No. 752,779. PATENTED FEB. 23, 1904.

E. A. JOHNSTON.

AUTOMATIC MOWING MACHINE.

APPLICATION FILED MAR. 1, 1902.

NO MODEL. 5 SHEETS—SHEET 1.

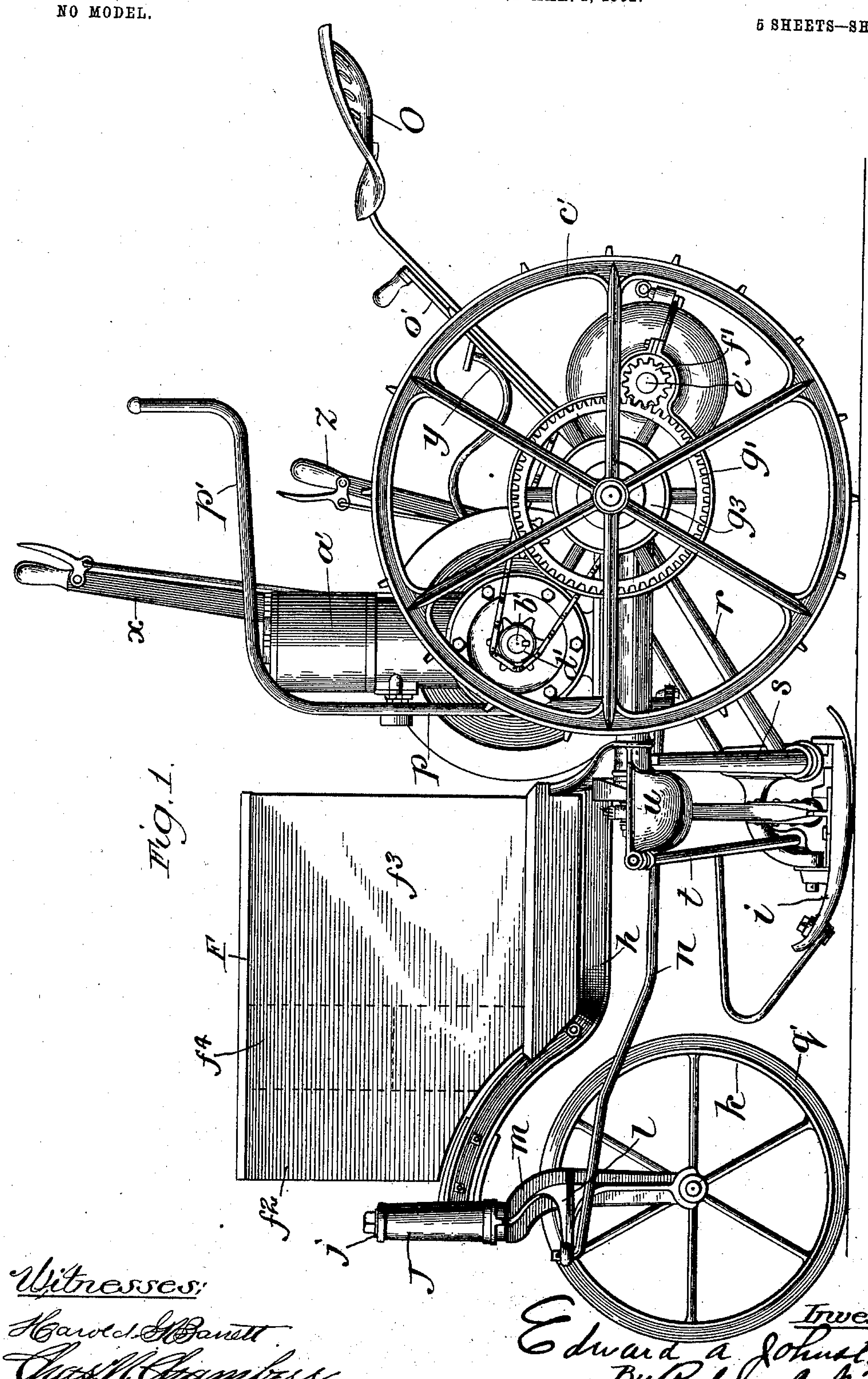

Fig. 1.

Witnesses:

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Chas. M. Chambers.

Inventor

Edward A. Johnston

By Rodney B. Swift Atty.

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APPLICATION FILED MAR. 1, 1902.

NO MODEL. 5 SHEETS—SHEET 2.

Fig. 2

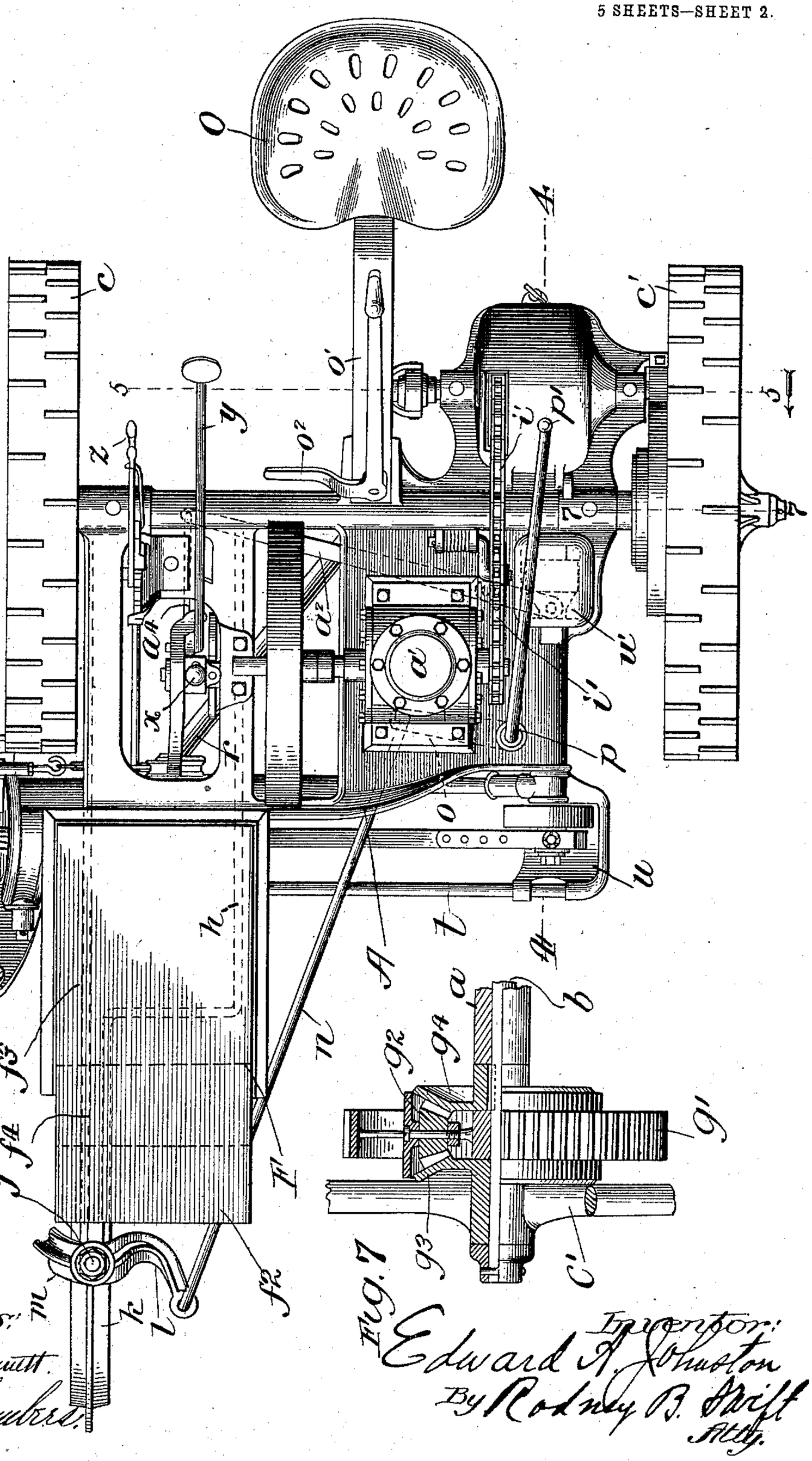

Fig. 7

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No. 752,779.

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NO MODEL.

5 SHEETS—SHEET 3.

Fig. 3

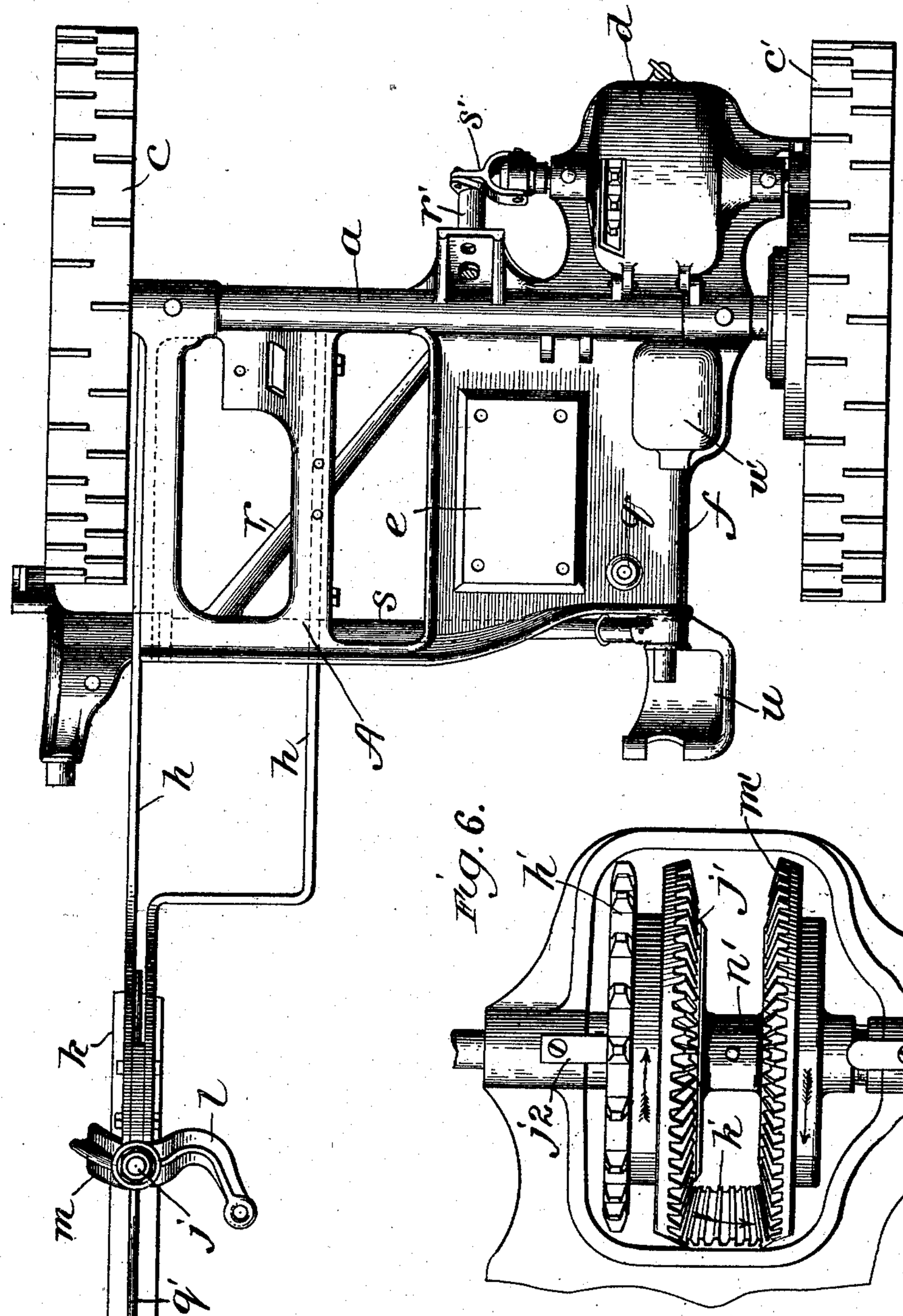

Fig. 6.

Witnesses:

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No. 752,779. PATENTED FEB. 23, 1904.

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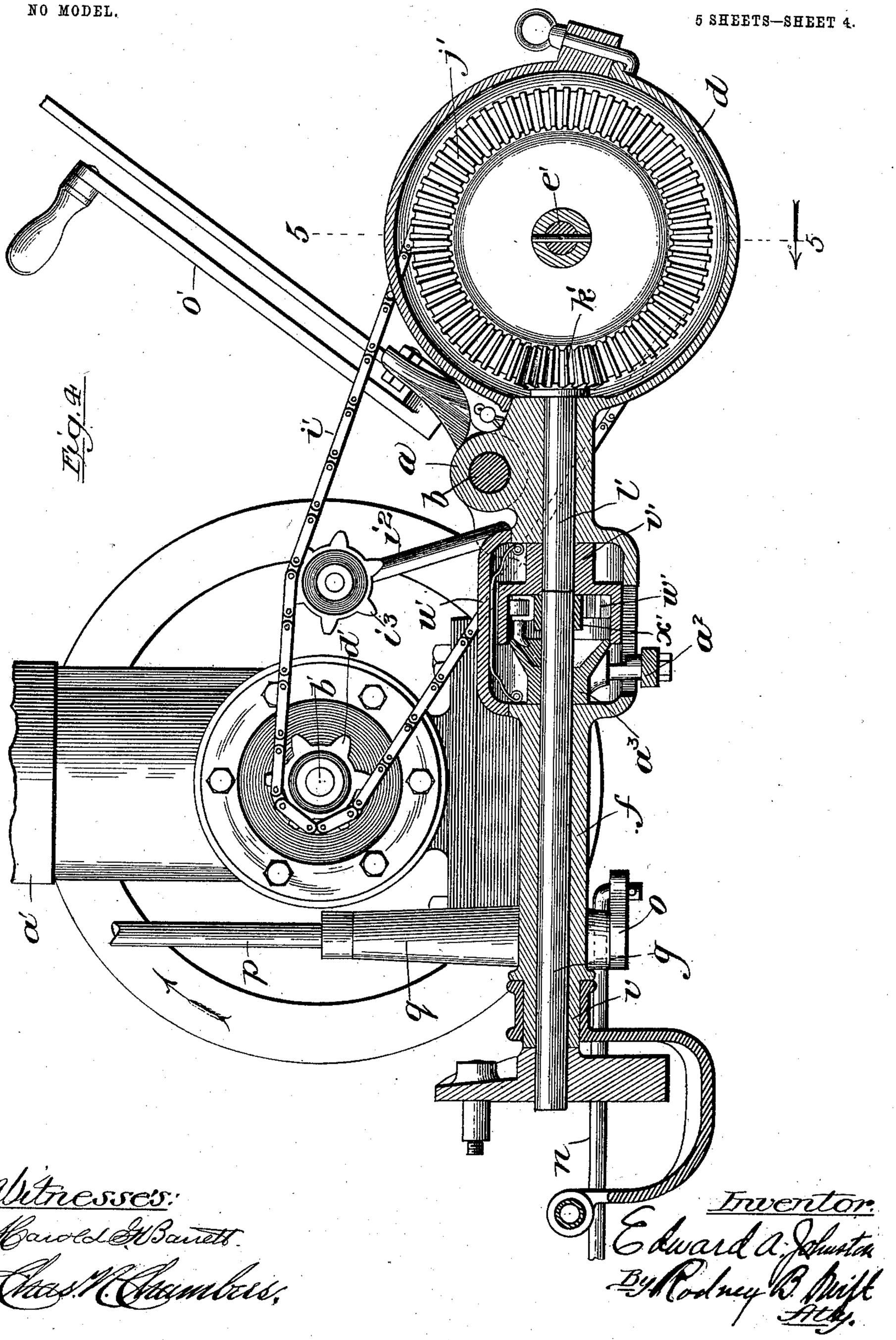
AUTOMATIC MOWING MACHINE.

APPLICATION FILED MAR. 1, 1902.

NO MODEL. 5 SHEETS—SHEET 4.

Fig. 4.



Witnesses:

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Chas. M. Coombes.

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No. 752,779. PATENTED FEB. 23, 1904.

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AUTOMATIC MOWING MACHINE.

APPLICATION FILED MAR. 1, 1902.

NO MODEL. 5 SHEETS—SHEET 5.

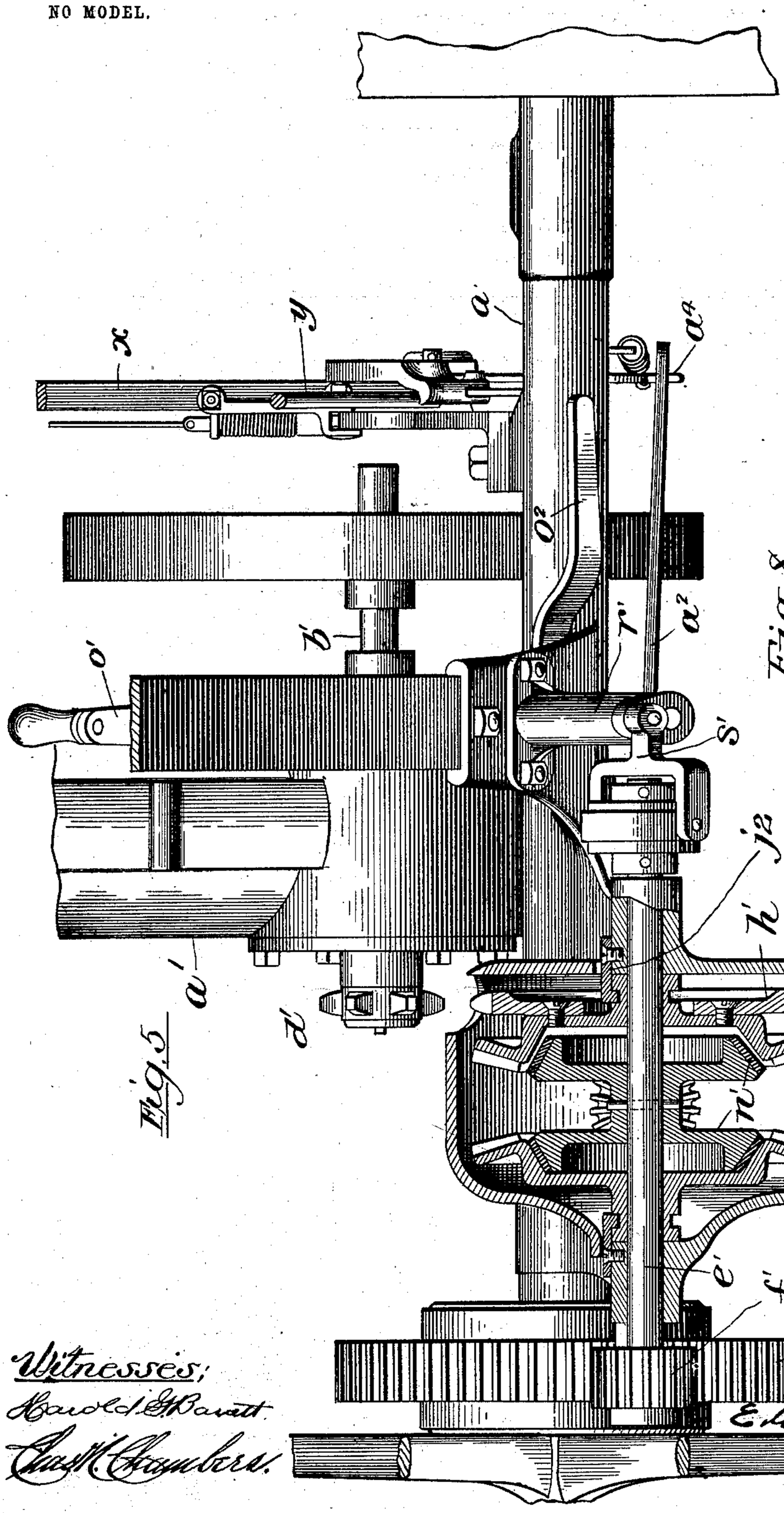

Fig. 5

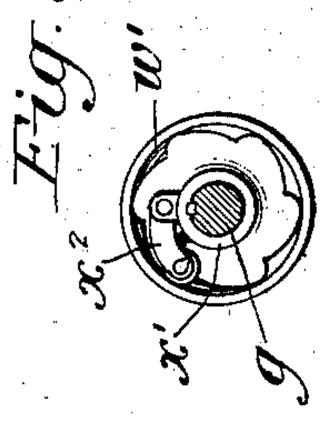

Fig. 8

Witnesses;
Harold E. Barrett
Chas. K. Chambers.

Inventor:
Edward A. Johnston
By Rodney B. Swift.
Atty.

No. 752,779. Patented February 23, 1904.

UNITED STATES PATENT OFFICE.

EDWARD A. JOHNSTON, OF CHICAGO, ILLINOIS, ASSIGNOR TO McCORMICK HARVESTING MACHINE COMPANY, OF CHICAGO, ILLINOIS.

AUTOMATIC MOWING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 752,779, dated February 23, 1904.

Application filed March 1, 1902. Serial No. 96,265. (No model.)

To all whom it may concern:

Be it known that I, EDWARD A. JOHNSTON, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Automatic Mowing-Machines, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

My invention relates to automatic or self-propelled mowing-machines—that is to say, such machines as are provided with engines or other prime motors that not only furnish motive power for propelling the machines themselves, but also for driving their operative mechanism.

Attempts heretofore have been made to adapt mowing and reaping machines to be propelled by engines that would also drive their operative parts; but they have required the construction of special framing involving radical departures from conventional types and have been so clumsy and unwieldly and have so greatly complicated the working parts that they have proven altogether impracticable. It is of course necessary that any self-propelled machine should be capable of going backward as well as forward. This heretofore has been provided for by the employment of reversing-engines and straight trains of driving-gears.

The object of my invention is to provide a machine of the above-described type in which the engine or motor rotates in one direction only and in which the direction of the machine's travel, as well as the stopping and starting of the working parts, is controlled by the interposition of trains of disconnecting and reversing gears. It is to be noted also that I have not materially departed from the conventional form of mowing-machines of the present day or made use of complicated systems of gearing.

In the drawings, Figure 1 is a stubble side elevation of the entire machine. Fig. 2 is a plan view of the same, showing a portion only of the cutting apparatus. Fig. 3 is a plan view of the machine-frame, all the working parts being removed except the supporting-wheels. Fig. 4 is a sectional view on the line 4 4, Fig. 2. Fig. 5 is a sectional view on the line 5 5 of the same figure. Fig. 6 is a detail of the gear-train between the engine and the counter-shaft; and Fig. 7 is a sectional view of the compensating gear of the main axle on the line 7 7, Fig. 2. Fig. 8 is an end elevation of the ratchet-clutch.

A represents the main frame of the machine; *c* and *c'*, the supporting or traction wheels; *k*, the lead or steering wheel; I, the cutting apparatus, and *a'* the engine. Referring to Fig. 3, it will be seen that the general structure of the frame conforms very closely to the conventional type of machines of the present day. Thus it has the tubular part *a*, in which the axle *b* of the traction-wheels is journaled, and at right angles thereto a similar part *f*, in which the crank-shaft *g* is journaled. Projecting rearward of the axle is the usual gear-case *d*, and secured to the frame and projecting forward therefrom are the means for balancing and steering the machine.

The construction of the main frame necessarily varies somewhat, however. This variation consists chiefly in the formation of a table or platform *e* adjacent to the tubular part or box *f*, upon which the engine is mounted, the construction of the portion adjacent to the inner traction-wheel *c* and the forward extension of the hounds *h*.

The hounds *h* are secured at their rear ends to the portion of the main frame adjacent to the inner traction-wheel and extend forward to a point considerably in front of the inner shoe *i* and are adapted to furnish bearing for the steering-wheel *k*, as will be described later. As far as the functions of steering and balancing the machine are concerned, the hounds and the steering-wheel take the place of the usual tongue. This arrangement is especially desirable, for the reason that it places the steering-wheel as nearly as possible into line with the line of advance of the inner shoe, where it may travel upon the ground in the track cleared by the usual grass or swath board (not shown) on the previous round instead of upon the loose slippery cut crop, as heretofore in machines of this type. The operator's seat

is placed immediately behind the engine, which in this instance is of the combustion type, where the operator may be within easy reach of his engine. The tank F, carrying a supply of oil or gasolene, cooling-water, and ignition-battery for the engine are mounted upon the hounds *h* at one side, leaving the operator an unobstructed view of the course.

At their forward ends the hounds are curved upward into a sort of a gooseneck form and carry at their extreme end the bearing J for the steering-head *j* of the lead or steering wheel *k*, which is journaled in the depending arms of the fork *m*, so that the wheel swivels freely in its bearings, as above referred to. The fork is provided on its stubble side with an outstanding arm *l*, and from this arm a rod *n* extends diagonally rearward and connects with the crank-arm *o* on the lower end of the vertical shaft *p*, that is journaled in a bearing *q* on the outer edge of the frame. The upper end of the shaft *p* has the crank-handle *p'*, which extends rearward into such proximity to the operator's seat that it may be easily reached. By these means the machine is guided. In order to prevent the steering-wheel from slipping sidewise, it is preferably provided with a rib or flange *q'*, which engages the ground by virtue of its position, as above described, thus insuring the perfect control of the movement of the machine.

The tank F, mounted upon the hound *h*, is provided with three compartments—the forward one, f^2, for oil or gasolene, the rearward one, f^3, for cooling-water, and the middle one, f^4, for the battery for ignition. By placing the battery between the fuel and the cooling-water it acts as a non-conductor, preventing excessive evaporation of the volatile oils. In case the battery does not fill the whole of the middle compartment, as in this instance, a non-conducting air-space is left either at the top or bottom.

The cutting apparatus is connected to the frame in the usual manner by means of arms or bars *r* and *s*, which are pivoted thereto, of which *s* is the principal or coupling bar, *r* the rearwardly-extending thrust-bar. The usual guard-bar *t* is located immediately in front of the pitman to protect the same from injury. The coupling-bar and guard-bar are rigidly connected at their stubble ends to a cap or shield *u*, that is sleeved to a forward projection *v* of the crank-shaft box and in the hollow of which the crank-disk rotates. This arrangement forms no part of the present invention, nor do the hand and foot levers *x*, *y*, and *z*, by means of which the cutting apparatus is handled by the operator.

Referring now more particularly to Figs. 4 and 5, *a'* denotes a gas-engine, which may be of the two-cycle or four-cycle type. It is bolted down on the bed before described so that its shaft *b'* lies crosswise of the machine parallel with the main axle. On its stubble end the engine-shaft has a sprocket-pinion *d'*, and on its opposite end there is the usual fly-wheel, which is accommodated in a cut-away part of the machine-frame. In suitable bearings in the main frame behind the axle there is journaled the counter-shaft *e'*, which is parallel with said axle and the engine-shaft and which is adapted to be connected to each, as will later be described. On the outer end of this counter-shaft there is a pinion *f'*, and interposed between said pinion and the traction-wheels is the usual compensating gear required in machines of this type. This compensating gear (illustrated in Fig. 7) consists in the spur-gear *g'*, loosely journaled upon the main axle *b*, the bevel-pinions g^2, one or more, as desired, journaled on the pins carried by said spur-gear, and the bevel-gears g^3 and g^4, both of which are adapted to mesh with each of the pinions g^2. The bevel-gear g^3 is secured to the traction-wheel *c'*, which is journaled loosely upon the axle *b* and the bevel-gear g^4, secured to the axle *b*, to which is also secured the traction-wheel *c*. By these means the traction-wheels are allowed to turn in opposite directions or at different rates of speed, as when turning corners, while both are connected to the same driving-shaft. The pinion *f'* meshes with the spur-gear *g'* and imparts the motion of the counter-shaft *e'* to the traction-wheels.

On the opposite end of the counter-shaft *e'* from the pinion *f'* is loosely journaled the bevel-gear *j'*, to which is secured on the side next the inner traction-wheel *c* a sprocket-wheel *h'*. It is held against movement along the shaft by the clip j^2, that is fixed to the machine-frame and fits into a groove in the hub of the gear, as clearly shown in Fig. 5. This sprocket-wheel and the bevel-gear to which it is secured are constantly driven in one direction by a chain or link belt *i'* from the pinion *d'* on the engine-shaft.

Pivoted in suitable bearings in the main frame is the spring-actuated tightener-arm i^2 of the chain-tightener, on the opposite end of which is pivoted the tightener-sprocket i^3, which is adapted to engage the slack side of the drive-chain *i'* in the usual manner.

The bevel-gear *j''* meshes with a bevel-pinion *k'*, that is rigidly secured to the rear end of a short shaft *l'*. This shaft is journaled in the main frame under the axle in line with the crank-shaft *g* and serves as a driver for said crank-shaft. The bevel-pinion *k'* forms the means of communicating rotation in a reverse direction to another bevel-gear, *m'*, that is loosely journaled on the counter-shaft on the opposite side of the line of the crank-shaft in precisely the same way that the gear *j''* is mounted. It will thus be seen that the counter-shaft carries two continuously-rotating driving-gears, one of which rotates in one direction and the other of which rotates in the opposite direction, both being normally loose

on the shaft, so as not to rotate it at all except when clutched to it through the intermediacy of a double-faced friction-clutch n', that is fixed to the shaft between the two gears j' and m'.

As clearly shown in Fig. 5, the gears are provided on their adjacent sides with inclined friction-faces to correspond with the similar faces on the intermediate friction-clutch n', and in order that the gear may be connected with the rearwardly-rotating gear j' or the forwardly-rotating one, m', the counter-shaft is arranged to slide in its bearings without disconnecting the spur-pinion f' from the spur-gear g' of the compensating gear. This movement of the shaft is controlled by the operator without leaving his seat by means of a combined hand and foot lever o' o^2, projecting from a short shaft journaled in a bearing r', which projects from the under side of the frame. A crank on the lower end of this shaft is pivotally connected to a yoke s', that in turn is connected to a ring which encircles the end of the shaft, so that when the hand-lever is moved grainward the counter-shaft is clutched to the rearwardly-moving gear, and when it is moved stubbleward the shaft is clutched to the forwardly-moving gear, and the distance between these gears is such that the intermediate friction-clutch need not be in contact with either, in which case, of course, no motion at all is communicated to the counter-shaft or the traction-wheels.

Referring now more especially to Fig. 4, the means for driving the cutters will be described. As shown in this figure, the crank-shaft g is in line with the short driving-shaft l', to which pinion k' is secured. This pinion being constantly in motion when the engine is going, whether the machine is moving or not, I provide for connecting the crank-shaft to the short shaft l' by a clutch which is conveniently housed in a casing u', and which, so far as the present invention is concerned, may be of any suitable construction, but which preferably consists of a clutch-disk v', having a recessed rim provided with ratchet-teeth w' around its inner periphery, and a collar x', that is fixed on the rear end of the crank-shaft and carries a pawl or dog x^2, that normally engages the teeth, and thus locks the two shafts g and l' together, but which readily permits their disconnection whenever desired.

Any suitable means may be provided for disconnecting these shafts automatically or by hand, and I show in Figs. 2, 4, and 5 an efficient arrangement for doing it automatically whenever the finger-bar is lifted up out of operative position. This consists of a lever a^2, pivoted to the under side of the frame and connected at its stubble end to a clutch-shipper a^3. This shipper is loose on the rear end of the crank shaft and has a flaring rim which engages the clutch-pawl x^2 on the collar x' whenever it is moved rearward, thus causing it to leave the ratchet-teeth in the hub v'. The grainward end of the lever a^2 is connected by a link a^4 to the lower end of the lifting-lever x, so that whenever the latter is pulled back by the operator sufficiently to throw the cutter-bar up out of action it will disconnect the crank-shaft from its driver.

The construction and operation of my invention being as thus described it is to be noted that the supporting-wheels are connected to the driving means through the intermediacy of the usual compensating gear, thus permitting the machine to be turned; that the prime motor for propelling the machine and driving the working parts moves constantly in one direction; that the power from the engine is distributed to the counter-shaft and the crank-shaft in a way to give the operator complete control over the movements of the machine as well as over the operation of its working parts, the latter being controllable, whether the machine be in motion or at rest. Moreover, that the counter-shaft and the axle are the only parts of the machine that are ever reversed, all the others moving always in one and the same direction, and, finally, that the location and arrangement of the engine, the tanks, and the operator's seat give the operator an unobstructed view ahead, and also enable him to watch the operation of the cutting apparatus, leaving at the same time sufficient space for the operation of the various levers for controlling the machine.

It is evident that many of the devices herein described and illustrated are quite as applicable to other types of reaping-machines than the one herein described and illustrated. Hence I do not wish to be limited to such as applied to mowers only.

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

1. In a self-propelled harvester or like machine, the combination of ground-wheels, a main frame, a cutting apparatus, a motor having a driving connection with one or more of said ground-wheels and also with said cutting apparatus, and steering means connected with one of said ground-wheels, which is suitably mounted in said main frame in or near a line traversed by one end of said cutting apparatus.

2. In a self-propelled mower or like machine, the combination of traction-wheels, a main frame, a cutting apparatus, a motor, a connection with one or more of said traction-wheels and also with said cutting apparatus, and a steering-wheel suitably mounted in said main frame in or near the line of travel of the inner end of said cutting apparatus.

3. In a self-propelled harvester or like machine, the combination of ground-wheels, a main frame, mechanism whereby work is performed as the machine is propelled, a motor

having a driving connection with one or more of said ground-wheels and also with said mechanism, said connection comprising means for driving either independent of the other, and steering means connected with one of said ground-wheels, which is suitably mounted in said main frame in or near the line of travel of another of said ground-wheels.

4. In a self-propelled mower or like machine, the combination of traction-wheels, a main frame, a cutting apparatus, a motor having a driving connection with said traction-wheels and also with said cutting apparatus, said connection comprising means for driving either independent of the other and a steering-wheel mounted in an extension of said main frame in or near the line of travel of one of said traction-wheels.

5. In a self-propelled mower or like machine, the combination of traction-wheels, a main frame, a cutting apparatus connected thereto, a motor mounted upon said main frame forward of the axle of said traction-wheels, means for transmitting motion from said motor to said traction-wheels and cutting apparatus, hounds secured to and projecting in front and at one side of said main frame, a steering-wheel pivoted in said hounds in or near the line of travel of the inner end of said cutting apparatus, and a tank mounted upon said hounds.

6. In a self-propelled mower or like machine, the combination of traction-wheels, a main frame, a cutting apparatus pivoted thereto and extending to one side thereof, an engine mounted upon said main frame at the opposite side from said cutting apparatus and in front of the axle of said traction-wheels, means for transmitting motion from said engine to said traction-wheels and cutting apparatus, hounds secured to and projecting in front of said main frame at the side adjacent to the cutting apparatus, a caster steering-wheel pivoted in the forward end of said hounds in or near the line of travel of the inner end of said cutting apparatus, and steering and controlling levers located upon the main frame.

7. In a self-propelled harvester or like machine, the combination with a motor, a traction wheel or wheels, and mechanism whereby work is performed as the machine is propelled, of oppositely-rotating gears connected with said motor, means for throwing said mechanism into and out of connection with one of said gears, and means also for throwing said traction wheel or wheels into and out of connection with either of said gears, said means being independent of each other.

8. In a self-propelled mower or like machine, the combination with a motor, traction-wheels, and a cutting apparatus, of a counter-shaft geared to said traction-wheels, oppositely-rotating gears for said counter-shaft geared to said motor, means for throwing said cutting apparatus into and out of connection with one of said gears, means also for throwing said counter-shaft into and out of connection with either of said gears, said means being independent of each other.

9. In a self-propelled mower or like machine, the combination with a motor, traction-wheels, and a cutting apparatus, of a compensating gear for said traction-wheels, a counter-shaft geared to said compensating gear, two oppositely-rotating driving-gears journaled upon said counter-shaft and geared to said motor, a clutch secured to said counter-shaft between said driving-gears, means for throwing said cutting apparatus into and out of connection with one of said driving-gears, and means also for throwing said clutch into and out of connection with either of said driving-gears.

10. In a self-propelled mower or like machine, the combination with a motor, traction-wheels, and a cutting apparatus, of a compensating gear, a counter-shaft geared to said compensating gear, two oppositely-rotating driving-gears journaled upon said counter-shaft, one of which is connected with said motor, a crank-shaft for said cutting apparatus, an intermediate gear meshing with each of said driving-gears, a friction-clutch secured to said counter-shaft between said driving-gears, means for throwing said crank-shaft into and out of connection with said intermediate gear, and means also for moving said counter-shaft endwise to throw said friction-clutch into and out of connection with either of said driving-gears.

11. In a self-propelled harvester or like machine, in combination with a motor, a traction wheel or wheels, and mechanism whereby work is performed as the machine is propelled, a continuously-rotating driving-shaft geared to said motor, oppositely-rotating gears geared to said driving-shaft, a counter-shaft geared to said traction wheel or wheels, means for throwing said mechanism into and out of connection with said driving-shaft, and means also for throwing said counter-shaft into and out of connection with either of said gears.

12. In a self-propelled mower or like machine, in combination with a motor, traction-wheels, and a cutting apparatus, a continuously-rotating driving-shaft geared to said motor, oppositely-rotating gears geared to said driving-shaft, a counter-shaft on which said gears are journaled geared to said traction-wheels, a clutch secured to said counter-shaft between said gears, means for throwing said cutting apparatus into and out of connection with said driving-shaft, and means also for throwing said clutch into and out of connection with either of said oppositely-rotating gears.

13. In a self-propelled mower, in combination with a motor, traction-wheels, and a cutting apparatus, a cutter, a cutter crank-shaft and driving-shaft therefor, a clutch between

said driving-shaft and crank-shaft, a gear secured to said driving-shaft, two oppositely-rotating gears meshing with said gear, a compensating gear for said traction-wheels, a counter-shaft on which said oppositely-rotating gears are journaled geared to said compensating gear, a friction-clutch secured to said counter-shaft between said oppositely-rotating gears, means for moving said counter-shaft endwise to throw said friction-clutch into and out of connection with either of said oppositely-rotating gears, a lifting-lever, and means actuated by said lever whereby said clutch is operated to connect and disconnect said driving-shaft and crank-shaft.

14. In a mower, the combination with a motor, of a cutter, a cutter crank-shaft, a continuously-rotating driving-shaft geared to said motor, a toothed clutch-disk secured to said driving-shaft, a clutch pawl or pawls carried by said crank-shaft and adapted to engage said clutch-disk, a clutch-shipper sliding upon said crank-shaft, a lifting-lever, and a connection between said lever and clutch-shipper for operating the latter.

15. In a self-propelled harvester or like machine, the combination with a motor, a traction wheel or wheels, and mechanism whereby work is performed as the machine is propelled, of oppositely-rotating driving-gears connected with said motor, means for throwing said traction wheel or wheels into and out of connection with either of said driving-gears, and means also for throwing said mechanism into and out of connection with said driving-gears, said two means being independent of each other.

16. In a self-propelled mower, the combination with a motor, traction-wheels, and a cutting apparatus, of oppositely-rotating driving-gears connected with said motor, a compensating gear for said traction-wheels, means for throwing said compensating gear into and out of connection with either of said driving-gears, and means also for throwing said cutting apparatus into and out of connection with said driving-gears, said two means being independent of each other.

17. In a self-propelled harvester or like machine, the combination with a motor, a traction wheel or wheels, and mechanism whereby work is performed as the machine is propelled, of a continuously-rotating driving-gear connected with said motor, oppositely-rotating gears interposed between said driving-gear and said traction wheel or wheels, means for throwing the latter into and out of connection with said driving-gear through the intermediacy of either of said oppositely-rotating gears, and means also for throwing said mechanism into and out of connection with said driving-gear, said means being independent of each other.

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

EDWARD A. JOHNSTON.

Witnesses:

CHAS. N. CHAMBERS,

WILLIAM WEBBER.