S. P. TOWNSEND.

MULTIPLE UNIT MOWER.

APPLICATION FILED JUNE 10, 1919.

1,437,874.

Patented Dec. 5, 1922.

8 SHEETS—SHEET 1.

Fig. 1.

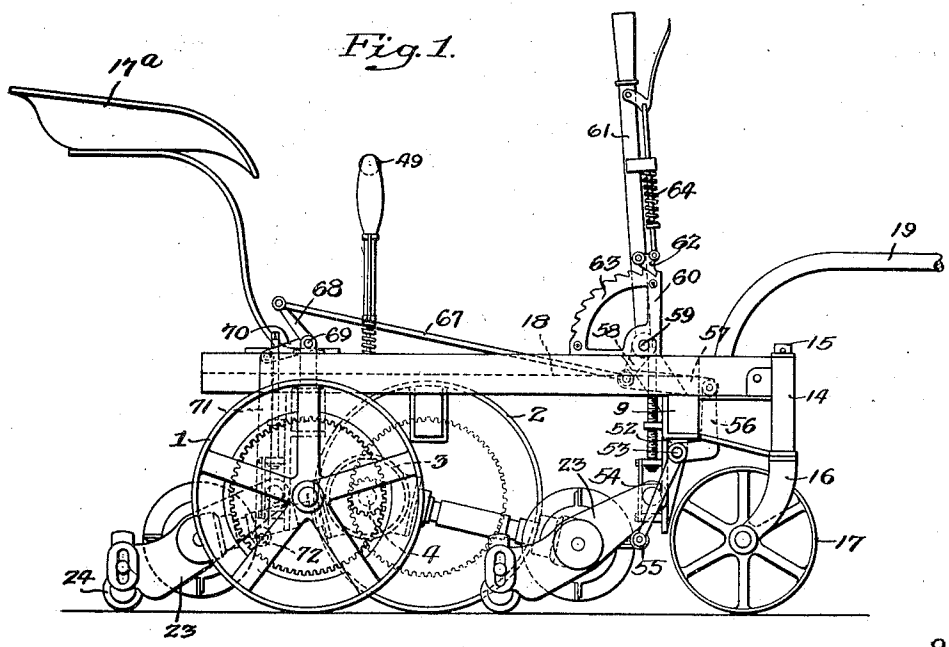


Fig. 18.

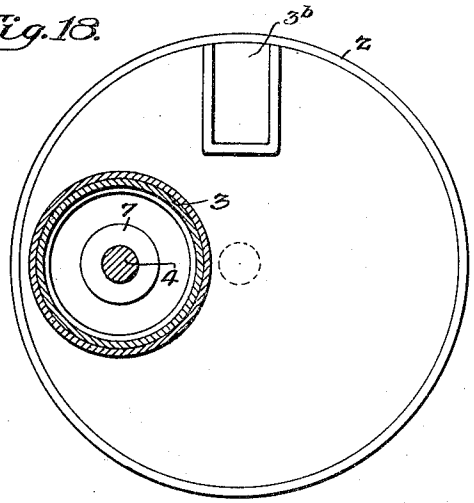
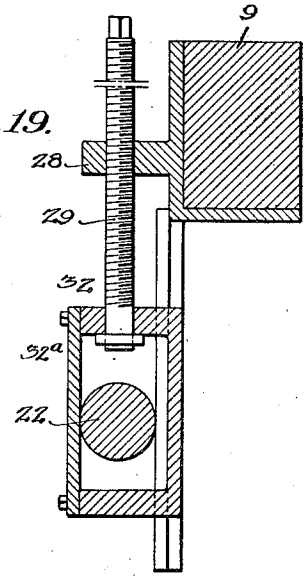


Fig. 19.



Inventor.
Samuel P. Townsend.
by his Attorneys.
Howson & Howson

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8 SHEETS—SHEET 2.

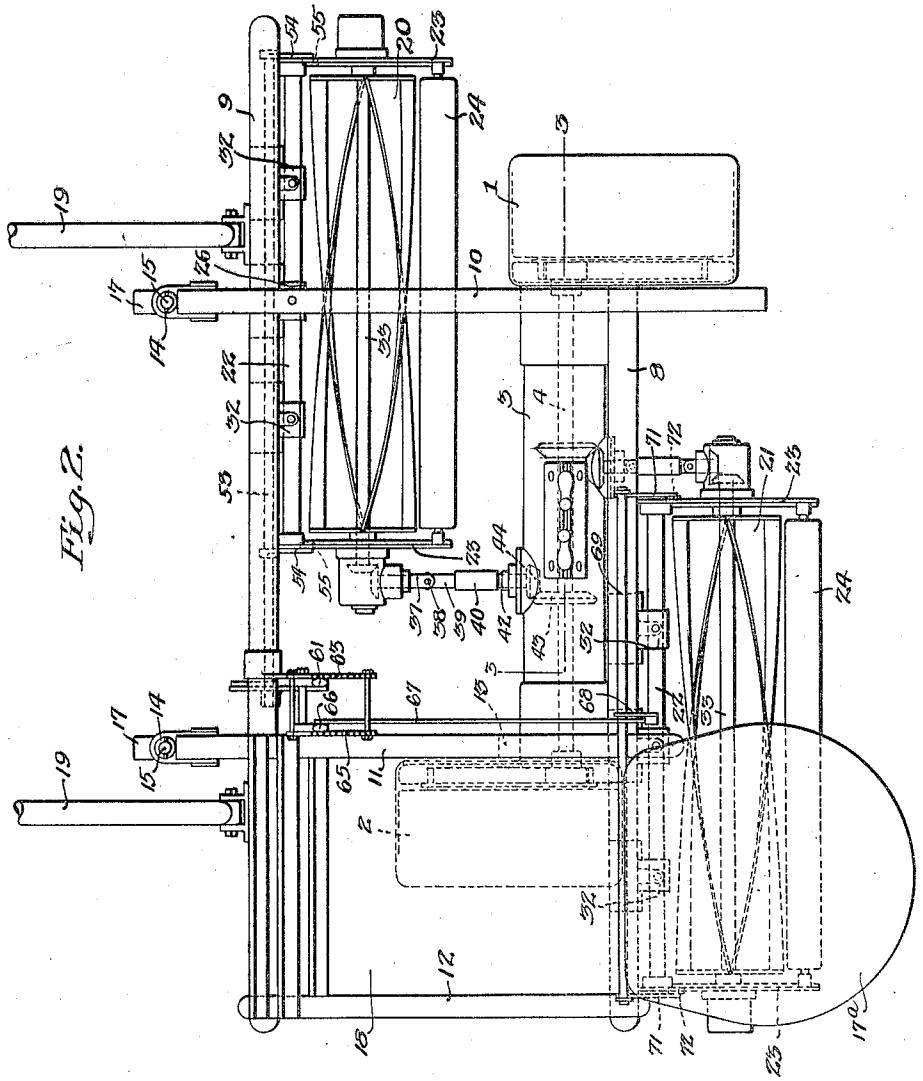


Fig. 2.

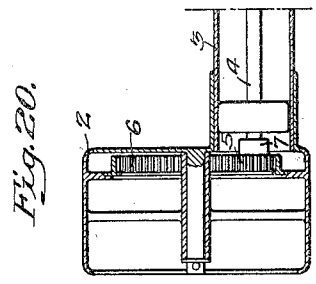


Fig. 2a.

Inventor:—
Samuel P. Townsend,
by his Attorneys.
Howson & Howson

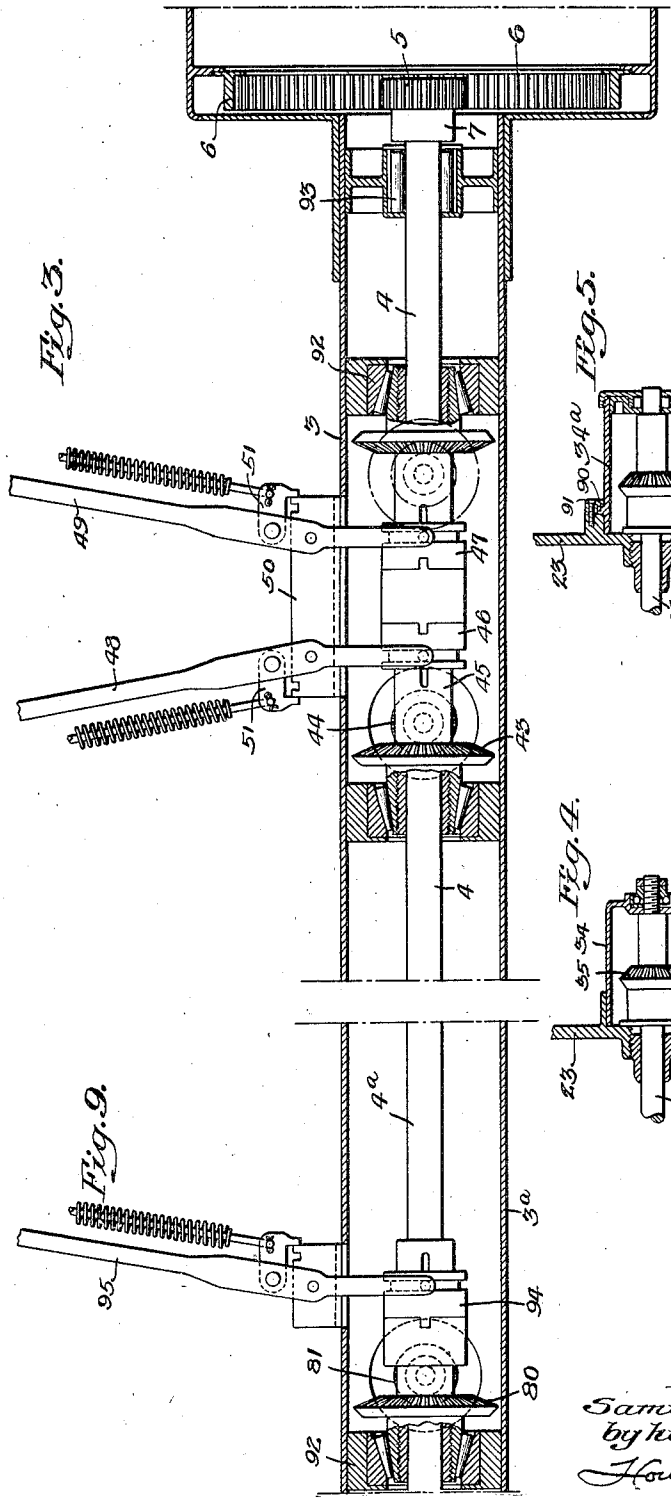
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8 SHEETS—SHEET 3.



Inventor:
Samuel P. Townsend.
by his Attorneys.
Howson & Howson

S. P. TOWNSEND.

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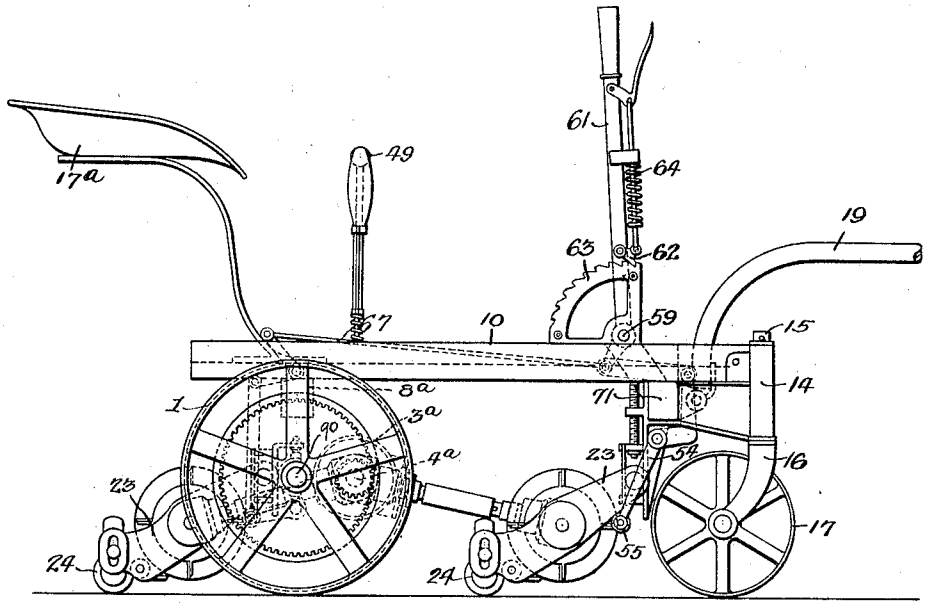
APPLICATION FILED JUNE 10, 1919.

1,437,874.

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8 SHEETS—SHEET 4.

Fig. 6.



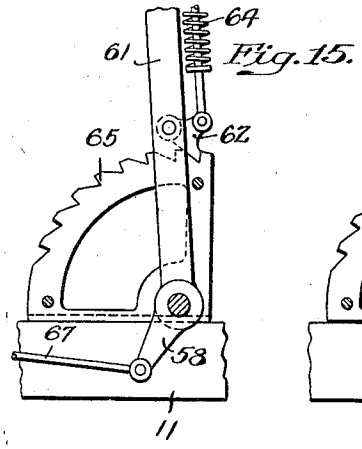


Fig. 15.

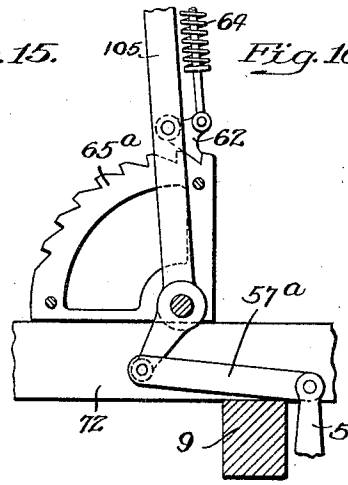


Fig. 16.

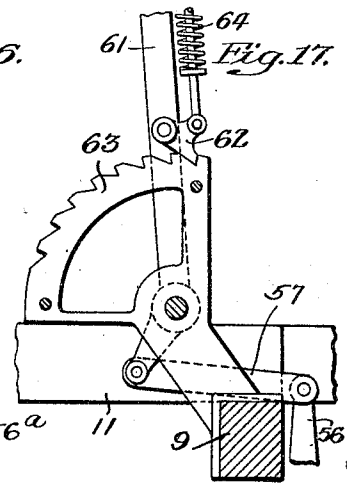


Fig. 17.

Inventor:—
Samuel P. Townsend.
by his Attorneys.
Howson & Howson

S. P. TOWNSEND.

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8 SHEETS—SHEET 5.

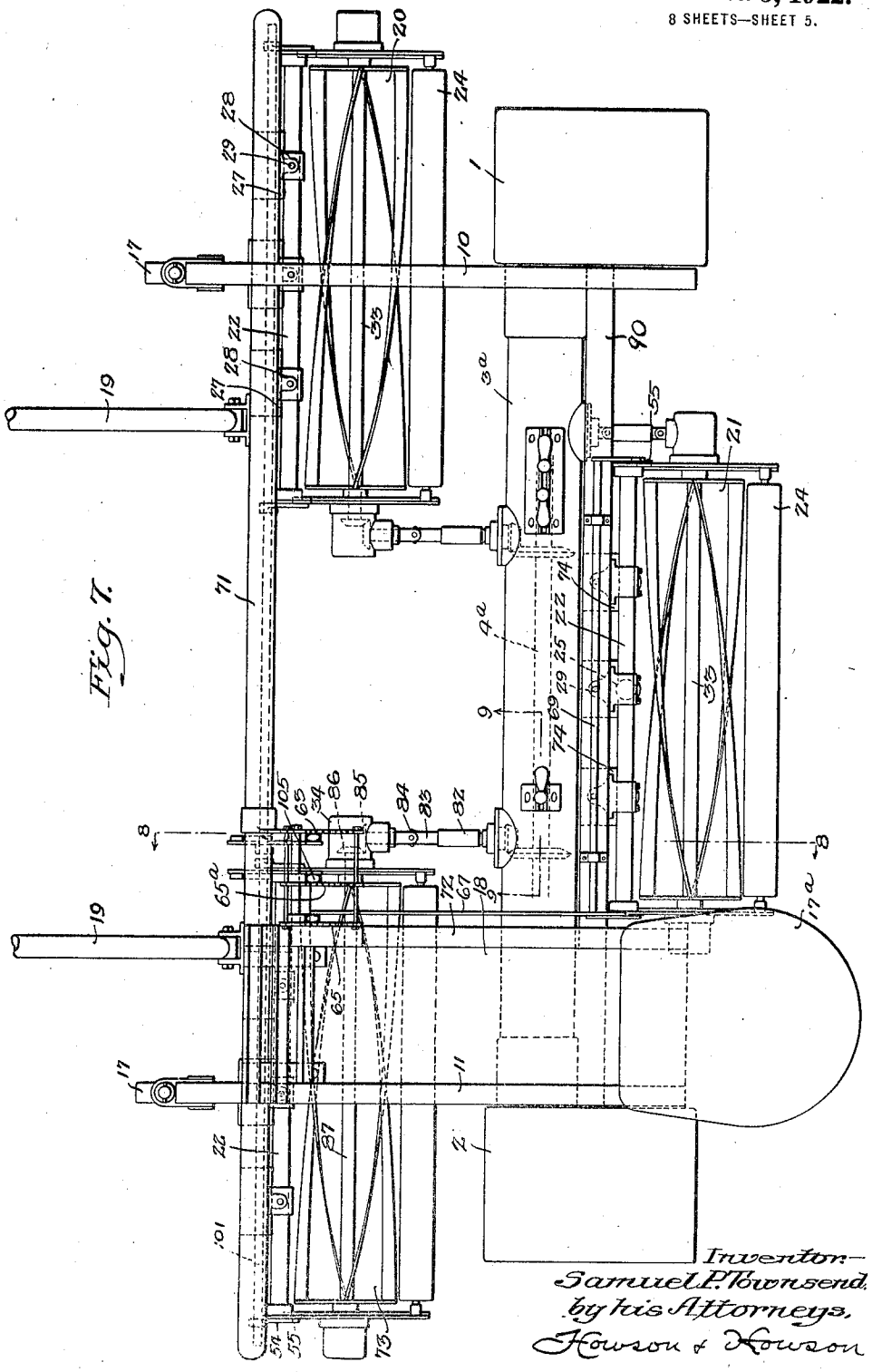


Fig. 7.

Inventor—
Samuel P. Townsend.
by his Attorneys,
Howson & Howson

S. P. TOWNSEND.

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8 SHEETS—SHEET 6.

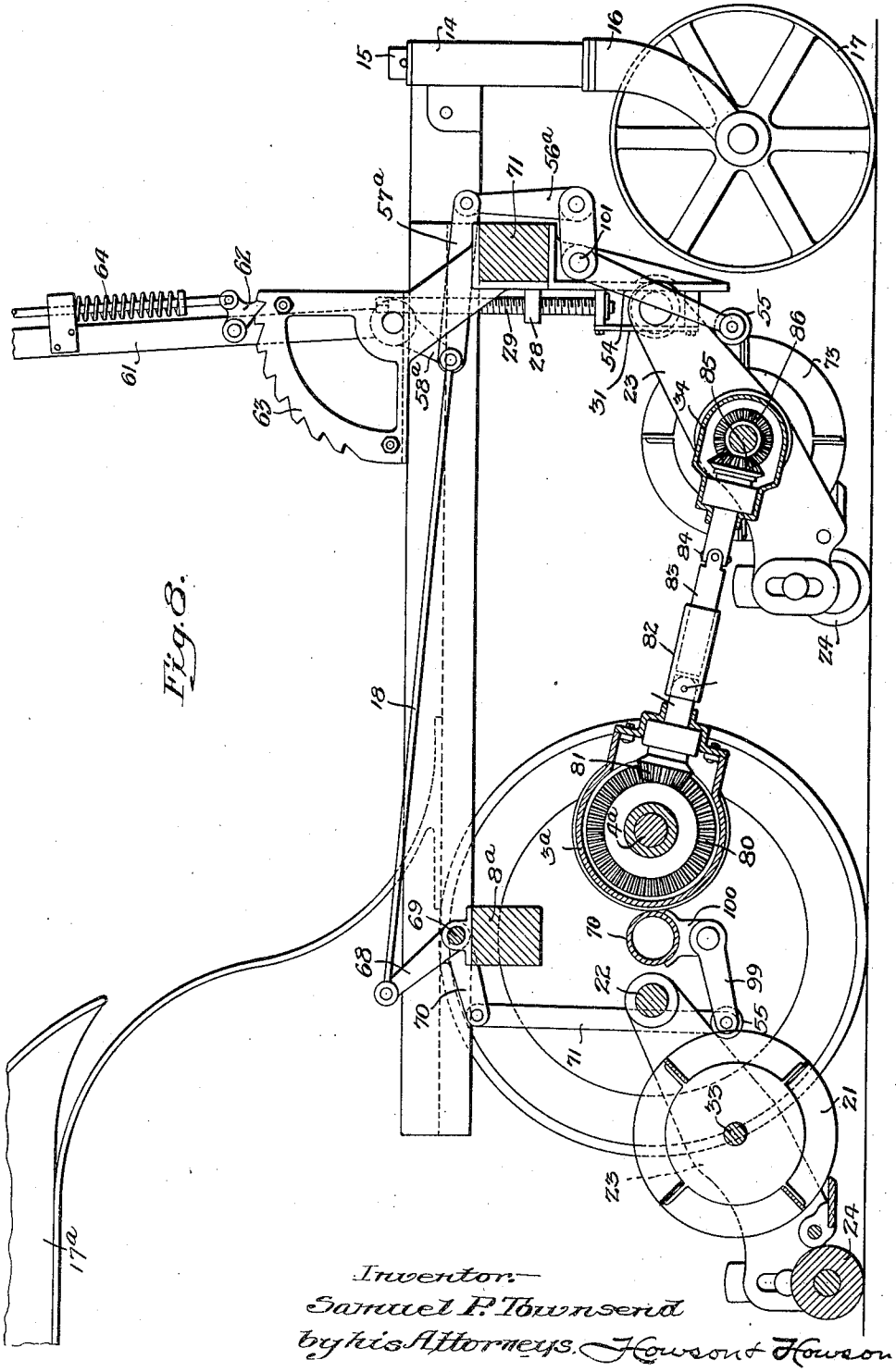


Fig. 8.

Inventor:
Samuel P. Townsend
by his Attorneys. Howson & Howson

S. P. TOWNSEND.

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8 SHEETS—SHEET 7.

Fig. 10.

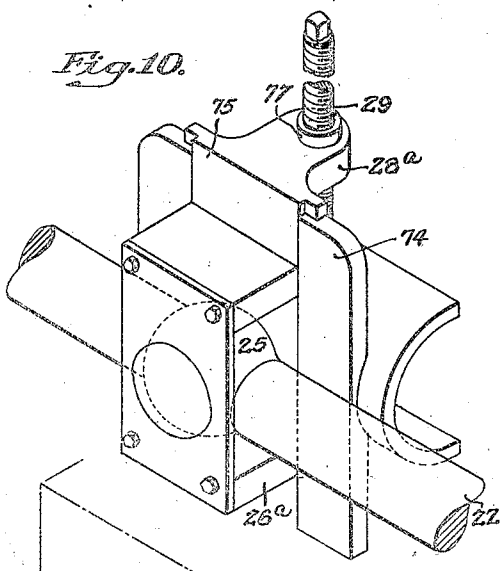


Fig. 11.

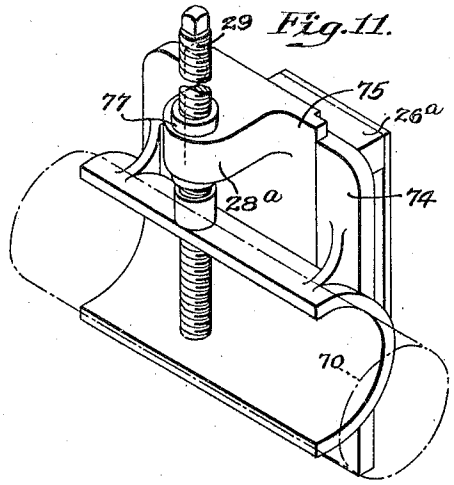


Fig. 12.

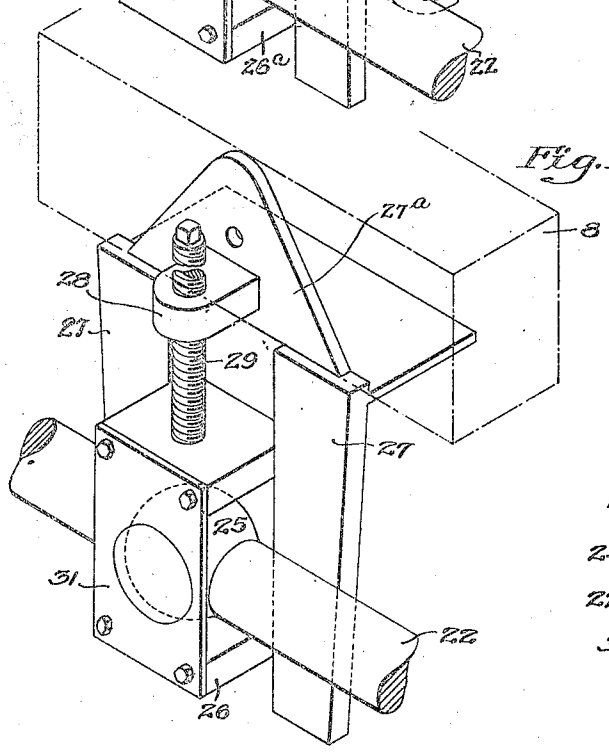


Fig. 13.

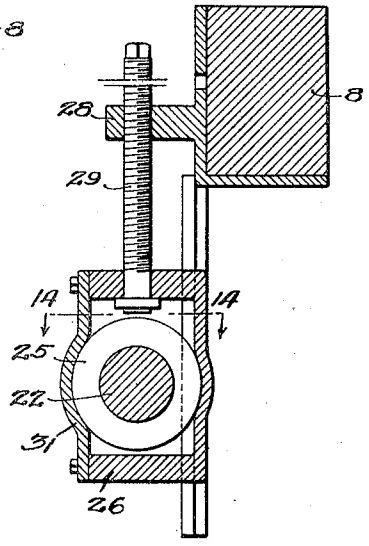
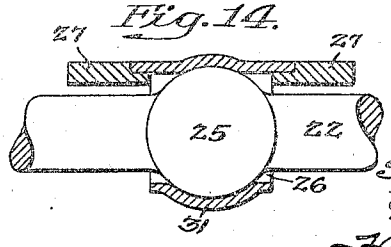


Fig. 14.



Inventor:—
Samuel P. Townsend,
by his Attorneys.
Howson & Howson

S. P. TOWNSEND.

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8 SHEETS—SHEET 8.

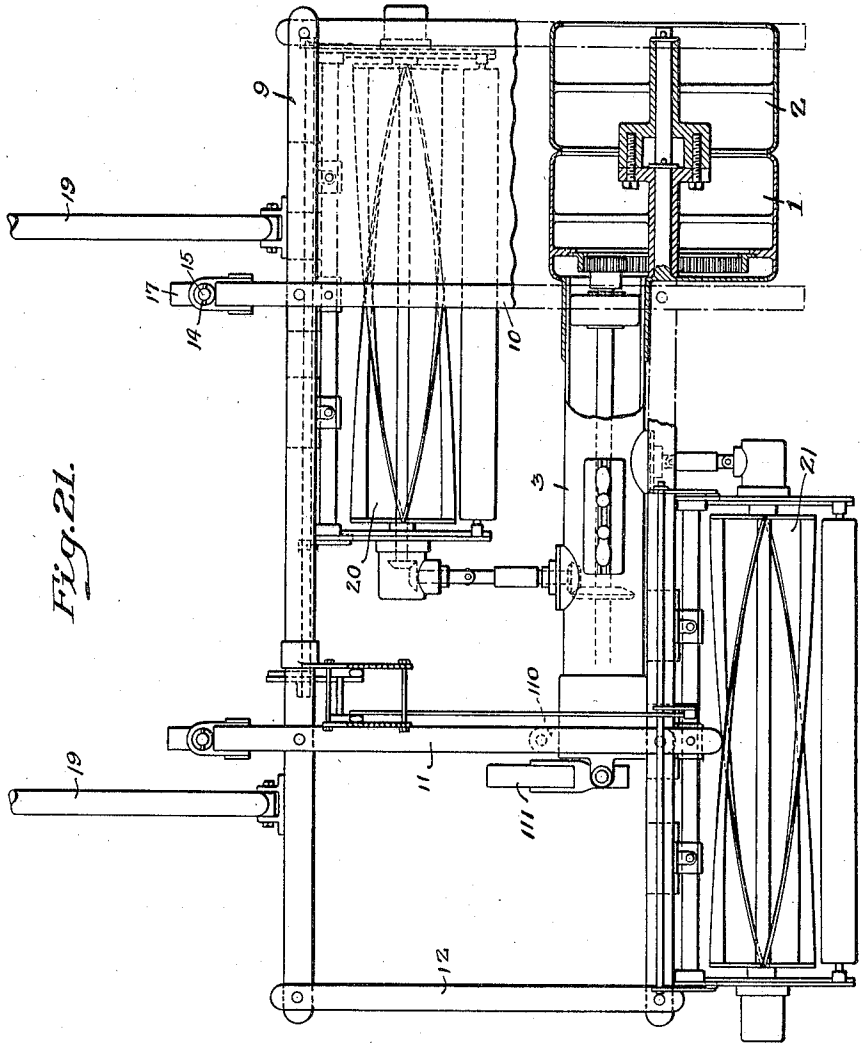


Fig. 21.

Inventor.—
Samuel P. Townsend,
by his Attorneys.
Howson & Howson

Patented Dec. 5, 1922. 1,437,874

UNITED STATES PATENT OFFICE.

SAMUEL P. TOWNSEND, OF ORANGE, NEW JERSEY.

MULTIPLE-UNIT MOWER.

Application filed June 10, 1919. Serial No. 303,081.

To all whom it may concern:

Be it known that I, SAMUEL P. TOWNSEND, a citizen of the United States, residing in Orange, New Jersey, have invented Multiple-Unit Mowers, of which the following is a specification.

This invention relates to machines for cutting the grass of lawns, golf courses, etc., and has to do more particularly with grass cutting apparatus utilizing a plurality of separate and operatively independent mower units combined in a single machine.

One object of the present invention is to provide a structurally strong, simple and compact arrangement of parts for connecting and actuating the different units of a mowing machine of the type above indicated; the invention being particularly designed to furnish substantial means for attaching the several mower units to the frame of the machine in such manner as to permit them to accommodate themselves to unevennesses of or variations in the level of the ground over which they pass, while holding them at all times parallel.

A further object of the invention is to provide simple and reliable means for transmitting power from a ground wheel or driving roll to a plurality of mower units movably connected to a frame structure as above indicated.

I also desire to provide a novel construction for enclosing and protecting the major portion of the driving mechanism of a multiple unit mowing machine; the invention in one of its embodiments particularly contemplating a novel combination of supporting rollers and frame with two mower units operative in parallel lines so that they may cut a swath practically double the length of that ordinarily cut by one of them, and the various parts being arranged especially with a view to the production of a compact, substantial and commercially practical machine.

These objects and other advantageous ends I attain as hereinafter set forth, reference being had to the accompanying drawings, in which,

Figs. 1 and 2 are respectively a side elevation and a plan of a duplex mowing machine embodying my invention;

Fig. 3 is an enlarged longitudinal vertical section taken on the line 3—3, Fig. 2, illustrating the detail construction of certain of the driving mechanism;

Fig. 4 is a fragmentary section illustrating the bevelled gear connection between each of the mower units and its associated driving shaft, together with the enclosing casing;

Fig. 5 is a section similar to Fig. 4, illustrating a slightly modified form of the invention;

Figs. 6 and 7 are respectively a side elevation and a plan of a mowing machine employing three mower units, arranged in accordance with my invention;

Fig. 8 is an enlarged vertical section on the line 8—8, Fig. 7;

Fig. 9 is a fragmentary vertical section on the line 9—9, Fig. 7;

Figs. 10 and 11 are perspective views illustrating the detail construction of the device for connecting one of the mower units to the frame in that form of my invention shown in Fig. 7;

Fig. 12 is a perspective view showing the detail of the connecting device employed for the front mower units in that form of the invention shown in Fig. 7 and for both of the mower units in that form of the invention shown in Fig. 2;

Fig. 13 is a central vertical section taken through the adjusting screw in that form of the invention shown in Fig. 12;

Fig. 14 is a sectional plan on the line 14—14, Fig. 13;

Figs. 15, 16 and 17 are side elevations partly in section illustrating portions of the mower raising apparatus;

Fig. 18 is an elevation, partly in vertical section, illustrating one of the main ground rollers;

Fig. 19 is a vertical section similar to Fig. 13, illustrating one of the two side guides for each of the mower units;

Fig. 20 is a sectional plan of one of the main ground rollers; and

Fig. 21 is a plan illustrating a modification of the duplex form of my invention.

In the machine of Figs. 1 to 3 of the above drawings, I provide two ground rolls 1 and 2 supporting between them an elongated, preferably cylindrical casing 3, through which extends a driving shaft 4 having at its opposite ends pinions 5 respectively meshing with internal gears 6 fixed to said rolls. Each of these gears is suitably mounted within one of the rolls 1 or 2 as the case may be and any desired form of ratchet mechanism well known in this art is inter-

posed between each pinion 5 and the end of the driving shaft 4 to which it is connected. This ratchet mechanism is enclosed within a cylindrical casing 7 and is designed to transmit movement from either or both rolls to the shaft 4 when said roll or rolls is rotated by a forward movement of the machine, while operatively disconnecting said shaft and the rolls when the direction of rotation of the latter is reversed.

The adjacent side plates of the supporting rolls 1 and 2 which are rigidly connected to the cylindrical casing 3, are each provided with an opening or socket 3^a which, in the case of the ground roller 1, is designed to receive one end of a rear transverse frame member 8 connected with a front transverse frame member 9 by three longitudinally extending frame members 10, 11 and 12. Of these the member 11 is supported adjacent its rear end by a block or short beam member 13 carried in the side socket 3^b of the ground roll 2 and the forward ends of the two frame members 10 and 11 are provided with vertical bearing brackets 14 for the reception of vertical shafts 15 on whose lower ends are mounted forks 16 each rotatably supporting a castor wheel 17. With the above described arrangement these castor wheels therefore support the forward portions of the frame whose rear parts are carried by the two ground rolls 1 and 2.

A driver's seat 17^a may, if desired, be mounted on the rear frame member 8 adjacent one end thereof and a suitable platform 18 be placed upon the frame structure between the members 11, 12, 8 and 9. In the case illustrated a pair of shafts 19 is connected to the front frame member 9 so that the machine may be drawn by a horse, although if other means of propulsion is desired, these shafts and the seat 17^a may be omitted or replaced by equivalent structures without departing from my invention.

In that form of the machine shown in Figs. 1 and 2 I provide two mower units 20 and 21 each preferably consisting of an independent grass cutting machine similar to the main part of an ordinary lawn mower. In the case illustrated the transverse bar 22 which connects the side plates 23 of each unit is so connected to the main frame 8—12 that said unit is free to rotate on the horizontal axis provided by its own ground roller 24 in order that the distance from the ground of its reel or wiper, with that of the coacting fixed cutting blade, may be varied as desired. In addition each of the mower units is so attached to or associated with the main frame that it is free to oscillate on an axis substantially at right angles to its ground roll in order to permit it to accommodate itself to undulations of the ground surface, although this attachment is such as to maintain it at all times substantially parallel with the other mower units.

For this purpose I preferably form or mount on the front cross bar 22 of each mower unit at the center thereof a spherical enlargement 25 (Figs. 12 to 14) and place this in a box or cross head 26 vertically adjustable upon or between a pair of guides 27 formed as part of a casting 27^a rigidly fixed to one of the transverse frame members 8 or 9 as the case may be. Each casting at its upper portion is formed with a horizontally projecting lug 28 having through it a threaded hole for the reception of a vertical screw 29 swiveled to the top of the box or cross head 26. The upper end of this screw is squared or otherwise formed for the reception of a wrench so that it may be conveniently turned to raise or lower said cross head and with it the cross bar 22 of its associated mower unit when it is desired to vary the height of the reel and cutter bar thereof.

As shown in Fig. 13, each cross head is made with a spherically curved depression or recess formed in the inner face of its rear side for the reception of the spherical enlargement 25 of the cross bar 22, and its front side 31 is likewise formed with a spherical depression also designed to fit this enlargement whereby said bar 22 is so held as to be free to oscillate in a vertical plane and is supported in position to maintain the cutter bar at the required height,—the spherical enlargement 25 serving as a pivot which may be removed from the cross head by removing the front plate 31 thereof.

On either side of the cross head 26, the bar 22 of each mower unit is also engaged by or is movable up or down in a pair of guide structures 32 mounted on the frame members 8 or 9 whereby it is maintained in a vertical plane, while being free to oscillate on its pivot 25. Each of these guides is in effect a box open at its ends and it includes a cover or front plate 32^a which may be removed when it is desired to release the bar 22 and remove the mower unit. As in the case of the cross head 26, each of the guide boxes may be adjusted vertically by a screw 29 which is threaded through a lug 28 forming part of a casing mounted on the frame 8 or 9.

Each end of the wiper or reel shaft of each mower unit projects beyond its adjacent side plate 23, having its extremity journalled in the end of a small casing 34 (Fig. 4) and in one of these casings there is fixed to said shaft a bevelled pinion 35 meshing with a second bevelled pinion 36 fixed to a short spindle 37 journalled in a suitable bearing carried by said casing 34.

As shown in Figs. 2, 4 and 5, this spindle through a universal joint connection 38, is connected to a second shaft section 39 making a telescopic joint with a tubular shaft

section 40 connected through a second universal joint 41 with a shaft section 42 extending into the main casing 3 where it has fixed to it a bevelled pinion 44. The latter engages a bevelled gear 43 fixed to or forming part of a collar 45 loosely mounted on the main driving shaft 4 to which however it may be connected at will, in the case of the front mower unit 20, by a clutch 46. A similar clutch 47 is designed to make possible the connection of the rear mower unit to said driving shaft, through a similar combination of universal joints, shaft sections, etc., whereby each mower unit is left free to swing about its ground roll 24 and to oscillate on its ball pivot 25 without interfering with the driving connection between the main shaft 4 and its reel or wiper shaft 33. For operating the two clutches 46 and 47 I provide a pair of hand levers 48 and 49 fulcrumed on a structure 50 carried by the casing 3 and including spring actuated pawls 51 designed to cooperate with suitable teeth on the structure 50 for holding said clutches in any given positions.

In order to permit of either of the mower units 20 or 21 being moved into an inactive position I provide means for swinging each of them upwardly around its front bar 22 as an axis and for this purpose I mount brackets 52 on the front frame member 9, rotatably carrying a rod 53 (Figs. 1 and 2) to which is fixed a pair of downwardly projecting arms 54 carrying rollers 55 respectively designed to engage the under edges of the side plates 23 of the front mower unit. Also fixed to this transverse rod is an angular arm 56 whose upper end is connected through a link 57 with an arm 58 fixed to a short shaft 59 journalled on a frame 60. The latter is rigidly fixed to the main frame of the machine in such position that an operating lever 61 mounted on it may be readily grasped by the hand of a driver occupying the seat 17^a. This lever has a holding pawl 62 mounted to coact with a toothed quadrant 63 under the action of a spring 64, and the arrangement is such that when said lever 61 is pulled back from its vertical position, the arms 54 through their rollers 55 swing the front mower unit upwardly into an inactive position in which it is retained by the pawl and ratchet 62—63.

The frame 60 includes a second ratchet 65 having a cooperating pawl and mower unit raising lever 66 connected through a link 67 with an arm 68 fixed to a transverse rod 69 rotatably mounted on the rear frame member 8. Also fixed to this rod are a pair of rearwardly projecting arms 70 carrying at their ends links 71 having rollers 72 engaging the under edges of the side plates 23 of the rear mower unit 21, so that when this second lever 66 is drawn back, the rear mower unit is likewise swung upwardly about its front rod 22 as an axis into an inactive position.

It is particularly to be noted that the two mower units 20 and 21 are so mounted relatively to each other that the swath cut by the first is slightly overlapped by that cut by the second, so that the total length of cut of the machine is but slightly less than the sum of the lengths of the two cutter bars of the mower units. It will further be noted that the ground roller 1 is mounted directly behind and close up to the front mower unit 20 as well as adjacent one end of the rear mower unit 21. The second ground roller 2 is mounted directly in front of the rear mower unit 1 so as to be immediately adjacent the same while the frame of the machine lies practically within or between two parallel lines defined by the opposite or outer ends of the two mower units 20 and 21. The machine as a whole is thus compact and while the two units are free to automatically adjust themselves to unevennesses of the ground surface, they are at all times maintained in substantial parallelism and their cross heads 26 may be adjusted by means of the screws 29 to raise or lower the cutter bars and thus vary the length of the grass cut.

In adapting my invention to a triplex mower, that is, one utilizing three mower units as illustrated in Figs. 6, 7 and 8, I provide two main ground rolls 1 and 2 as before, connecting these by a main casing 3^a in which is mounted the main driving shaft 4^a. In this case however I may if desired additionally connect the side plates of these ground rolls by a hollow tube 90 coaxial with them and immediately to the rear of the driving shaft casing 3^a. The main frame of the machine in this case has the rear ends of its two longitudinal members 10 and 11 supported on a transverse member 8^a whose ends are supported in the sockets or openings 3^b in the side plates of the ground rollers 1 and 2 and as in the case of Figs. 1 and 2, the front ends of the frame members 10 and 11 are supported by a pair of castor wheels or rollers 17. The front transverse frame member 71 is supported from the longitudinal frame members 10 and 11 in addition to which I also provide a third longitudinal member 72, and support the operator's platform by this latter and by the members 8^a, 11 and 71. The operator's seat 17^a in this instance is mounted on said platform.

In this form of the invention there are two front mower units 20 and 73 each connected to the front transverse frame member 71 in the same manner and by the same means as is employed for the front mower unit 20 in that form of my invention shown in Figs. 1 and 2. These two front mower units are spaced apart a distance slightly

less than the length of the cutter bar of the rear mower unit 21 which is placed to cut the grass left uncut between the two front units, and while I may connect said rear mower unit to the transverse frame member 8ª in the same manner as was employed in the case of the duplex form of my invention, I have illustrated it as attached to and propelled by the tubular roll-connecting member 70.

For this purpose I provide a central guide bracket 74 (Figs. 10 and 11) fixed in any suitable manner as by spot welding to the member 70 and having a guideway for a vertically movable slide 75 formed as part of a cross head structure 26ª preferably of a construction the same as that shown in Figs. 12 and 13 for use on the duplex machine. The cross bar 22 of the rear mower unit 21 has a central spherical enlargement 25 which is rotatably held by this cross head so as to permit said bar 22 to oscillate in a substantially vertical plane. The slide 75 may be raised or lowered to vary the height of the cutting mechanism of the mower by means of the adjusting screw 29 which is fixed to a sleeve 77 rotatably supported in a lug 28ª and is also threaded into the body of the bracket structure 74 so that when it is turned, the slide 75 with the cross head is moved up or down as desired.

The driving shaft 4ª is journalled in the main casing 3ª in the same manner as described in connection with the shaft 4 and as shown in Figs. 3 and 9, with the difference that its left hand end is operatively connected to the roll 2 in the same manner as its opposite end is connected to the roll 1. The two mower units 20 and 21 are driven from this main shaft through bevelled gearing and universal joint connections as previously described, while the third mower unit 73 has its reel also driven from this main shaft through a bevelled gear 80 fixed thereto and a bevelled pinion 81 which meshes with said gear. This bevelled pinion is fixed to a tubular shaft member 82 telescopically engaged by a second shaft member 83 to which it transmits motion, and the latter, through a universal joint 84, actuates a pair of cooperating bevelled pinions 85 and 86 mounted in a casing 34 carried by the side plate of the mower unit as illustrated in Fig. 4. The latter of these pinions is fixed to the reel shaft 87 of said mower unit 73.

It will be noted that of the several ways of enclosing and protecting the bevelled gears 35 and 36 or 85 and 86, I may utilize a structure such as that indicated at 34 in Fig. 4, which rotatably engages the adjacent side plate of the mower unit by fitting into and having bearing upon a circular flange thereon. On the other hand as shown in Fig. 5, I may make the casing 34ª with a flange 90 and rotatably connect it to the side plate 23 of the mower unit by a flanged ring 91 detachably held to said plate by screws or other suitable means. In each case I preferably extend the wiper or reel shaft so that its outer end is supported by and is provided with a bearing in the outer part of the enclosing casing 34 or 34ª. As shown in Figs. 3 and 9, the main shaft 4ª is provided with suitable antifriction bearings 92 adjacent the bevelled gears and also is provided with suitable supporting bearings 93 where required.

In the case of the triplex machine shown in Fig. 7, I provide a clutch 94 whereby the bevelled gear 80 may be operatively connected to the driving shaft 4ª at will and control this clutch by a suitable operating lever 95. Any one of the three mower units 20, 21 or 73 may be swung on its side plate connecting bar 22 by suitable elevating mechanism which, so far as the mower units 20 and 21 are concerned, is identical except for dimensions, with that employed in the duplex form of my invention;—it being noted that if found advisable I may pivot the lower end of each of the links 71 to one end of an arm 99 whose opposite end is pivoted to a bracket or lug 100 suitably fixed to the roller-connecting tube 70.

For elevating the third mower unit 73 I provide a transversely extending rod 101 parallel with and supported from the transverse frame member 71 in front of said unit and having downwardly projecting arms 54 provided with rollers 55 engaging the lower or under edges of the side plates 33 of the mower unit. By means of a suitably bent arm 56ª fixed to the rod 101, I connect the latter through a link 57ª and an arm 58ª with an operating lever 105, which when drawn back, elevates the mower unit as desired. In each instance a suitable toothed segment or ratchet 63, 65 or 65ª is provided for coaction with a pawl 52 mounted on the elevating lever, whereby the mower units may be held in their elevated position.

In this case as in the duplex form of my invention, each of the mower units is supported partly by its own ground roll and partly by the main frame of the machine, to which it is so connected that while it is free to oscillate in a vertical plane as defined by the two guide structures 32 on either side of its central pivot, it is maintained at all times substantially parallel with the other mower units. At the same time it may be adjusted up or down around its own ground roller as an axis in order to vary the height at which the grass is cut and may be so turned about its cross bar 22 by one of the levers 61 as to be altogether put out of service.

As indicated in Fig. 17, I may in the duplex form of my machine place both of the

ground rollers 1 and 2 at the same end of the main tubular casing 3 to avoid crushing down of the grass in front of the rear mower unit, and carry the second end of said casing by a suitable structure 110 suspended from the frame member 11. In such case a third castor wheel 111 is provided adjacent this end of the casing 3 immediately in front of the rear mower unit 21 and inasmuch as such a wheel is relatively narrow, the grass knocked down by it in front of the rear mower is practically negligible. With this arrangement the necessary tractive force to operate the cutting mechanism would be amply provided by the two ground rollers 1 and 2.

I claim:

1. A mower consisting of at least two cutting units of which one is arranged at one side and to the rear of another; a frame for propelling said units; a driving shaft extending transversely between and operatively connected to the cutting units; and means for driving said shaft consisting of a ground roll to the rear of the forward mower and a second ground roll in front of the rear mower with its axial line to one side of that of the first ground roll.

2. A mowing machine consisting of two grass cutting units arranged in staggered relation; two unaligned ground rolls respectively in front of one of said units and to the rear of the other unit; and mechanism for driving the cutters of said units from said rolls.

3. The combination of a propelling frame; two cutting units connected to the frame in staggered relation and free to oscillate in parallel planes; two rolls respectively in front of the rear unit and to the rear of the front unit; a driving shaft operatively connected to the rear portion of one side of the front roll and to the front portion of one side of the rear roll; with means operatively connecting said shaft to the cutting units.

4. The combination of a frame; a plurality of cutting units connected to said frame; a tubular casing; a driving shaft in said casing and operatively connected to the cutters of said units; two ground rolls respectively adjacent the ends of but eccentric to said casing; and means for connecting the shaft to said rolls.

5. The combination of a plurality of ground rolls; an elongated tubular casing extending between said rolls; a frame supported partly on said casing; a plurality of cutting units in staggered relation connected to the frame; a shaft in the casing operatively connected to the ground rolls; and means for connecting said shaft to the cutting units.

6. The combination of a frame; two cutting units connected to said frame in staggered relation and free to oscillate in parallel planes; a driving shaft extending transversely between and parallel with the cutting units; means for driving said shaft; with mechanism including bevelled gearing and universal joint connections for transmitting power from said shaft to each cutting unit.

7. The combination of a pair of ground rolls; a main shaft actuated thereby; a tubular casing extending between the rolls and enclosing said shaft; a frame; two cutting units connected to the frame in staggered relation; two shafts journalled in the casing and driven from the main shaft; shafts respectively connected to the cutters of the units and extending at right angles thereto; and universal joint connections respectively operative between said latter shafts and said casing-carried shafts.

In witness whereof I affix my signature.

SAMUEL P. TOWNSEND.