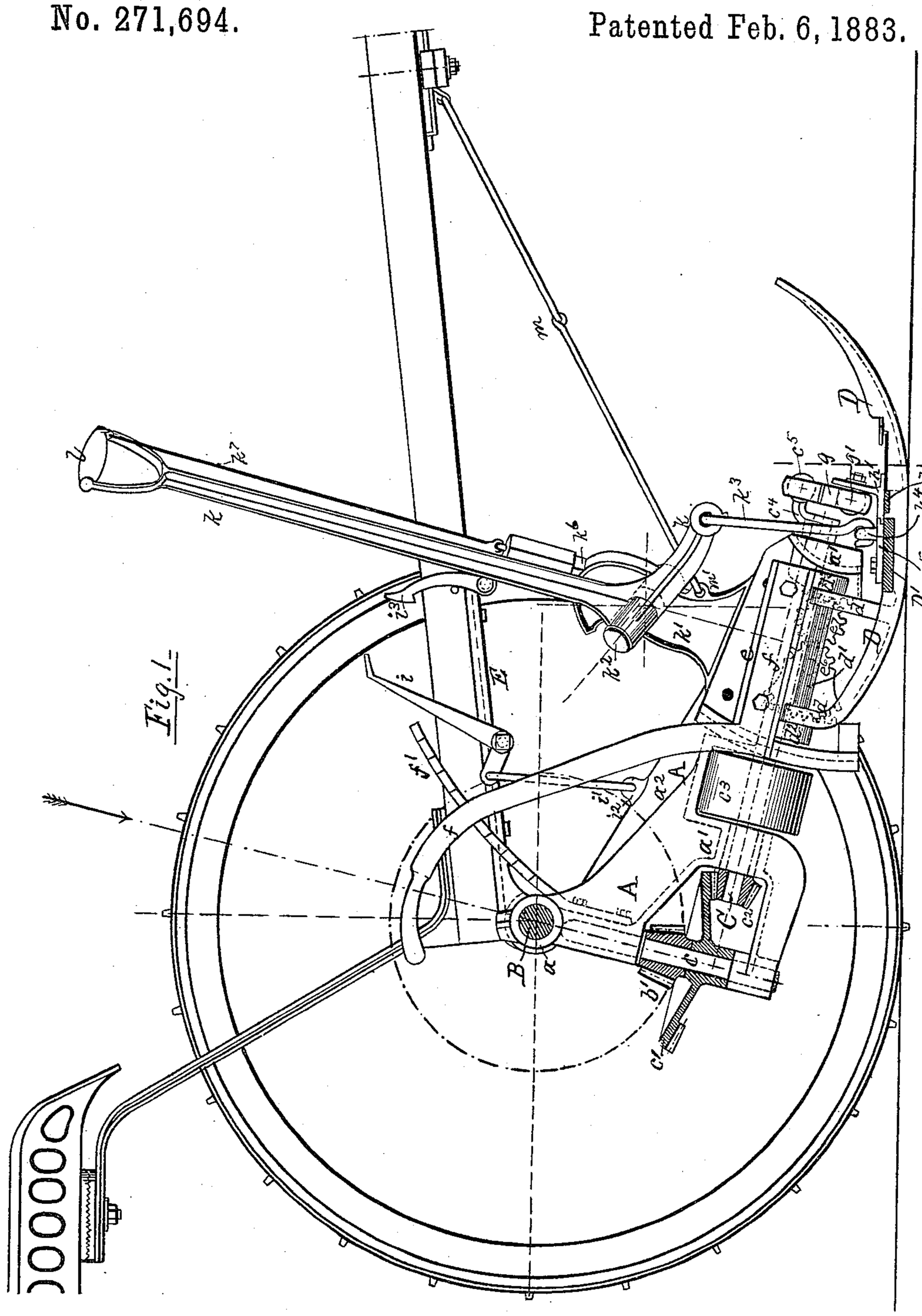
(No Model.)

3 Sheets—Sheet 1.

R. EICKEMEYER.

HARVESTING MACHINE.

No. 271,694. Patented Feb. 6, 1883.



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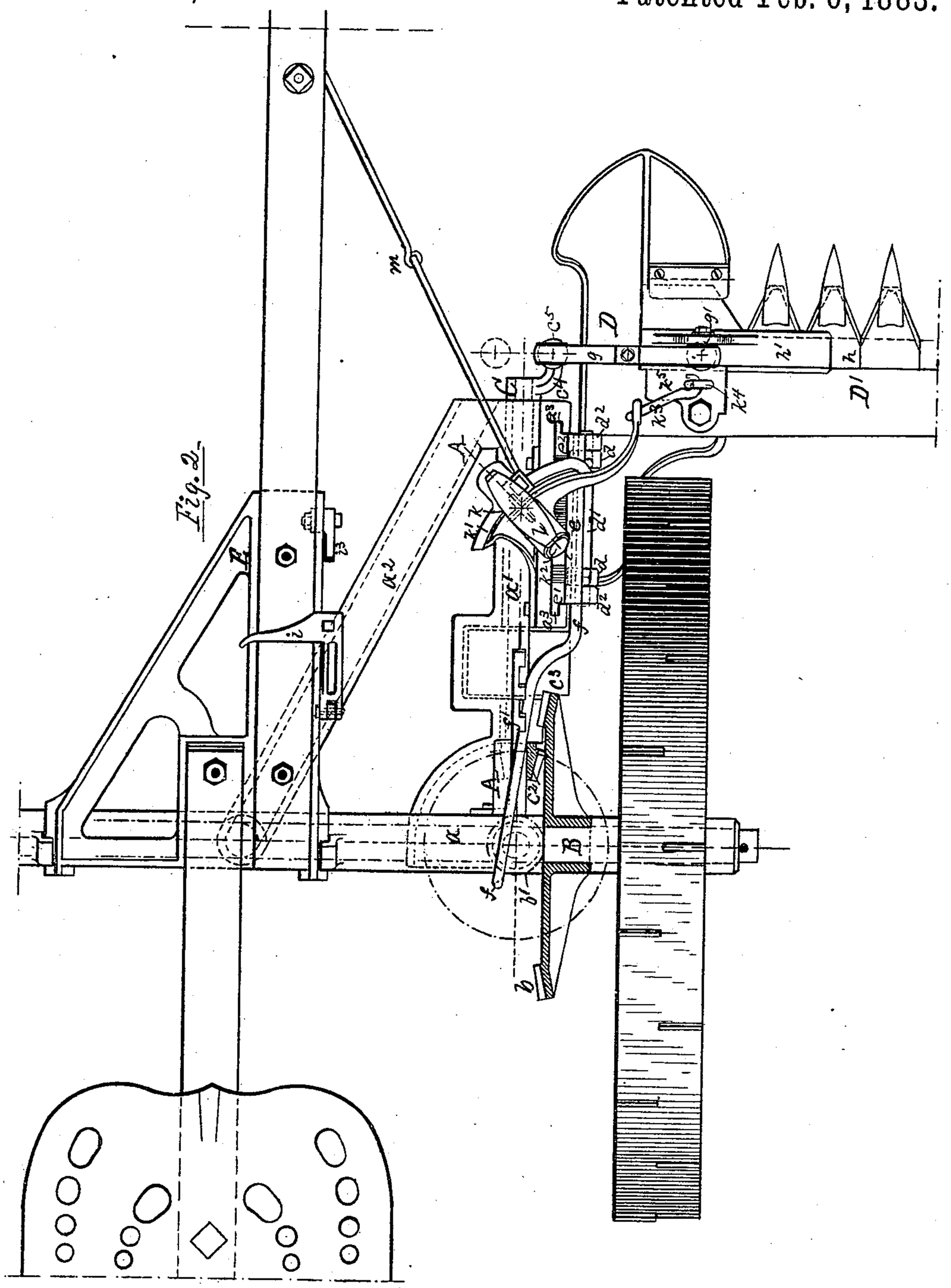
(No Model.)

3 Sheets—Sheet 2.

R. EICKEMEYER.

HARVESTING MACHINE.

No. 271,694. Patented Feb. 6, 1883.



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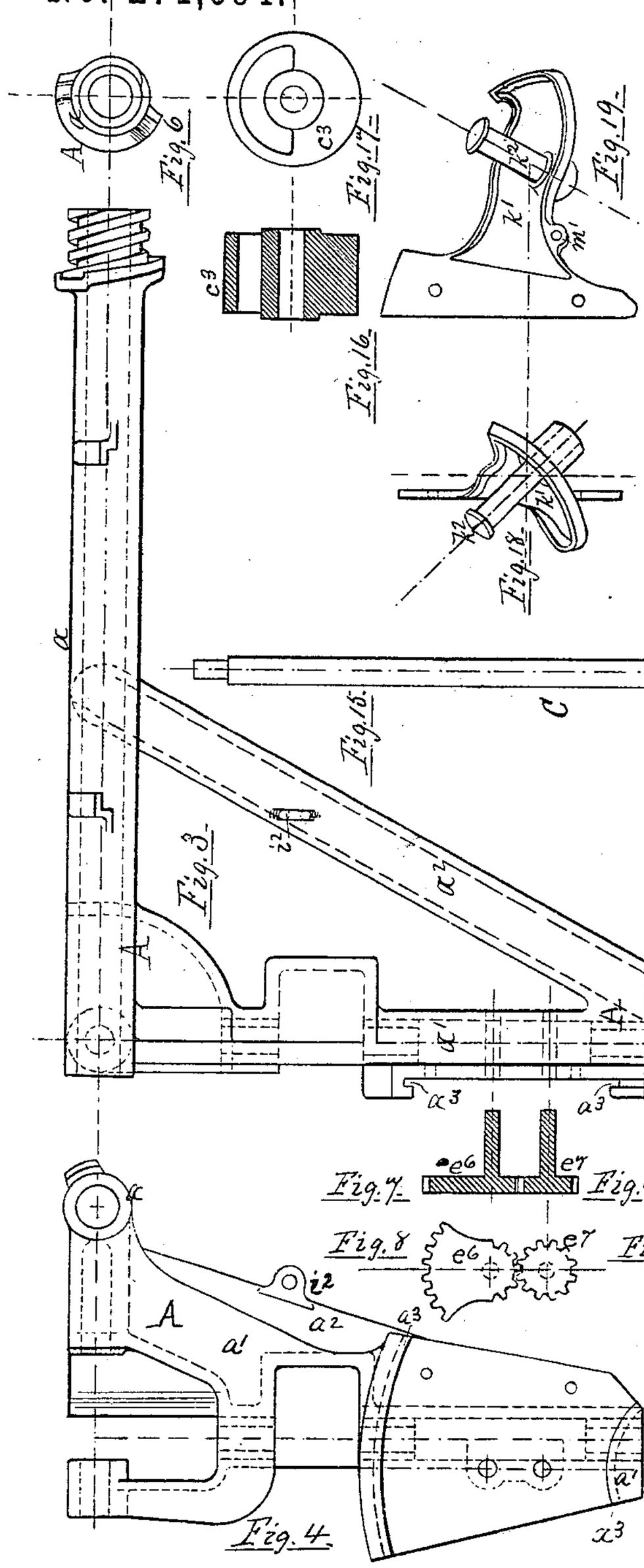
(No Model.)

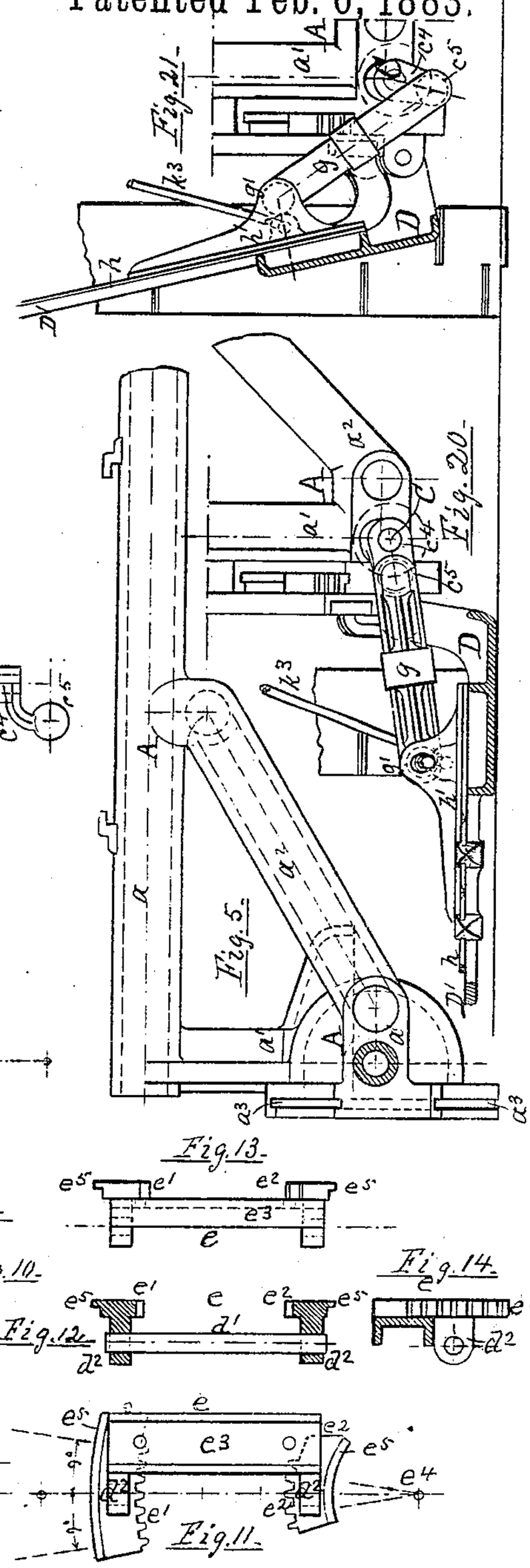
3 Sheets—Sheet 3.

R. EICKEMEYER.

HARVESTING MACHINE.

No. 271,694. Patented Feb. 6, 1883.





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UNITED STATES PATENT OFFICE.

RUDOLF EICKEMEYER, OF YONKERS, NEW YORK.

HARVESTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 271,694, dated February 6, 1883.

Application filed May 1, 1882. (No model.)

To all whom it may concern:

Be it known that I, RUDOLF EICKEMEYER, of Yonkers, in the county of Westchester and State of New York, have invented certain new and useful Improvements in Harvesting-Machines; and I do hereby declare that the following specification, taken in connection with the drawings furnished and forming a part of the same, is a clear, true, and complete description of the several features of my invention.

My said improvements relate to novel connections between the frame of the machine and the inner shoe or equivalent floating device, to which the finger-bar is attached, and to means whereby the finger-bar and knife-bar are lifted, lowered, and adjusted, and also to certain novel combinations and arrangements of shafting, gearing, and connecting mechanism employed between the main axle and the knife-bar.

Certain portions of my invention are applicable to machines embodying differential gearing, as shown and described in my prior Letters Patent of April 12, 1870, No. 101,719; July 18, 1876, No. 180,014; March 19, 1878, No. 201,396; January 11, 1881, No. 236,564, and November 8, 1881, No. 249,826, and also to machines in which the more ordinary types of gearing are employed.

After a full description of a machine embodying my improvements the features deemed novel will be specified in detail in the several clauses of claim hereunto annexed.

Referring to the three sheets of drawings, Figure 1, Sheet 1, is a side view of my machine with one wheel removed, the axle and a portion of the gearing in section, and the finger and cutter bars in section outside of the inner shoe. Fig. 2, Sheet 2, is a top view of the main portion of the machine with a portion of the gearing in section. Fig. 3, Sheet 3, is a top view of the frame of the machine detached. Fig. 4 is a side view of said frame. Fig. 5 is a front view of said frame as if in its normal position in the machine. Fig. 6 is an end view of that portion of the frame which incloses the axle. Figs. 7 to 10, inclusive, are sectional and side views of toothed segments which are rotatively mounted in the side of the frame. Figs. 11 to 14 are side, top, and sectional views of a coupling-block on which the inner shoe is mounted and to which the tilting-lever is secured. Fig. 15 is a view of the crank-shaft detached. Figs. 16 and 17 are sectional and side views of a balance-wheel for the crank-shaft. Figs. 18 and 19 are top and side views of the bracket and stud on which the tilting-lever is mounted. Figs. 20 and 21 are front and sectional views of the finger and knife bar, inner shoe, portions of the frame, the crank-shaft, and its connections with the knife-bar, and show respectively the cutting apparatus in and out of working position.

The frame A is pivotally mounted upon and suspended from the axle, and is well shown in Figs. 1 to 5, inclusive. This frame is or may be cast with all its parts integral. It has the tubular portion *a*, within which are the bearings for a rotating axle, B. The side portion, *a'*, extends forward and downward, and contains bearings for the crank-shaft C, and also bearings for a nearly-vertical counter-shaft, *c*; and these two portions of the frame are strengthened and braced by a diagonal portion, a^2, extending from near the line of the axle forward and downward to the front end of the side portion, *a'*.

The gearing between the axle B and the crank-shaft C is clearly illustrated in Figs. 1 and 2. Upon the axle, near the inner face of the adjacent wheel, is a bevel-gear, *b*, (shown in dotted lines in Fig. 1 and in section in Fig. 2,) which, beneath the axle, meshes with the small bevel-pinion *b'* upon the nearly-vertical counter-shaft *c*, which is mounted in bearings within the rear end of the side portion, *a'*, of the frame, and on said counter-shaft is a larger bevel-gear, *c'*, which meshes with a smaller bevel-pinion, c^2, upon the inner end of the crank-shaft C, thus providing for the desired increase of speed, the frame being so formed and recessed as to desirably house and protect the gearing and secure its smooth and proper operation. Upon the crank-shaft is a fly-wheel, c^3, Figs. 1, 2, 16, and 17, weighted upon one side to balance the crank c^4, the wrist-pin ball c^5 thereon, and its connections with the knife-bar head. The crank-shaft is at right angles to the axle, and is as nearly horizontal as is practicable and at the same time provide for reasonable clearance of the

lower portion of the frame from obstacles when the cutting apparatus is elevated and out of service, and the counter-shaft is also at right angles to the axle and to the crank-shaft, thereby securing, with the gearing shown, a desirable speed for the crank-shaft, with no liability of binding or twisting in the bearings or between the meshed teeth of the gearing.

A somewhat similar arrangement of gearing has heretofore been employed in connection with a gear-frame having a shoe rigidly connected therewith or forming a part thereof; but I am the first to organize such gearing and gear-frame with a tilting inner shoe for varying the height of cut without lifting the outlet or front end of said frame, and by having the crank-shaft in a plane as nearly horizontal as is practicable the crank thereon rotates in a practically-vertical plane and substantially in the vertical plane of the knife-bar, thus enabling it to operate the knife-bar smoothly, regardless of the varied tilted positions of the inner shoe and cutter-bar, which are incident to variations in the height of cut. The crank, operated in as nearly a vertical plane as possible, is also of special value in combination with the ball wrist-pin on the crank-shaft, the ball on the knife-bar head, and the ball-socketed link or pitman which connects the head and crank, because said link has a greater capacity for axial movement with reference to and upon the wrist-pin ball and the knife-head than could be the case if the crank-shaft were not in a nearly-horizontal position, as shown.

It will be seen that the gearing which connects the large gear on the axle with the crank-shaft is located wholly below the axle, and that the vertical counter-shaft has upper and lower bearings in the pendent frame, beneath the axle and at right angles thereto, thus well balancing said frame and causing the gearing to operate smoothly and effectually.

So far as my knowledge extends, I have for the first time, in providing for the tilting or rocking adjustability of a floating finger-bar for varying the height of cut, so pivotally connected the frame and finger-bar, or the inner shoe, to which it is attached, that said finger-bar can be rocked or tilted upon an axis which is so nearly coincident with the longitudinal axis of the finger-bar that said finger-bar, in all its various adjustments as to height of cut, will be moved around an axis which is practically in line with the knife-bar or knife-head, and also in line with whatever device may be connected therewith for imparting to it the desired reciprocating motion. By having these driving-connections of the flexible or ball-and-socket-joint order my machine operates equally smooth and with a uniform expenditure of power, regardless of the tilted position of the finger-bar. I employ a novel segmental coupling-block, to which the finger-bar or inner shoe is attached, said block serving as the connecting medium between the finger-bar or its inner shoe and the frame, and it slides upon the side of said frame in the arc of a circle which has its axis or center located beyond the end of the frame, and substantially in the vertical plane of the longitudinal axis of the finger-bar. This segmental block may be variously constructed and applied to the frame, and various means may be employed for moving said block up and down for varying the elevation of the front portion of the finger-bar, without departure from certain portions of my invention.

The inner shoe, D, has secured to it the usual finger-bar, D′, and knife-bar; but it is connected with the frame in the novel manner before referred to. At the rear inner end of the shoe there are two vertical studs, *d*, Fig. 1, having eyes or bearings at their upper ends, which are freely occupied by the hinge-rod *d′*, which is mounted at each end in two ears, d^2, at opposite ends of a coupling-block, *e*, Figs. 1 and 2, and 11 to 14, inclusive, which is of peculiar form and construction. This block, although cast in one piece, may be described as having two segmental ends, *e′* and e^2, connected by a top bar, e^3. These segmental ends are toothed at their inner edges, and both are arcs of circles of different diameters, having a common center, as at e^4, Fig. 11, that center or axis being wholly beyond the end of the frame and located in the plane occupied by the link which connects the wrist-pin of the crank to the knife-head, as hereinafter more fully described. The outer curved edges of these segmental ends have each a flange, e^5, which occupies its respective vertical guiding-recess a^3 in the side of the side portion, *a′*, of the frame, as clearly seen in Figs. 3 and 4. This coupling-block slides upon the side of the frame, and is guided in its movements by a toothed segment, e^6, and a pinion, e^7, Figs. 7 to 10 and Fig. 1. The toothed segment e^6 meshes on one side with the toothed end *e′* of the coupling-block, and on its opposite side with the pinion e^7, which in turn meshes with the toothed end e^2 of said block; and said segment e^6 and the pinion e^7 have each an axis or stud mounted in bearings in the side portion, *a′*, of the frame, as clearly indicated in Figs. 3, 4, 7, and 9. The top bar of the coupling-block is laterally and longitudinally recessed for the reception of the lower end of the hand-lever *f*, which is secured to the block by bolts, as shown in Figs. 1 and 2, and the upper end of said lever extends upward and rearward, so as to be readily accessible to the driver when on his seat, and it is maintained in any desired position by the notched bar *f′*. The lever itself may have a lateral springing capacity; or it may be provided with a spring-bolt, in a manner well known, for securing proper engagement with the notched bar.

Referring now to Fig. 1, it will be readily seen that by raising or depressing the lever *f* the shoe and finger-bar will be tilted forward or backward upon an axis which is beyond the end of the frame, and substantially in line with

but above a prolongation of the longitudinal center of the knife-bar when in service, and also in the plane occupied by the link or pitman *g*, which, by means of a ball-and-socket joint, *g'*, is connected at one end with the head of the knife-bar *h* and at its opposite end with the ball wrist-pin c^5. It will also be seen that while the coupling-block is maintained in a vertical position by the recesses a^3 in the side *a'* of the frame A it is so guided by the toothed segment and the pinion that they relieve said block from undue friction of its ends with the said recessed portions of the frame in which they slide.

Although I have shown a lever or handle attached directly to the coupling-block, I do not limit myself thereto, for it is obvious that various forms of levers may be employed, and also that said block may be raised and lowered by the rotation either of the segment e^6 or the pinion e^7, and that either of these can readily be rotated by means of a toothed segmental lever meshing with a pinion attached to the axle or stem of, for instance, the pinion e^7, which in that case would have its axle extended entirely through and beyond the inner surface of the side portion, *a'*, of the frame for the reception of said pinion. It is also to be understood that I do not limit myself to a segmental coupling-block constructed and applied to the frame precisely as shown, and having the toothed ends and accompanied by the segment and pinion, except as hereinafter specially indicated in my claims, because, although I prefer the construction shown, it is obvious that said coupling-block may be provided with a segmental tail-piece projecting upward from its point of connection with the shoe and sliding within a segmental recess in the frame, and that for reducing friction smooth faced guiding-wheels may be applied to bear against the opposite edges of said tail-piece, and in such case the adjusting-lever may be connected to said tail-piece by means of a stiff link for raising or lowering the coupling-block and correspondingly adjusting the shoe and finger-bar.

I employ the pole-frame E, which is hinged, as heretofore, to the main frame A and carries the driver's seat, and to one edge of the pole-frame the usual foot-lever, *i*, is pivoted, and connected by a link, *i'*, to an eye, i^2, upon the top of the diagonal brace portion a^2 of the main frame for lifting its front end and the inner shoe, and a pawl, i^3, on the pole-frame engages with said foot-lever for maintaining the frame and shoe in an elevated position.

The lifting of the outer end of the finger-bar from the ground and folding it upward into a practically-vertical position is accomplished by the hand-lever *k*, which is bell-crank in form, and is pivoted upon a vertical standard, *k'*, which is bolted to the rear side of the portion *a'* of the frame A, adjacent to the coupling-block recess, as clearly seen in Figs. 1 and 2. This standard has the lever-stud k^2, which projects therefrom, and is inclined upward and rearward, as seen in Figs. 1, 2, 18, and 19, so that the outer end of the short or lower arm of the lever moves in substantially the line which is normally occupied by the link k^3 and the eye-bolt k^4 on the plate k^5, which is bolted to the finger-bar and serves as a guide for one side of the head *h'* of the knife-bar *h*, as seen in Figs. 1 and 2. When the finger-bar is thus lifted the hinging of the shoe is of course upon the rod *d'*, which is mounted upon the coupling-block, and it will be seen, in whatever position the outer end of the finger-bar may be, that the working relations of the crank, link, and knife-head will remain substantially the same, and that the ball-and-socket connections of the link with the crank and the knife-head secure a smooth and easy action, regardless of the tilted position of the finger-bar and shoe, and permit the complete lifting and folding of the finger-bar while the machine is in motion and the knife-bar vibrating. The eyebolt k^4 being located closely adjacent to the knife-head, it will be seen that the finger-bar is well balanced while being lifted, and therefore the knife-head, its link, and the connections thereof with the knife-head and crank maintain substantially the same relations, whether the cutting apparatus be parallel with the ground or folded up, as seen in Fig. 21.

The lever *k* for lifting the finger-bar is maintained in its rearward position by means of a spring-latch, k^6, on said lever, near its pivot, which engages with the rear edge of the top of the standard k^2, and said latch is controlled by a rod or cord, k^7, connected to the rotating handle *l* at the top of the lever.

The front end of the main frame is connected with the whiffletree-bar by means of links *m*, which connect with an eye, *m'*, in the front edge of the standard *k'*, thus enabling the team, as heretofore, to relieve the front end of the frame from unduly bearing downward.

While I prefer the simple system of gearing shown and described, it is obvious that any other variety of gearing may be employed for vibrating the knife-bar, in connection with such of my improvements as relate to the tilting of the inner shoe and finger-bar, and to the lifting of the same, and it is equally obvious that the gearing shown and described may be employed with prior arrangements for controlling and lifting the shoe and finger-bar; and although I have illustrated my improvements as applied to a front-side-cut machine it is obvious that no substantial variations will be requisite for their application to other varieties of machines, regardless of the particular location of their cutting apparatus.

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

1. The combination of a frame mounted upon and pivotally suspended from the axle of a harvesting-machine, a tilting shoe connected to said frame, a crank-shaft at right angles to and below the axle and occupying bearings in

said frame, a counter-shaft mounted in upper and lower bearings in the pendent frame beneath the axle, at right angles thereto and to the crank-shaft, and gearing which connects the axle with the counter-shaft and the crank-shaft, substantially as described.

2. The combination, with the axle and the pendent frame pivotally suspended from the axle, of the vertical counter-shaft with upper and lower bearings in said frame, the crank-shaft at right angles to and below the axle, the gearing on said counter-shaft for connecting the axle-gear with the crank-shaft, the tilting shoe, the cutter-bar at right angles to the crank-shaft, the knife-head, the ball wrist-pin on the crank-shaft, the ball on the knife-head, and a link or pitman with ball-sockets for connecting the knife-head and crank, substantially as described.

3. The combination, substantially as hereinbefore described, of the frame, and the finger-bar connected to said frame by a pivotal connection having its axis located beyond the frame and substantially in line with the longitudinal axis of the finger-bar, whereby the finger-bar may rock or tilt for affording variations in the height of cut substantially around its longitudinal axis, as set forth.

4. The combination of the frame, the crank-shaft, the knife-head, and the link having ball-and-socket connections for the crank and knife-head, and the cutter-bar attached to the frame by a pivotal connection having its axis beyond the frame, substantially as described, whereby said cutter-bar can be turned upon its longitudinal axis for varying the height of cut without varying the working relations of the knife-head, link, and crank, as set forth.

5. The combination, substantially as hereinbefore described, of the frame, the shoe, and a segmental coupling-block sliding upon the side of said frame and connected with the shoe, whereby the latter may be tilted longitudinally around an axial point located beyond the end of the frame, as set forth.

6. The combination of the frame, the shoe, the segmental coupling-block, toothed near each end, and the guiding segment and pinion, mounted upon the frame and meshing respectively with opposite ends of the segmental block, substantially as described.

7. The combination of the frame, the segmental coupling-block, the shoe, and a lever for moving said block and adjusting the shoe, substantially as described.

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