

No. 815,681.

PATENTED MAR. 20, 1906.

R. G. COATES.
MOWING MACHINE.

APPLICATION FILED MAR. 14, 1904.

2 SHEETS—SHEET 1.

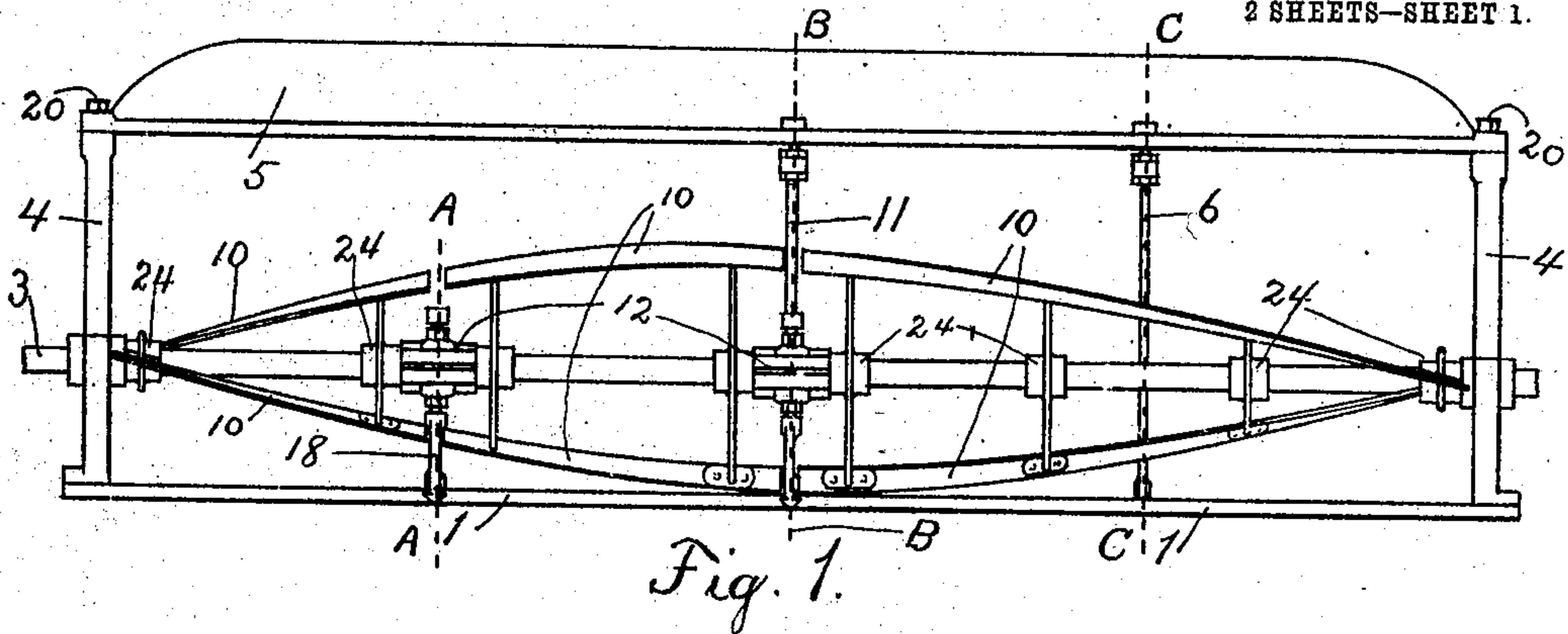


Fig. 1.

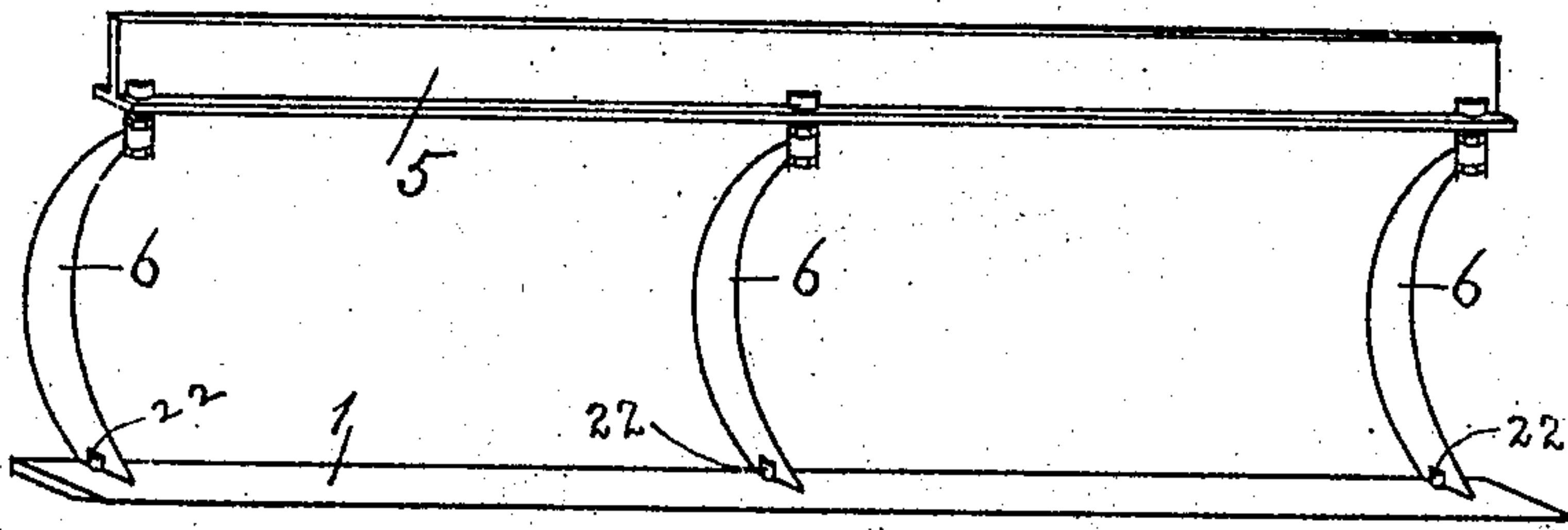


Fig. 5.

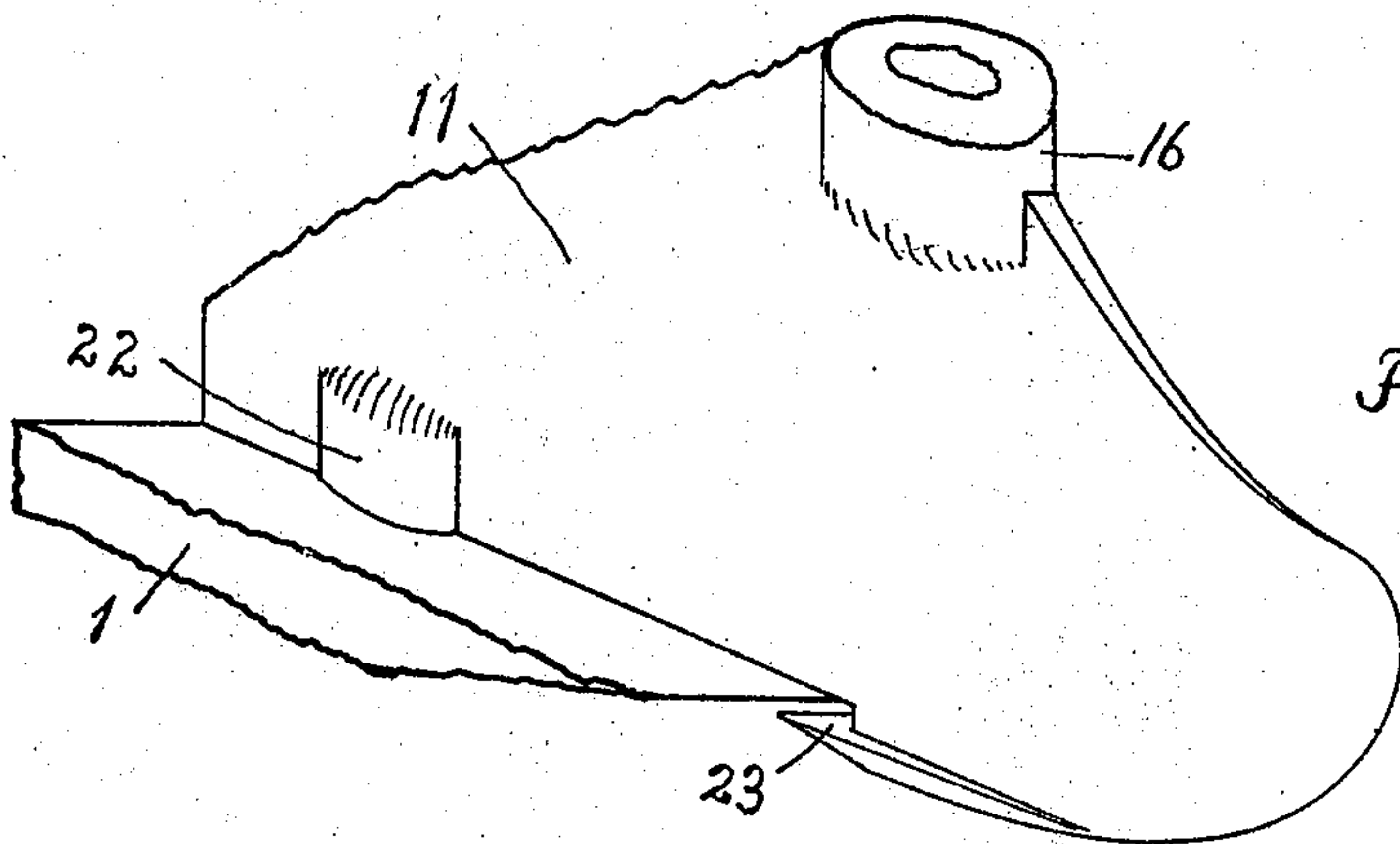


Fig. 6.

Witnesses.

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2 SHEETS—SHEET 2.

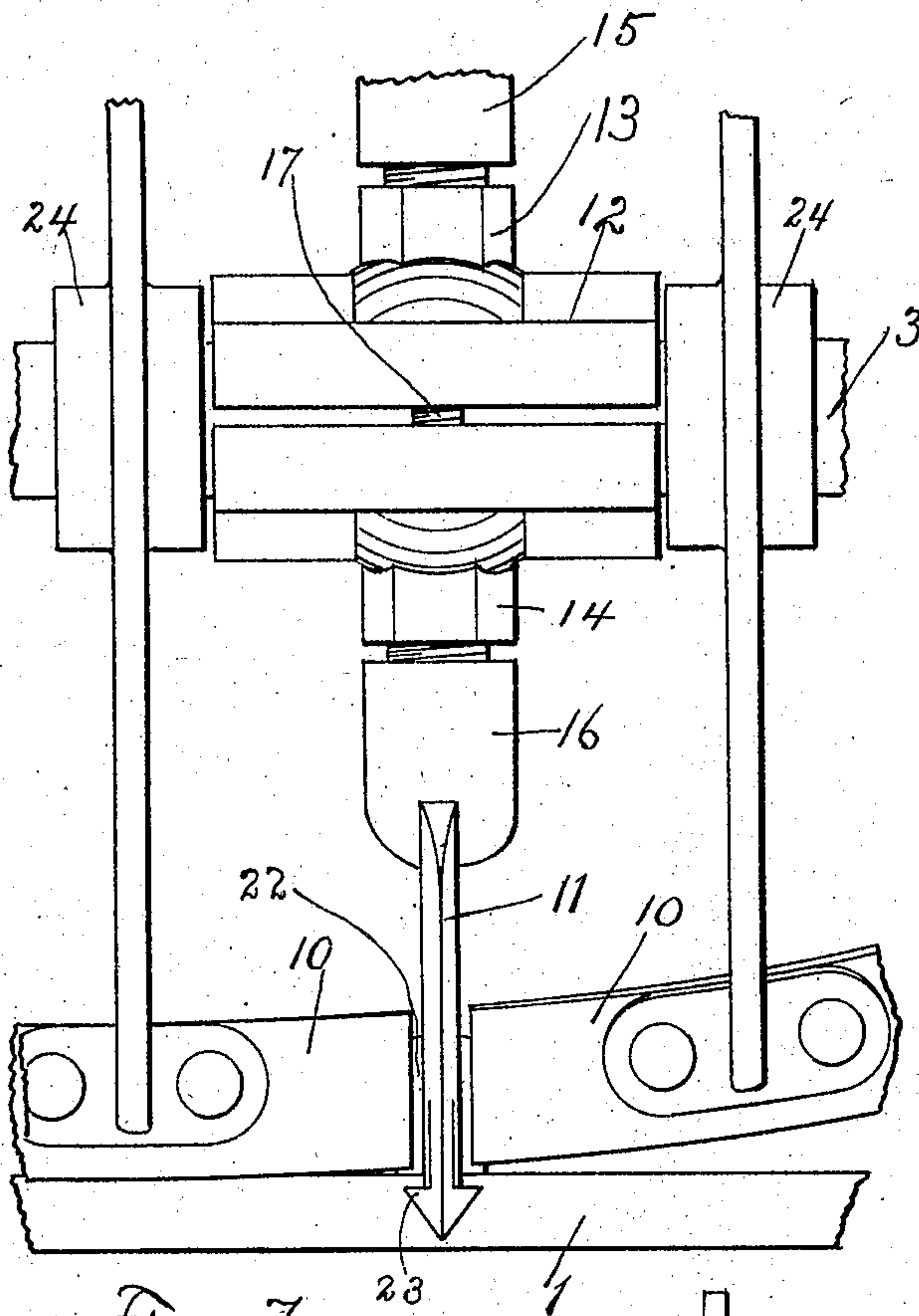


Fig. 7

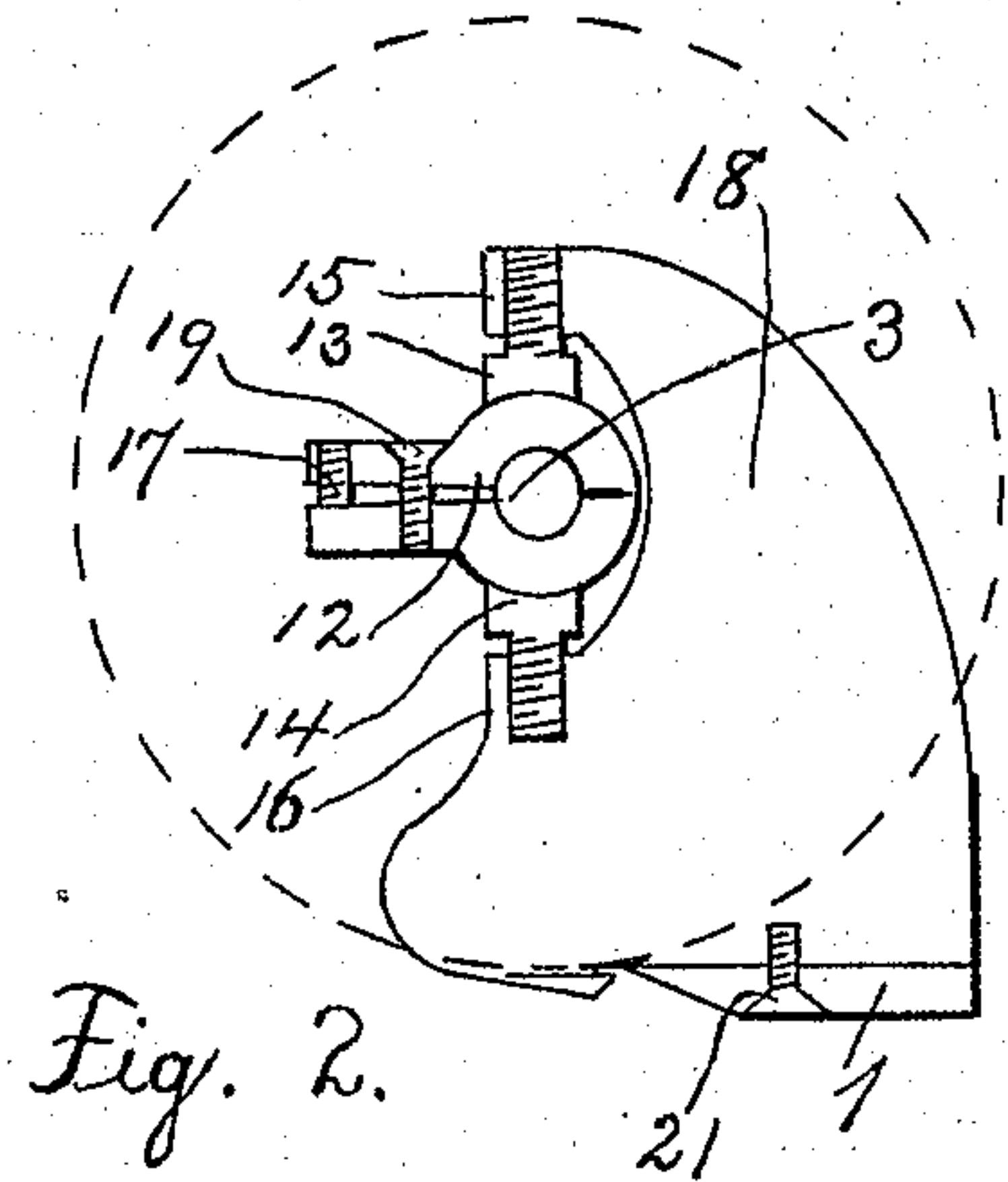
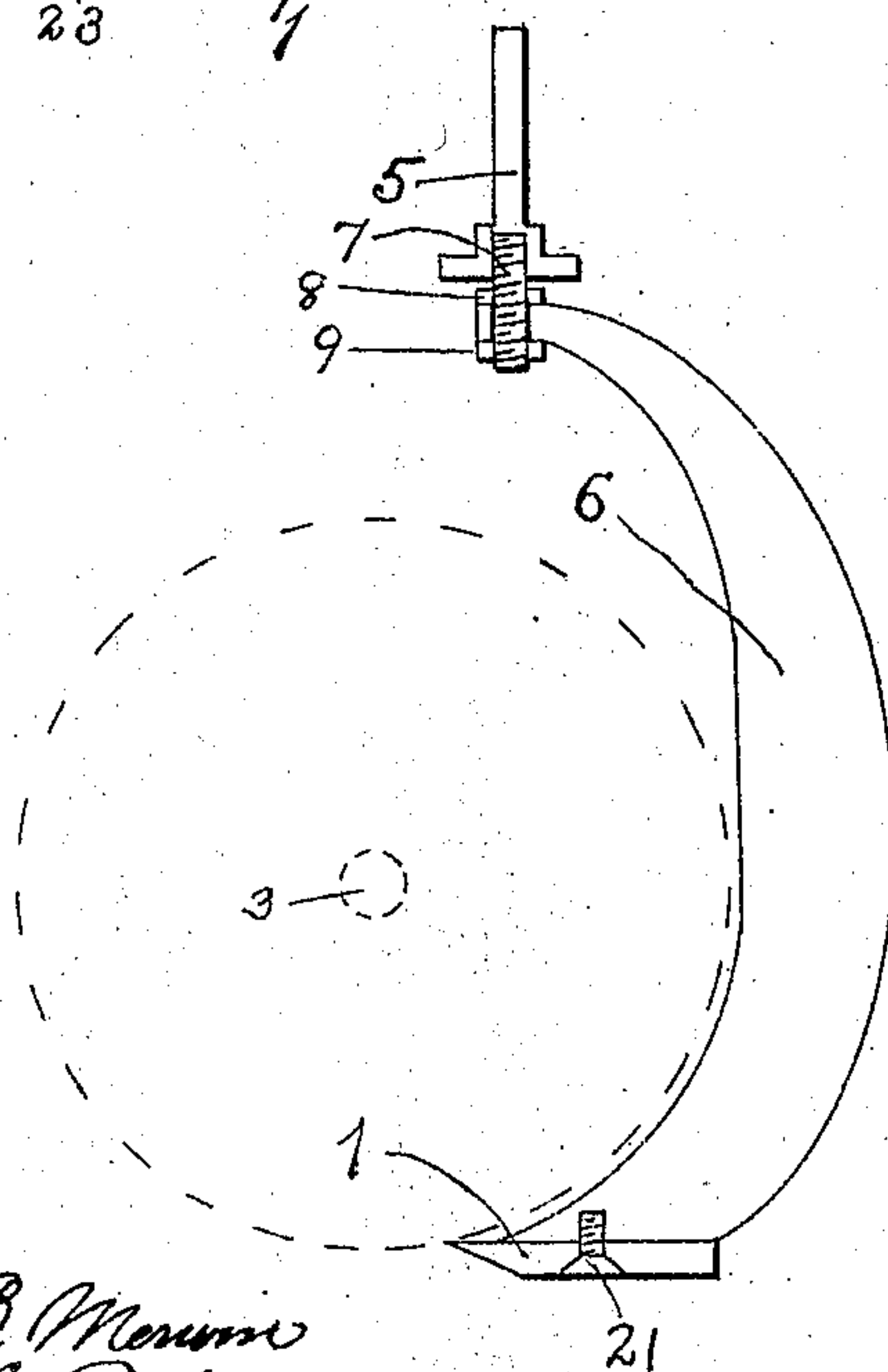


Fig. 2.



Fig. 3.

Fig. 4.



Witnesses.

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UNITED STATES PATENT OFFICE.

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MOWING-MACHINE.

No. 815,681.

Specification of Letters Patent.

Patented March 20, 1906.

Application filed March 14, 1904. Serial No. 198,166.

To all whom it may concern:

Be it known that I, RAY G. COATES, a citizen of the United States, residing at Pasadena, in the county of Los Angeles and State of California, have invented a new and useful Improvement in Mowing-Machines, of which the following is a specification.

My improvement relates to that class of mowing-machines in which a rotating cutter coöperates with a fixed knife, the combination acting as a species of shear. In order that this cutting mechanism may prove efficient, it is important that the contact between the cutting edges themselves shall occur as designed, and any "springing" of either or both members impairs the efficiency of the action. Owing to the location of the fixed knife in the limited space between the rotating cutter and the ground, it is impossible to materially strengthen it against springing away from the rotating cutter by increased thickness. Consequently when a great width of cut is attempted in the construction of the machine a point is soon reached where the spring of the knife is a limiting factor in the width that is efficient. The knife can be readily made sufficiently stiff against a force applied in a plane parallel with the surface of the ground, since in this direction its dimensions may be increased as desired. In addition to the weakness of the knife the rotary cutter itself loses stiffness as its length is increased or the number of its cutters reduced, and a point is reached where the rotary cutter ceases to make a correct contact with all points in the length of the knife even if the latter itself should be rigid.

The objects of my invention are to stiffen the knife in the plane of its leaf stiffness, also to insure the proper contact between the rotating cutter and the knife regardless of some weakness in the cutter itself, so that any width of cut may be practicable in the construction of the machine. This I accomplish by providing intermediate support for the knife in the plane of its weakness as heretofore constructed; also, by furnishing intermediate support for the shaft of the rotating cutter, so that it will retain its proper relations with the fixed knife; also, by furnishing means for restoring the proper relations of the intermediate parts of the cutting edges when such relations are disturbed by wear.

Since mowing-machines of this class are already well known in the arts, only that part

of such a machine to which my improvement applies is shown in the drawings.

Figure 1 represents a front elevation of a knife with my improvement applied in its several forms and also the improvement in the rotary cutter. Figs. 2, 3, and 4 are transverse sections showing the shaft of the rotary cutter and the path of the cutters of the latter as a dotted circle, respectively, on the lines A A, B B, and C C of Fig. 1. Fig. 5 is a modification. Figs. 6 and 7 show details which the following description will make clear.

In the drawings, 1 represents the lower knife, which in this case is shown as rigidly attached to the side members 4 4 of the common form of mower. The shaft 3 of the rotary cutter rests at its extremities in bearings in the members 4 4, as is now practiced in this art. The character of the bearings in the members 4 4 is not a part of my invention. When the knife 1 is rigidly attached to said members, it is necessary that the said bearings be adjustable as regards said knife, so that the usual take up for the wear of the cutting edges may be made. Any of the customary methods of accomplishing this result may be used for these bearings, the practice being well known in the arts. A bar 5 of sufficient strength to furnish the desired reinforcing stiffness to the knife 1 is mounted above the cutter; the ends of the said bar being firmly fixed to said members 4 4 if said members are sufficiently high for this result; otherwise, as shown, on raised seats especially prepared on said members 4 4 for this purpose. Said bar may be secured to said members 4 4 by screws 20 20 or by any other appropriate means. The bar 5 is preferably of that form of cross-section which will give the greatest stiffness with the least weight. Secured to the bar 5 are members 6 and 11, reaching to the knife 1. These members may be either of the form shown in Fig. 4, the latter being a transverse section through C C of Fig. 1, which clears the rotary cutter by being curved around it, or they may be of the form shown in Fig. 3, which is a transverse section through B B of Fig. 1, and used with what I call the "gang" form of rotary cutter, or, again, a combination of both forms may be used.

In Fig. 4 the curved member 6 is secured firmly to the knife 1 by means of the screw 21, which passes through the knife into a threaded hole in the boss 22 of the member 6

or by other appropriate means. The upper end of 6 is provided with a hole. In the under side of the bar 5 a stud 7 is screwed and a nut 8 placed thereon. The hole in the upper end of the member 6 is then passed over the stud and a nut 9 screwed on the stud below. It will be evident that by moving both nuts 8 and 9 either up or down on the stud 7 the member 6 will be raised or lowered and that the knife 1 will move with it. When the rotary cutter itself needs no stiffening, this form of connecting member answers the purpose of stiffening the knife to the desired extent.

When the rotary cutter itself requires support, I use the connecting member shown in Fig. 3. In this figure the main member 11 is secured to the knife 1 by the screw 21, as previously described, for the member 6 or by other appropriate means. A bearing 12, spherically shaped in its middle part, is held between the heads of the screws 13 and 14, the said heads being properly hollowed to fit the spherical part of said bearing. The bearing is constructed in two parts, as shown, in order that it may be placed on the shaft of the rotary cutter. The two parts of the bearing are held together by the screw 19 and prevented from clamping the shaft either from the pressure of the screw 19 or from that of the screws 13 and 14 by the screw 17. The screws 13 and 14 are fitted into the threaded bosses 15 and 16, which latter are integral with the member 11. The upper end of the member 11 is finished like the upper end of the member 6 and like that member is also attached to a stud secured to the bar 5. In order that the shaft of the rotary cutter may be supported by the bearing 12, the blades 10 10 10, &c., of said cutter are not continuous for the full length of the shaft, and, as shown at B B and A A, openings are formed across said blades through which a support may reach the knife 1. This construction practically divides the rotary cutter into several cutters operating as a gang. Through such an opening the member 11 passes from the bar 5 to the knife 1. The member 11 is made as thin as possible in a direction parallel with the axis of the cutter, and the ends of the blades 10 10, &c., are given no more "clearance" than is necessary. These rotary cutters are composed of a shaft, spiders arranged along the shaft, and spiral blades secured to the spiders after the well-known practice in this art. In order that there may be abundant room for the bearing 12 on the shaft 3, simultaneously with a small opening between the blades 10 10 for the member 11, the "spiders" 24 24, adjacent to the openings, are not set out so far as the ends of the blades, and the ends of the latter therefore overhang the bearing. Unless otherwise provided the grass in front of the member 11 would be pressed down by that member and

would be uncut. In order that this may not occur, the front edge of the member 11 is carried forward of the knife 1 and is formed into a wedge, as shown in the detail views in Figs. 6 and 7. The wedge-shaped forward part of the member 11 starts the movement of the grass laterally each way from the middle line, and this movement is finished by the enlarged part 23, which lies below the path of the blades of the rotary cutter, so that these blades ultimately catch the grass and shear it against the fixed knife 1. It will be evident that the base of this deflecting-wedge should be a little wider than the opening between the blades 10 10 in order that the grass may be safely caught between the cutting edges, yet the total width of the base of the wedge need be but a part of an inch. When the rotary cutter is provided with many blades, its stiffness is apt to be greater than that of the knife, and the latter is the first to require support. When, however, the said cutter has few blades, it may require support before the knife and may be supported on the knife itself. In this case in order to keep the rotary cutter in its proper relation with the knife I provide an intermediate bearing for the shaft of the rotary cutter, which in this case is attached to the knife. Such a bearing is sectionally shown in Fig. 2 across A A of Fig. 1. It consists of the member 18, secured to the knife by the screw 21, as previously described, for the other members 6 and 11 or by other appropriate means. The rotary cutter-blades are separated so that an opening occurs, as shown at A A in Fig. 1, which opening is identical in principle with the opening shown for the member 11. The member 18 is provided with a bearing, as described for the member 11, and like the latter member has its front edge and lower part formed into a wedge shape for the purpose of moving the grass laterally, so that it will be caught by the cutter-blades 10 10. The shaft of the rotary cutter is fitted to the bearing and by adjusting the screws 13 and 14 the distance between the shaft and the knife may be adjusted as desired.

In applying my invention the bar 5 may be fixed to the members 4 4, or it may be supported on the knife itself. This latter modification is shown in Fig. 5, in which a member 6 is secured to each end of the knife inside of whatever device may be used to fasten the knife to the side members of the machine. The ends of the bar 5 are secured to these members 6 6, and the intermediate supports of the knife may be either that of the form 6 or 11.

By making the bar 5 of suitable strength and without much increasing the width or thickness of the knife over the present practice any desired width of cut may be provided for in the construction of the machine.

The details of the driving mechanism of the cutter has no part in my invention, since the latter is applicable to any method of driving.

I am aware that in mowing-machines of the class to which my improvement applies bearings both adjustable for wear of the bearing itself and also for that of the cutting edges are old in the arts. Such adjustable features apply to the ends of the rotary cutter and knife, and these I do not claim. I am also aware that in adjustable hangers for shafting a ball-and-socket effect practically identical in principle with the bearing shown is well known in the arts. The bearing illustrated is merely illustrative, and any other of the present known forms that one familiar with this art would find appropriate I consider as coming within the scope of my invention.

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

1. In the cutting mechanism of a mowing-machine the combination of a knife, a rotary cutter coöperating with said knife, end supports for the shaft of said rotary cutter, and a support for said shaft on said knife intermediate between said end supports, for the purpose described.

2. In the cutting mechanism of a mowing-machine the combination of a knife, a rotary cutter coöperating with said knife, end supports for the shaft of said rotary cutter, a support for said shaft on said knife intermediate between said end supports, and means of adjusting said shaft as regards said knife at said intermediate support, substantially as described.

3. In the cutting mechanism of a mowing-machine the combination of a knife, a rotary cutter coöperating with said knife, a rein-

forcing-bar for said knife located above said knife and clear of the path of revolution of said cutter and approximately in the plane of least stiffness of said knife, a member, curved to clear the path of revolution of said cutter, adapted to locally support said knife from said bar at a point intermediate between the ends of said knife, and means of adjusting said knife to said bar at said member, in substance as described.

4. In the cutting mechanism of a mowing-machine the combination of a knife, a rotary cutter coöperating with said knife, a reinforcing-bar for said knife located above said knife and clear of the path of revolution of said cutter, a member intermediate between the ends of said knife connecting said knife and said bar, a supporting-bearing on said member for the shaft of said rotary cutter, and means of adjustment between said knife and said bar at said member, in substance as described.

5. In the cutting mechanism of a mowing-machine the combination of a knife, a rotary cutter coöperating with said knife, a reinforcing-bar for said knife located above said knife and clear of the path of revolution of said cutter, a member intermediate between the ends of said knife connecting said knife and said bar, a bearing on said member for the shaft of said cutter, and means of adjustment between said knife and said bearing at said member, in substance as described.

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

RAY G. COATES.

Witnesses:

W. B. MERWIN,
H. S. ROLLINS.