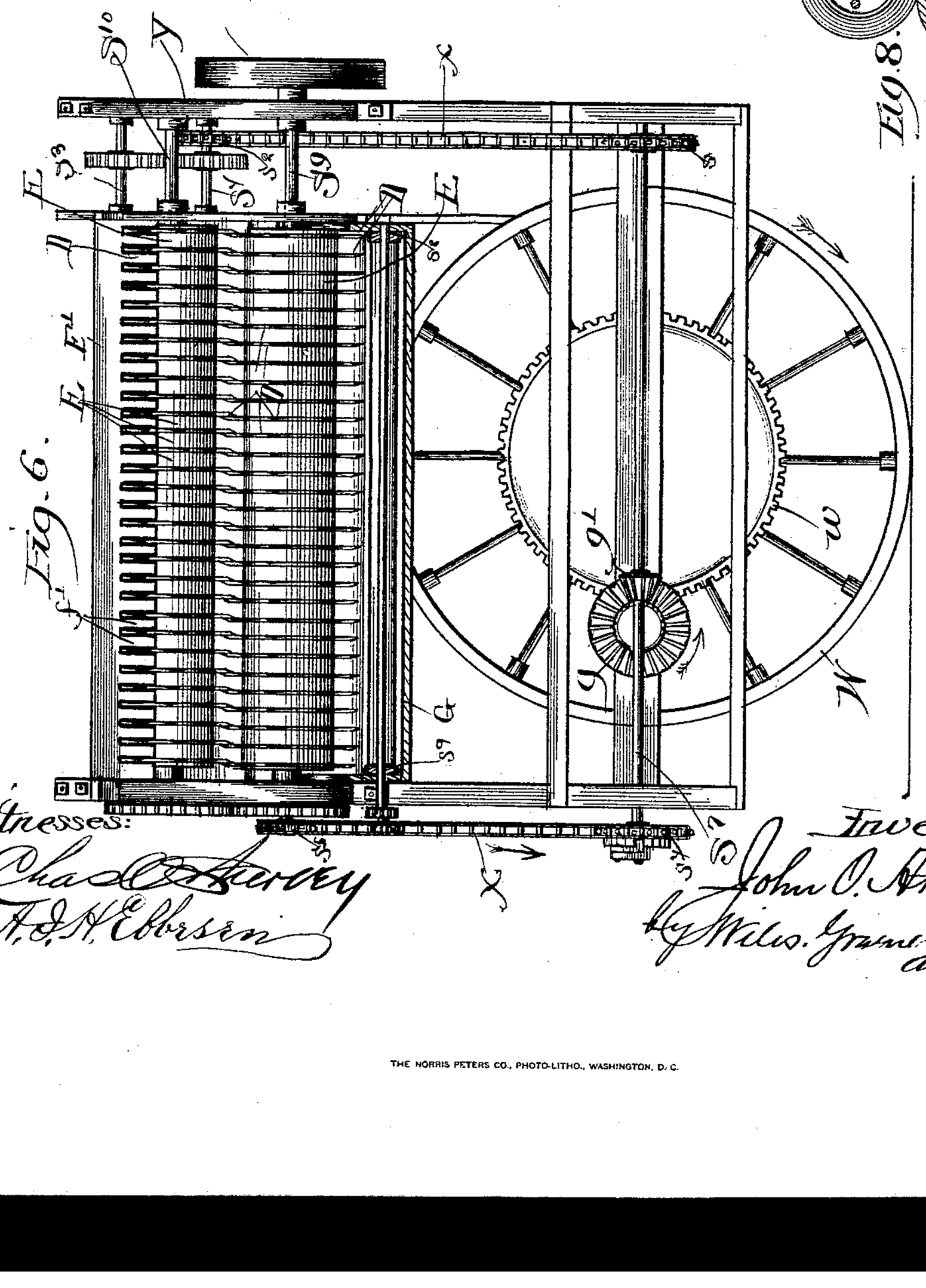

Fig. 6.

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UNITED STATES PATENT OFFICE.

JOHN O. ATKINSON, OF FREEPORT, ILLINOIS.

ENSILAGE-MACHINE.

SPECIFICATION forming part of Letters Patent No. 500,181, dated June 27, 1893.

Application filed September 12, 1892. Serial No. 445,612. (No model.)

To all whom it may concern:

Be it known that I, JOHN O. ATKINSON, a citizen of the United States of America, residing at Freeport, in the county of Stephenson and State of Illinois, have invented certain new and useful Improvements in Ensilage-Machines, of which the following is a specification.

My invention relates to improvements in machines for cutting and preparing ensilage for the silo, the object of the invention being to provide a machine which shall cut standing fodder in the field, chop it into small pieces suitable for packing in the silo and place it in wagons, whereby it may be transported from the field to the silo.

The invention is fully described and explained in this specification and shown in the accompanying drawings, in which—

Figure 1 is a top plan of a machine embodying my invention. Fig. 2 is a longitudinal vertical section of the machine, the view being in the direction indicated by the arrow *a*, Fig. 1. Fig. 3 is an elevation of two co-acting disks adapted for use in the chopping mechanism of the machine. Fig. 4 is a rear elevation of a part of the machine, the view being in the direction indicated by the arrow *a'*, Fig. 1. Fig. 5 is a front elevation of the machine, the view being in the direction indicated by the arrow *a'*, Fig. 1. Fig. 6 is an end elevation of the machine, the view being in the direction indicated by the arrow a^2, Fig. 1. Fig. 7 is a central longitudinal section of the chopping mechanism of the machine; and Figs. 8 and 9 are views of a modified form of chopping mechanism.

In the views, A is the bed of a reaper of ordinary construction and is provided at its front edge with the ordinary finger bar and with the usual sickle for cutting standing grain, the sickle being operated in any known or suitable manner. On the front edge of the bed and at one end thereof are rigidly secured two oblique braces B, B', Figs. 2, 5, and on the rear edge of the bed and at the same end thereof are rigidly fastened oblique braces B^2, B^3, corresponding substantially in position to the braces B, B', and connected therewith by transverse bars 90 in such a way as to form a single rigid frame. A third oblique timber B^4, lying in the same plane as the braces B^2, B^3, at the rear edge of the bed, is connected by transverse bars *b*, *b*, Fig. 5, with the brace B, at the front edge of the bed, the timber B^4, being parallel to the brace B^2, and separated from it by a narrow space in the manner shown in Fig. 4. In the bed A, are journaled two transverse parallel rollers R, R', Fig. 2, and about these rollers extends an endless apron C, adapted to receive grain cut by the machine in the manner well known in reaping machines. The grain, as it is cut, may be allowed to fall upon the apron C, without assistance, or the machine may be supplied with the usual reel adapted to strike the grain and force it onto the apron. In the brace B, and the timber B^4, connected with it, as above set forth, are journaled two rollers R^2, R^3, Fig. 2, and about these rollers extends an endless carrier C'; and in the braces B' B^3, and the bed of the machine are journaled two parallel rollers R^4, R^5, about which extends an endless carrier C^2, parallel to the carrier C', and separated from it by a space sufficient for the upward passage of grain delivered to the carriers from the horizontal apron C. It is evident that if the apron C, and the carriers C', C^2, be so operated that their folds shall move in the directions indicated by the arrows in Fig. 2, grain falling upon the apron must be carried up between the carriers and delivered at the top of the frame of the machine.

From the foregoing description of the support of the upper carrier C', it is evident that there is a clear space between the carriers at the rear edge of the machine, and that grain falling upon the apron may be carried up between the carriers even though its length be greater than the width of the carriers, the surplus length of the grain being allowed to project beyond the rear edge of the machine. This is important for the reason that grain cut for ensilage is generally corn, and is frequently of a height greater than the width of the carriers.

The rollers R, R', R^2, R^3, R^4, R^5, are provided with shafts indicated respectively by the letters S, S', S^2, S^3, S^4, S^5, journaled in the various parts that support the rollers, some of the shafts being extended through their supports and provided with means for their operation in the manner hereinafter set forth.

The end of the frame of the machine, which supports the carriers C′, C², is itself supported by a ground wheel W, the opposite end of the frame being supported by a smaller and lighter wheel W′. The wheel W, is provided with a geared ring *w*, Fig. 6, which engages a pinion on the inner end of a shaft S⁶, Fig. 2, parallel with the axis of the wheel, the outer end of said shaft being provided with a beveled gear *g*, which engages a second beveled gear *g′*, mounted on a transverse shaft S⁷, journaled in suitable bearings on the end of the bed. The shaft S⁷, is rotated by the rotation of the ground wheel as it rolls along the ground, and this shaft communicates motion to all the carrying mechanism thus far described. The gearing by which this is accomplished is shown in Fig. 5, *s* being a sprocket-wheel mounted on the driving shaft S⁷, and *s′*, *s²* being sprocket-wheels mounted respectively on the shafts S′, S⁴, already mentioned. Another sprocket-wheel *s³*, is mounted on a shaft S⁸, which serves to transmit motion to the reel of the machine, (not shown) and a chain X, of ordinary construction passes around the four sprocket-wheels *s*, *s′*, *s²*, *s³*, the rotation of the driving sprocket *s* being such as to give to the chain the movement indicated by the arrows upon it in Fig. 5, and thus to give to the apron and the carriers C′, C², the movements indicated by the arrows in Fig. 2. The chain may be tightened by means of the tightening sprocket *s⁵* shown in Fig. 5.

It is evident that by means of the mechanism thus far described, grain of any length may be cut by the machine, dropped on the apron and elevated between the carriers C′, C².

On the upper rear portion of the frame of the machine are secured two opposite curved members Y, Y, Figs. 2, 4, 5, 6, and in these members are journaled two shafts S⁹, S¹⁰, parallel to the shafts that support the endless carriers, and on these shafts are rigidly mounted co-acting disks D, D, so arranged that each disk on one shaft shall overlap and lie in contact with the corresponding disk upon the other shaft with which it forms a shear. Between the disks D, D, on each shaft are plates E, E, Fig. 7, adapted to maintain the proper spacing between the disks, and all the disks and interposed plates on each shaft are rigidly fastened together in any desired manner, as for instance, by means of rods *r*, *r*, Figs. 3, 7, passing from end to end of each of the cutting cylinders thus formed. Rotation of the disks and plates upon each shaft may be prevented by any suitable means, as for instance, by squaring those parts of the shafts on which the disks and plates are situated as shown in Fig. 3. The two shafts S⁹, S¹⁰, are provided with engaging gear-wheels in the manner shown in Fig. 4, and the shaft S⁹, is provided with a sprocket-wheel *s⁵*, which is connected by means of a chain X′, with a sprocket wheel *s⁷*, on the driving shaft S⁷, already mentioned. The sprocket-wheel *s⁷*, may be rigidly mounted on the shaft S⁷, but I prefer to mount it loosely thereon, and provide it with a ratchet disk as shown in Fig. 4, this disk being engaged by a pawl carried by an arm on the shaft, and the parts being so arranged that the rotation of the shaft S⁷, may be imparted to the sprocket-wheel *s⁴*, chain X′, and sprocket-wheel *s⁵*, at the same time that the cutting disks are allowed to continue their rotation after the rotation of the shaft S⁷, has ceased.

I have found it desirable to provide one of the shafts S⁹, S¹⁰, with a balance wheel as shown in Fig. 6, so that the momentum of the cutting mechanism may insure an even and steady operation, and it would evidently be objectionable to stop the cutting cylinders suddenly with every stoppage of the movement of the machine along the ground.

Near the upper ends of the carriers C′, C², is a feed-board F, Figs. 2, 4, and 5, extending downward and backward toward the lower chopping cylinder, and preferably provided with fingers extending between the edges of the disks D, of the lower cylinder to the peripheries of the plates E, these fingers being adapted to clear the spaces between the edges of the disks. A second transverse board F′, Fig. 2 is supported near the upper cylinder and is provided with fingers *f′*, extending between the edges of the disks thereon and adapted to clear these spaces between them. Grain falling upon the apron C, and brought upward between the carriers C′, C², drops upon the feed-board F, and passes downward between the edges of the disks upon the shafts S⁹, S¹⁰, each stalk of grain being in a line parallel to the shafts of the disks and being therefore at right angles to the disks themselves. The co-acting disks cut the grain thus presented into short pieces, and these pieces pass between the cylinders and are delivered at their outer or rear faces where they drop downward. Any pieces of grain lodging between the disks are extracted by means of the fingers *f*, *f′*, of the boards F, F′, and are thus left free to drop downward.

The delivery of the stalks of grain to the chopping disks in the position and relation described, renders it possible to rotate the disks at a low rate of speed and still dispose of the grain as rapidly as it can be cut from the ground. This is a very great advantage in a machine of this class in which the chopping mechanism must be supported upon a comparatively light frame and at a considerable distance above the bed of the machine and the wheels which carry it.

Beneath the cylinders lies the lower end of an elevator box G, having a width substantially the same as the length of the cylinders, the upper end of the box being supported by a suitable brace extending to the frame of the machine and being at such a height as to extend over the box of a wagon driven beside the machine. In the elevator box G, are journaled two transverse shafts carrying sprocket-wheels *s⁸*, *s⁹*, Fig. 2, and

on these sprocket-wheels are mounted two endless chains X^2, Figs. 1 and 2. These chains are operated by means of a sprocket-wheel s^6, Fig. 4, engaging the chain X′, and having on its shaft a pinion engaging a second pinion mounted on the same shaft as the sprocket-wheel s^8. This gearing moves the sprocket-chains in the direction indicated by the arrow in Fig. 2, the movement of the lower folds of the chains being upward. Transverse slats fastened to the chains move with them, the slats on the lower folds of the two chains being adapted to rest upon the bottom of the elevator box G, and to move upward and away from the cutting mechanism the divided stalks dropped from the mechanism into the elevator box. The material carried upward by these slats is discharged from the upper end of the elevator into the wagon moving with the machine, and the wagon thus receives the grain chopped at a single operation into pieces of suitable size for delivery to the silo.

The machine thus described may evidently be modified in various particulars without changing the essential nature of my invention, and I desire therefore not to limit the invention to the use of the specific forms described.

Modifications of one portion of the invention are shown in Figs. 3, 8, and 9, which illustrate different forms of mechanism adapted for dividing the stalks of grain into small pieces. In the form shown in Fig. 2, the disks are notched in the form common in circular saws. In the form shown in Fig. 3, the co-acting disks on the two cylinders are all circular. In the form shown in Figs. 8 and 9, the disks are circular, but only one of the shafts is provided with disks, the other being provided with a smooth cylinder preferably of wood against which the edges of the disks are pressed, the grain being passed between the edges of the disks and the cylinder.

Having now described and explained my invention, what I claim as new, and desire to secure by Letters Patent, is—

In a machine of the class described, the combination with a moving frame and a suitably operated sickle bar and sickle adapted to cut standing grain, of a moving endless apron adapted to receive stalks of grain falling upon it in lines at right angles to the sickle and move them laterally in a direction parallel to the sickle, two parallel shafts at right angles to the line of the sickle, means for rotating said shafts in opposite directions, suitably spaced chopping disks mounted on one of said shafts, co-acting disks mounted on the other shaft, and conveying mechanism adapted to receive the stalks of grain from said endless apron and deliver it to said co-acting disks in lines parallel to their shafts; substantially as shown and described.

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