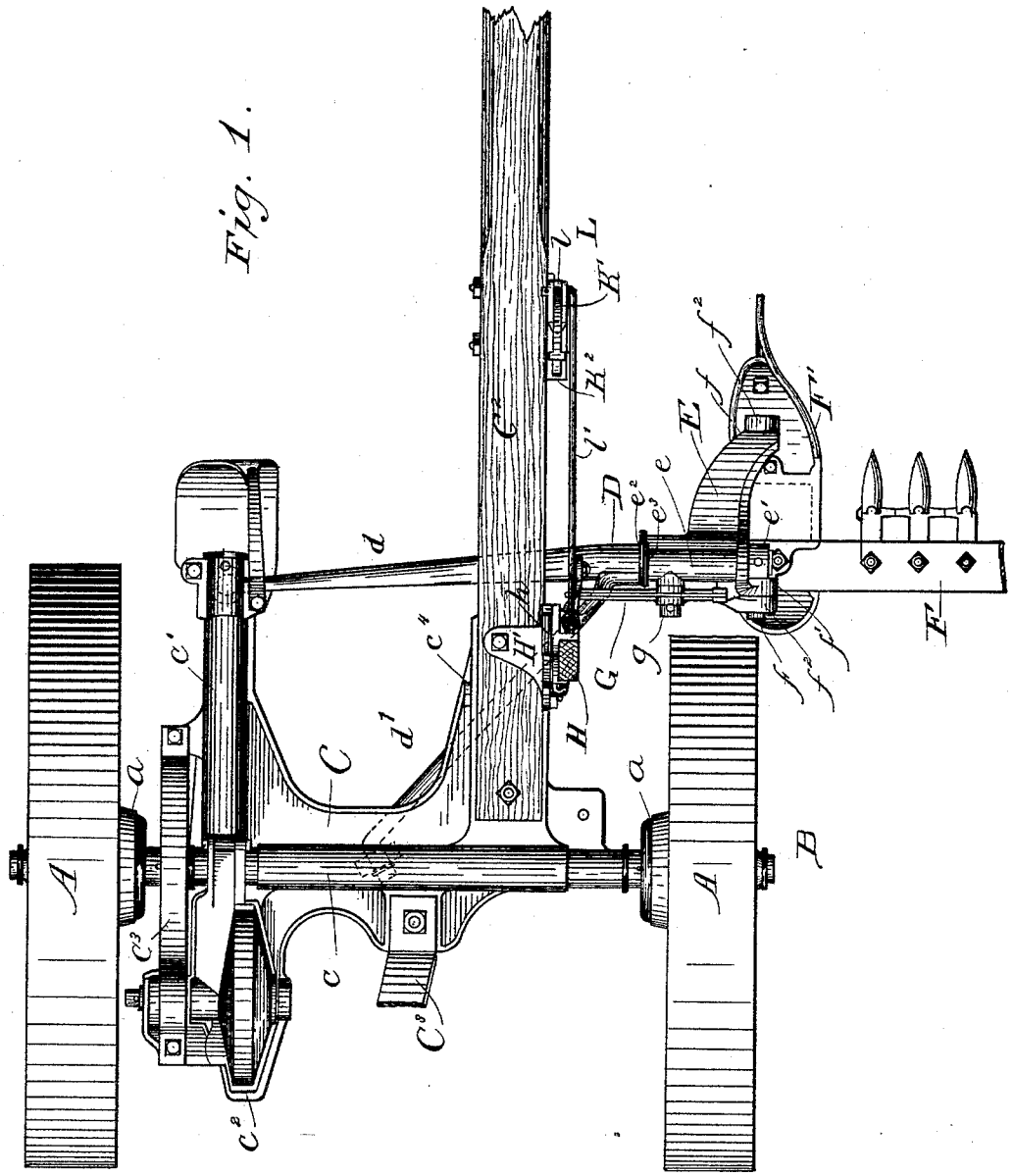
(No Model.) 4 Sheets—Sheet 1.

H. E. PRIDMORE.

MOWER.

No. 497,816. Patented May 23, 1893.

Fig. 1.



Witnesses

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4 Sheets—Sheet 2.

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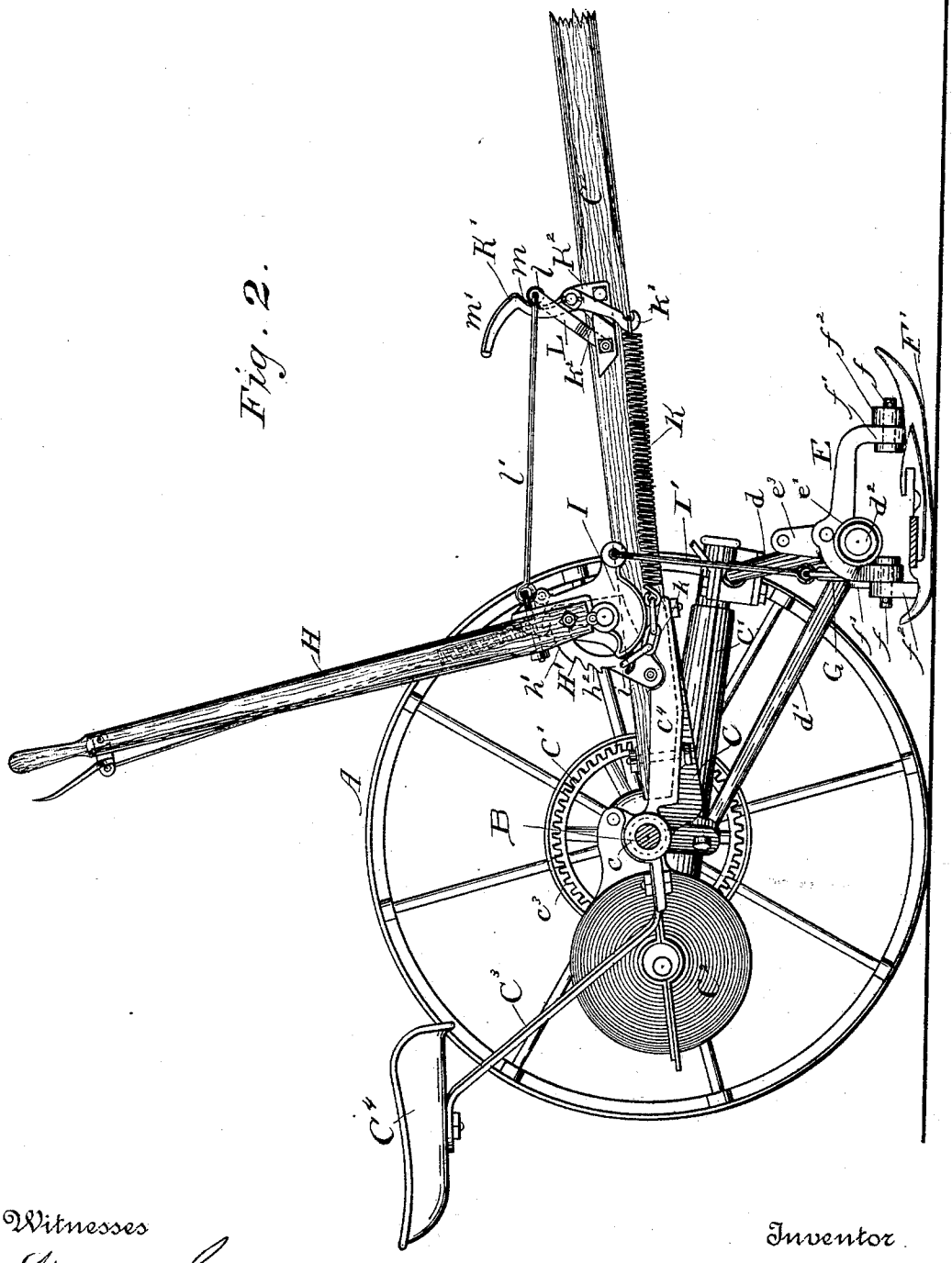
Fig. 2.



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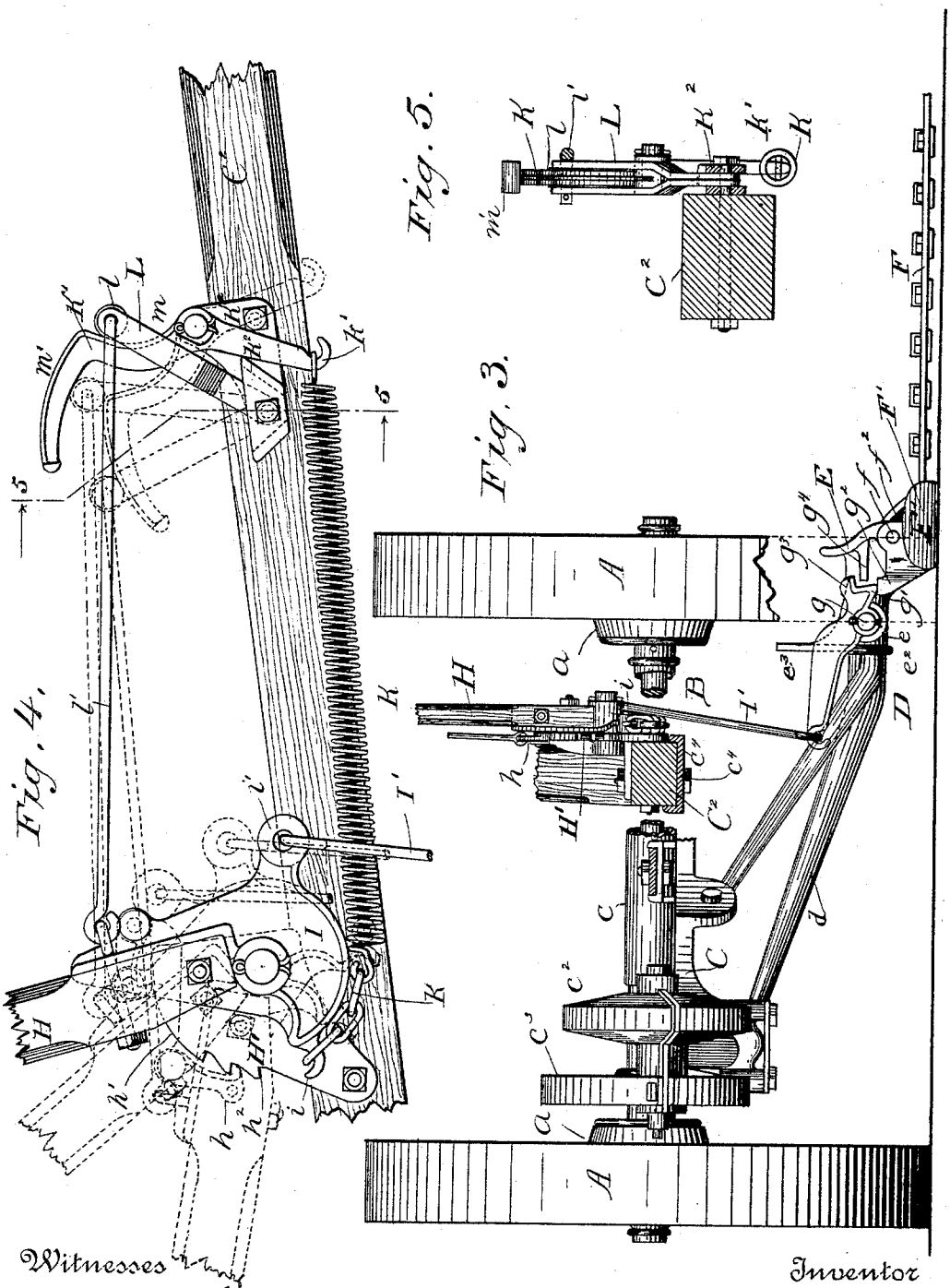

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No. 497,816. Patented May 23, 1893.

Fig. 7.

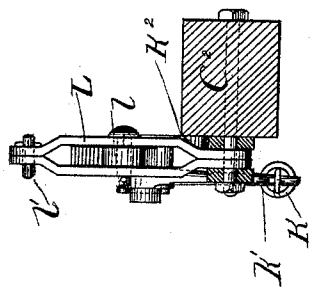
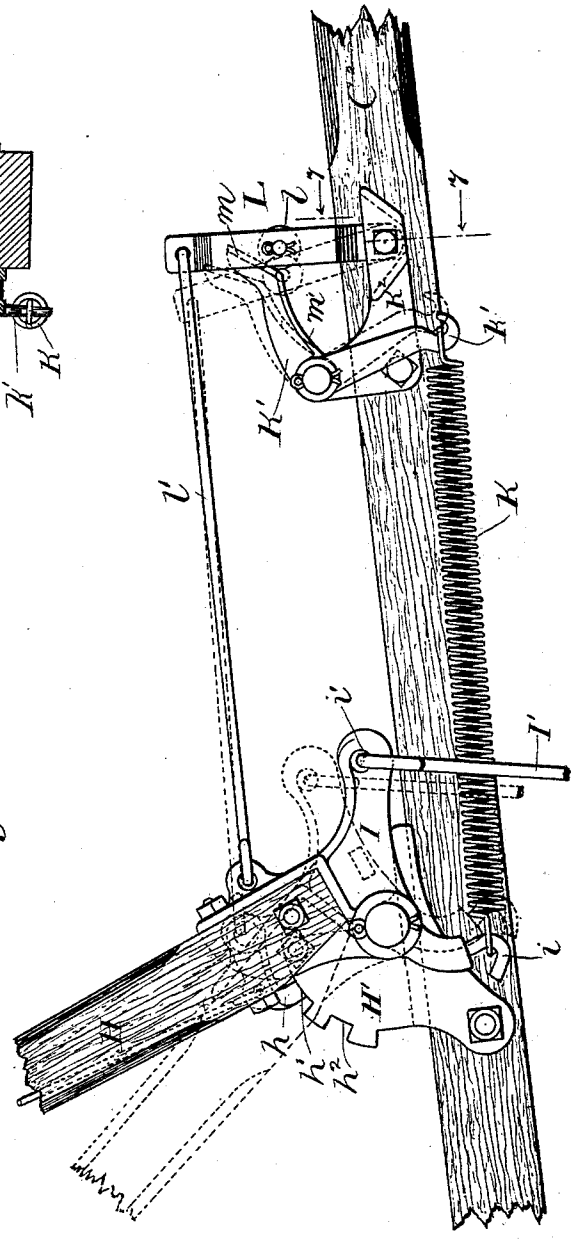


Fig. 6.



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UNITED STATES PATENT OFFICE.

HENRY E. PRIDMORE, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE McCORMICK HARVESTING MACHINE COMPANY, OF SAME PLACE.

MOWER.

SPECIFICATION forming part of Letters Patent No. 497,816, dated May 23, 1893.

Application filed October 5, 1889. Serial No. 326,123. (No model.)

To all whom it may concern:

Be it known that I, HENRY E. PRIDMORE, 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 Mowers, of which the following is a specification.

My invention relates to the mechanism for lifting the finger-beam of mowers, more particularly such as have said finger-beam hinged to floating coupling-frames and to the mechanism for elastically supporting said finger-beam both at its inner and outer end, being part of said lifting mechanism.

Heretofore gag-levers have been arranged to act upon a spur or insetting ledge from the shoe, first striking that spur and raising the outer end of the finger-beam; next striking a lug on the coupling frame upon the inner end of the finger-beam to raise the whole bodily. The power-arm of the gag-lever has been as a rule connected with the lifting-lever by a chain or other flexible connection, and with the finger-bar at its normal this chain would be slack, so that the lifting-lever would have to be moved a considerable distance back before its effective action commenced, the space through which it moves representing lost motion.

In Letters Patent of the United States, granted me on the 2d day of December, 1890, No. 441,896, I have proposed to connect the spur-arm of the gag-lever to the lifting-lever by means of a link, playing through said lifting-lever and having an encircling coiled spring resting upon its weight-arm so as to exert constant elastic force upon the heel or power-arm of the gag-lever and through it upon the spur from the shoe when the finger-bar is at its normal, thus taking up shocks and jars and tending constantly to lift the outer or divider end of the finger-bar whenever that end, or the whole finger-bar, drops below the normal. In this construction there is also lost motion of the lifting-lever before actual effective action to lift the finger-bar even at its outer end commences; that is, although this outer end will be elastically supported through the gag-lever and spring and its tendency to sag partly neutralized and the ease with which it rises out of a hollow increased by the assistance of the spring, yet this spring must be compressed by the action of the tilting-lever to a certain point before its resistance is enough to overbalance the finger-bar and lift its outer end and finally the entire weight of the coupling-frame and finger-bar.

In my present invention I propose not only to support the finger-bar elastically, but to utilize this lost motion in storing up power in the elastic medium, so that the spring may not only elastically support the finger-bar and tend to lift it, but may co-operate with the lifting-lever itself in raising it. To this end I have adopted various arrangements of devices of which such as are now the best known to me will be explained in the ensuing description and illustrated in the accompanying drawings, in which—

Figure 1 is a top-plan view of a two wheel, front-cut, hinged-bar mower embracing my invention in one of its preferred forms. Fig. 2 is a side elevation thereof with the carrying-wheel at the grain side of the machine removed and the main axle and finger-bar in section to more clearly expose the supporting and lifting devices. Fig. 3 is a rear elevation thereof, partly broken away, to show the gag-lever and its connection with the heel of the finger-bar. Fig. 4 is an enlarged detail view, in side elevation, of the supporting and lifting devices, excluding the gag-lever, and with the parts in successive positions to more perfectly explain the manner in which the lost motion is converted into increased power in the spring. Fig. 5 is a section on the correspondingly numbered line in the preceding figure, viewed in the direction indicated by arrows. Fig. 6 is an enlarged detail view in side elevation of an alternative and preferable form of the power and lifting devices, being the one which I have so far found best in use, and Fig. 7 is a section therethrough on the correspondingly numbered line in said sixth figure, viewed in the direction indicated by the arrows.

A represents the two carrying-wheels of a mower having pawl and ratchet cases, *a*, for independent connection with the main-axle, B, as usual in this class of machines.

C is the metal gear-frame having a sleeve, *c*, whereby it is mounted upon the main-axle, a bearing, *c'*, for the cutter crank-shaft, casings, c^2 and c^3, for the main-gear, C', prime-pinion and bevel-gear whereby motion is com-

municated to the crank-shaft from the main-axle, and a socket, c^4, for the draft-tongue, C^2, which is rigidly bolted therein, and together with the gear-frame constitutes the main frame of the machine, and also another socket in rear of the axle to receive the foot of the standard, C^3, carrying the usual seat, C^4, at its upper end.

D is a forked coupling-frame, one arm, *d*, of which is or may be connected with the gear-frame by a universal joint beneath the forward end of the crank-shaft sleeve and extends nearly parallel with the main-axle to the front of the carrying wheel at the grain side of the machine, while the other arm or branch, *d'*, rigidly connected with the first, extends obliquely rearward to a point beneath the main-axle, where it is pivoted to the gear-frame upon an axis intersecting the center of vibration of the other arm.

Beyond the fork in the coupling-frame is formed a cylindrical journal extension, d^2, upon which the sleeve, *e*, of the finger-bar bridge, E, takes bearing, and to which it is confined by a collar and pin or key, *e'*, at the outer end of the journal and a second collar, e^2, fixed at the inner end thereof. From the sleeve projects a short standard, e^3, for connection with the tilting lever, which is not shown. The finger-bar, F, is hinged or secured to the bridge by pivot-pins, *f*, passing through the pendants, *f'* from said bridge and through ears, f^2, upstanding from the inner shoe, F', on an axis parallel with the line of advance of the machine, or nearly so, so that the finger-bar may be capable of folding up toward the draft-tongue.

From the rear side of the sleeve on the finger-bar bridge projects a pivot-pin, *g*, upon which vibrates the gag-lever, G. This latter has a chain, *g'*, which comes above and rests upon a spur, g^3, insetting from the heel of the finger-bar; that is, from the inner shoe and above this chin the lever has a nose, g^3, which, when sufficiently depressed in the movement of the lever against the spur to lift the outer end of the finger-bar, will strike against a ledge, g^4, upon the sleeve and prevent the lever rocking or vibrating further on its pivot, establishing in fact a stiff connection between the gag-lever, sleeve and coupling-frame and finger-bar, so that further power applied to the gag-lever will lift the coupling-frame and finger-bar together as if rigidly connected.

Mounted upon the main-frame is a lifting-lever, H, having a spring-dog or pawl, *h*, which engages with a rack-segment, H', rigidly secured to said main-frame. Preferably this segment is made with a smooth periphery, *h'*, for a part of its distance, corresponding with the normal position of the lever and finger-bar when the latter is in action and with the limit of play which may be expected in the floating-frame or with the limit of vibration of the gag-lever before its nose comes in contact with the ledge on the finger-bar sleeve, and at the rear end of this surface is notched as at h^2 so that the dog or pawl may engage when the lever is depressed and the finger-bar lifted.

To the foot of the lifting-lever is secured a segment sheave, I, having at its rear end a hook, *i*, and at its front end an eye-lug *i'*, the latter being connected with the power-arm of the gag-lever by a link, I', while the hook receives one or the other of the links of the short-chain, *k*, secured to the rear end of the coiled spring, K, extending along the side of the draft-tongue for some distance and having its front end secured to the pendent-arm, *k'*, of a cam-lever, K', pivoted to a bracket, K^2, upon the tongue. This bracket has a stop, k^2, and at the normal, that is, when the parts are in the position represented in full lines in the second figure of the drawings, with the finger-bar resting naturally on the ground, it is intended that the spring shall be under such high tension, say about sixty pounds, as to exert through the gag-lever a strong lifting force upon the outer or divider end of the finger-bar and sustain much of the weight of the latter and of the coupling-frame, and in this position the pendent-arm of the gag-lever will be drawn back and rest against the said stop on its bracket.

To the rear of the cam-lever, in the construction shown in the first four figures of the drawings and to the front in the preferable construction shown in the sixth and seventh figures, a radius-bar, L, is pivoted to the bracket and its upper end which carries an anti friction roll, *l*, bearing against the track-face of the cam-lever, is connected by a link, *l'*, with the lifting-lever above the pivot of the latter. In the first construction, the first reach, *m*, of the track, is curved concavely and when the parts are at the normal the anti-friction-roll will rest in the bottom of the curve, as in Fig. 2, but when the lifting-lever is drawn back, it will be caused to travel up along the curve, drawing the contiguous or upper arm of the cam-lever backward to the first position shown in dotted lines in Fig. 4, and forcing the lower arm forward to stretch the spring, until the second, convexly curved, reach, *m'*, of the track, is brought to a point where it is concentric with the axis of the radius bar and the roll will thereafter travel over it without disturbing the position of the cam-lever, but at the same time holding said lever in position, as if locked against movement. In the second construction, in which the radius-bar is pivoted in front of the cam-lever, the first reach, *m*— is at the extreme end of the lever and is straight and set at a greater or less angle, and the roller on the radius-bar, as the latter is drawn back, travels down said reach toward the pivot of the cam-lever, pushing the cam-arm of the latter backward and forcing the pendent-arm forward away from its stop until the roller reaches the second reach, *m'*, of the track, which is now curved concavely, and at the normal is eccentric to the radius-bar, but at this moment becomes concentric

therewith so that the cam-lever is thereafter held positively against movement in the direction of the stress of the spring, while the lifting-lever continues to operate. The pendent arm of the cam-lever is longer than the distance between the pivot of the radius-bar and the axis of the anti-friction roll bearing against the cam-track on said lever so that notwithstanding the connection between said radius-bar and the lifting-lever, the force of the spring acting upon the lower-arm of the cam-lever will hold it back against its stop. In case the finger-bar runs into a depression and drops below its normal, it will act upon the chin of the gag-lever and draw down upon the link connecting the power-arm of said lever with the lifting-lever and the latter will be rocked upon its pivot, carrying it forward stretching the spring through the quadrant, the other end of the spring being stayed by the stop, and increasing its tension, the increased force tending to restore the outer end of the finger-bar, or divider end, to the normal height, or, when the depression is at the inner end of the finger-bar or so great that the ledge of the finger-bar bridge is brought against the nose of the gag-lever tending to raise and sustain the entire length of the finger-bar together with the coupling-frame. As the lifting-lever rocks forward the link connecting it with the radius-bar pushes the latter forward and moves the anti-friction roll away from contact with the cam-lever so that none of the power of the spring will be neutralized by the resistance of said radius-bar and the full power will be released and act through the quadrant sheave and lifting-link upon the heel of the gag-lever to raise the finger-bar or shoe. If the lifting-lever is drawn back to raise the outer end of the finger-bar, the lifting-link immediately pulls upon the power end of the gag-lever, first lifting the divider-end of the finger-bar by the action of the chin of the gag-lever upon the heel of the bar, and finally engaging with the ledge on the bridge, gags the inner end of said finger-bar which is then raised concurrently with the outer end.

The power required to raise the outer end of the finger-bar is small compared with that required to raise the shoe and the entire bar together with the coupling-frame. The initial movement of the lifting-lever up to the point where the gag-lever engages with the ledge and continues to raise the shoe, corresponds with the travel of the roller upon the radius-bar over the first or actuating-track of the cam-lever, being the inwardly curved track in the fourth figure and the straight track in the sixth figure and the further movement of the lifting-lever to raise the entire finger-bar and coupling-frame corresponds with the travel of said lever over the concentric track of said cam-lever when the latter lever is held stationary. Now in this initial movement the quadrant lever pays out the spring at its end as the lifting-lever rocks back, but at the same time the cam-lever draws up or takes up its end of the spring faster than the quadrant pays out so that the tension on the spring is slightly increased by this initial movement, which, as just stated, takes place during the easiest part of the lift when the outer end of the finger-bar only is being raised. In this movement as the radius-roller travels upon the actuating track or initial reach of the cam-lever, it is constantly getting farther away from the pivot of said lever, (in the construction shown in the fourth figure) and increasing the power of the pull of the lifting-link, but when it runs up the concentric track of said cam-lever it is the same distance from the pivot of the latter as is the spring. Thus while the power of the spring is increasing, the radius link is gaining a compensating advantage over the cam-lever that neutralizes the back pull on the lever through the lifting-link, while the increasing power of the spring is duly effective in its pull upon the quadrant. From the time the radius roller encounters the concentric reach of the cam-lever, it offers no further resistance to the swing of the lifting-lever, so that the entire power of the spring aids the lever to raise the finger-bar and coupling-frame. Since the cam-lever ceases its movement when the radius-roller is upon its concentric-track, it no longer takes up its end of the spring and therefore, as the lifting-lever continues to swing back to its final position the power of the spring gradually diminishes, but this is compensated for by the more advantageous position into which the quadrant is brought by swinging the lifting-link in toward its pivotal-axis, or, in other words, the effective length of the weight-arm of the lifting-lever is shortened, while the power arm remains practically constant.

In the preferable construction indicated in the sixth figure of the drawings the action of the parts differs slightly from the foregoing, although the spring, as in the first, is normally under high tension, say sixty pounds, but at the normal this entire strain is not exerted to lift the shoe or finger-bar as at least fifty per cent. is neutralized by the oblique initial reach of the cam-lever, the degree of this neutralization depending upon the angle of this reach to the pivot of the radius-bar which is practically such as to produce about a balance of forces at the normal. When the lifting-lever is rocked to lift the finger-bar it pulls the radius-roller along said initial reach and rocks the cam-lever to the position indicated in dotted lines in said sixth figure when the roller enters the second or concave reach, which has now become concentric with the axis of the radius-bar. In the initial movement, while the radius-roller is traveling along the straight reach of the track, the cam-lever draws it on its end of the spring but the quadrant pays out at the other end at about the same speed so that there is no appreciable change in the tension of the spring. The first

movement depresses the chin of the gag-lever until the outer end of the finger-bar is sufficiently raised to permit contact between the nose of said lever and the ledge on the finger-bar sleeve when any further movement will lift the whole finger-bar. At this moment the neutralizing forces are removed by the passage of the radius-roller off of the straight or actuating track and upon the concentric track and the entire tension of the spring is exerted thereafter to aid the lifting-lever in raising the shoe, finger-bar and coupling-frame. Whenever the finger-bar falls into a depression the lifting-lever in the second construction (as in the first), will be rocked forward by the pull upon the lifting-link, allowing the radius-roller and the cam-lever to move in the same direction, yielding up some of the spring-tension at the cam-lever end, in this second construction, but at the same time taking up at the other end by means of the quadrant faster than the cam-lever pays out, so that the spring exerts a greater than the normal force to lift the finger-bar back to its former elevation.

Having thus described my invention, I desire it to be understood that I do not limit myself to the specific construction herein set forth, since it is obvious that various modifications may be introduced without departing from its principle. But

What I claim, and desire to secure by Letters Patent, is—

1. The combination substantially as hereinbefore set forth, with the finger-bar and coupling-frame, and with the lifting-lever, of a spring connected with the lifting-devices and normally under considerable tension, and means whereby the tension of said spring is abnormally increased or stored up in the initial lifting movement of the lifting-lever, and released in its further movement whereby it is caused to assist the lifting operation in the further movement of said lever.

2. The combination substantially as hereinbefore set forth, with the finger-bar and coupling-frame, of the lifting-segment, the spring connected with said segment and normally under considerable tension, to tend to lift the finger-bar and coupling-frame, the lifting-lever and intermediate connections between said lever and the spring, whereby the tension of the spring is abnormally increased in the initial lifting movement of the lever before the latter begins to act positively upon the coupling-frame.

3. The combination substantially as hereinbefore set forth, of the finger-bar, and coupling-frame, the lifting-segment, a lifting spring acting upon said segment to raise the finger-bar and coupling-frame, and intermediate connections between the segment and opposite end of the spring, whereby said end will be pulled away from the segment to increase the tension as the finger-bar is lifted.

4. The combination substantially as hereinbefore set forth, of the finger-bar, the coupling-frame, the lifting-segment, the spring connected to said segment, the cam-lever to which said spring is attached, and apparatus acting upon said cam-lever to stretch said spring and increase its tension as the finger-bar is lifted.

5. The combination substantially as hereinbefore set forth, of the finger-bar, the coupling-frame, the lifting-segment, a spring secured at one end to said segment, the cam-lever to which the other end of said spring is secured, the radius bar, the lifting-lever, and the link connecting said lifting-lever with the radius-bar.

6. The combination substantially as hereinbefore set forth, of the finger-bar, the coupling-frame, the gag-lever, the lifting-link and segment, the coiled spring attached to said segment, the lifting-lever, and intermediate connections between said lifting-lever and the opposite end of the spring, whereby its tension is abnormally increased in the initial lifting movement of said lifting-lever.

7. The combination substantially as hereinbefore set forth, of the finger-bar, the coupling-frame, the gag-lever, the lifting-link and segment, the spring secured to said segment at one end, the cam-lever to which the other end of said spring is secured, the stop for said cam-lever, a link from the lifting-lever connected with a roller traveling on the cam-lever and means controlling said roller to cause it to travel in the arc of a circle around the cam-lever.

8. The combination substantially as hereinbefore set forth, of the finger-bar and coupling-frame, the lifting-segment, the coiled spring attached to said segment, the cam-lever to which the other end of the spring is attached, provided with an initial oblique reach and a succeeding curved reach, the radius-bar, the lifting-lever, and the link connecting said lifting-lever with the radius bar.

9. The combination, substantially as hereinbefore set forth, with the floating coupling-frame and lifting apparatus in a mower, of a freely acting lifting spring normally under high tension, and means controlled by the lifting apparatus whereby a portion of said tension may be stored up and rendered ineffective in the initial movement of said apparatus and released in the positive lifting operation.

10. The combination substantially as hereinbefore set forth, with the finger-bar and coupling-frame, of the lifting-link and segment, the lifting-lever, the rack for said lever having an initial smooth reach, the spring secured at one end to the segment, the cam-lever to which the other end of the spring is secured, the radius-bar and the link connecting said radius-bar with the lifting-lever.

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