No. 662,605. Patented Nov. 27, 1900.

W. P. SMITH.

HARROW.

(No Model.) (Application filed Jan. 31, 1900.)

3 Sheets—Sheet 1.

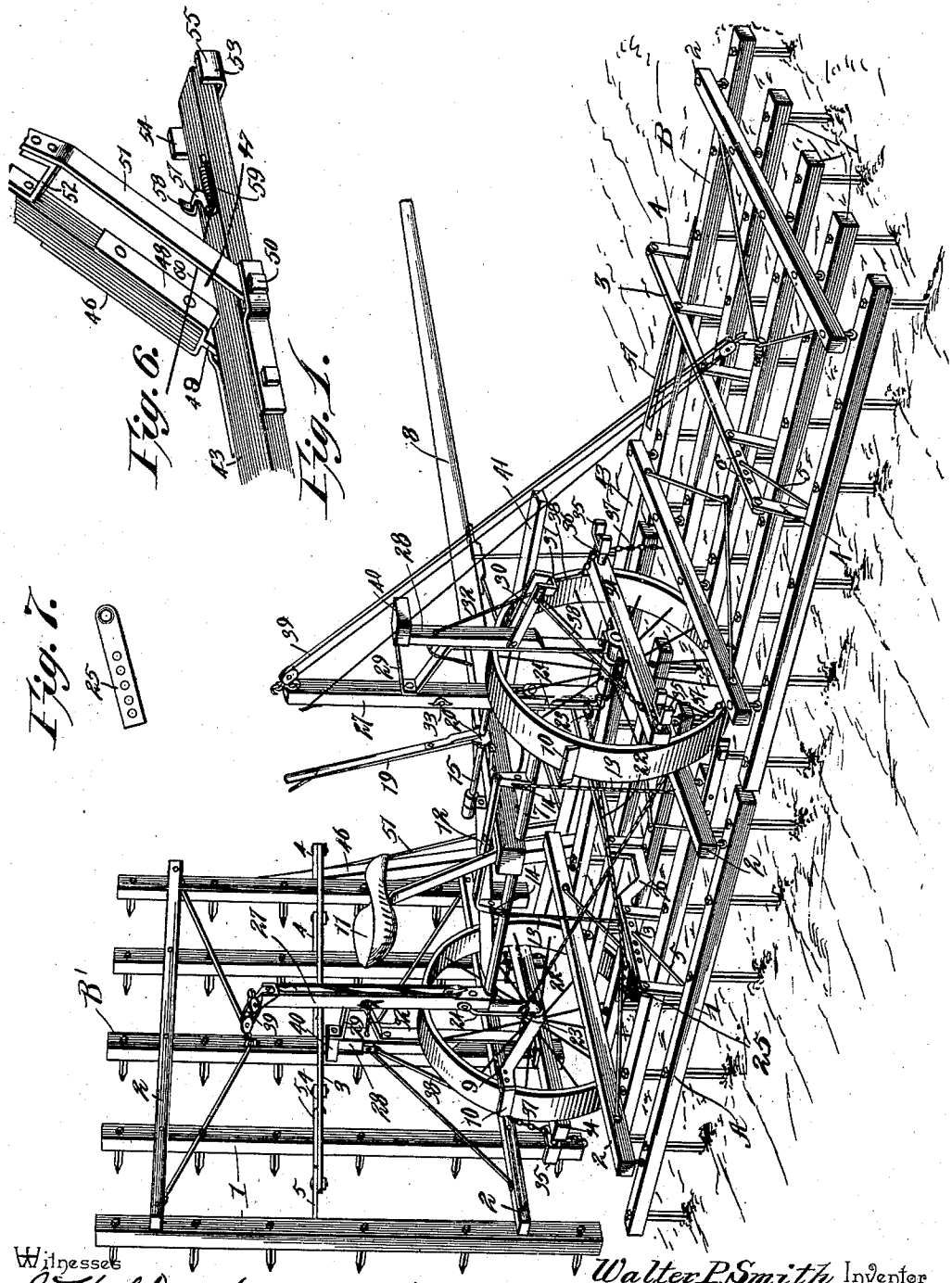


Fig. 6.

Fig. 1.

Fig. 7.

Witnesses
C. H. Walker
C. E. Shepard.

Walter P. Smith Inventor
By his Attorneys,
C. A. Snow & Co.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 662,605. Patented Nov. 27, 1900.

W. P. SMITH.

HARROW.

(No Model.) (Application filed Jan. 31, 1900.)

3 Sheets—Sheet 2.

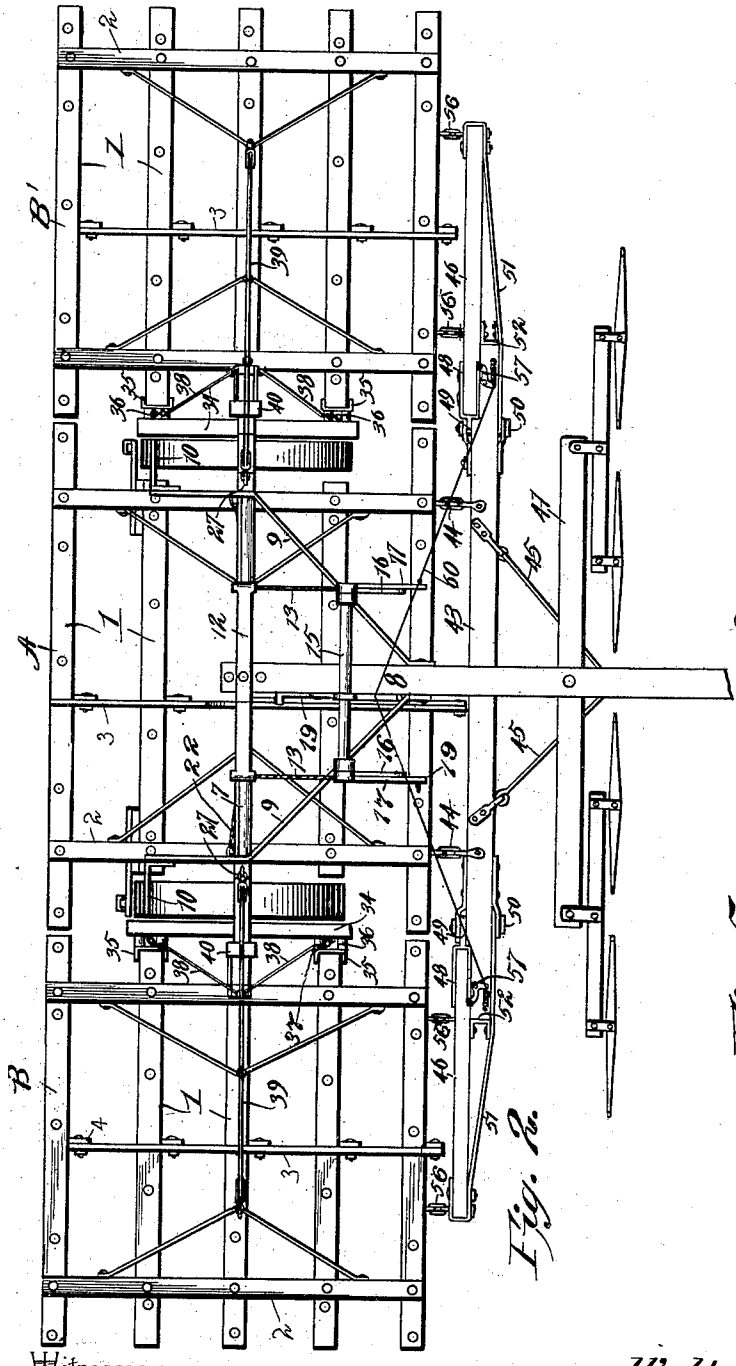


Fig. 2.

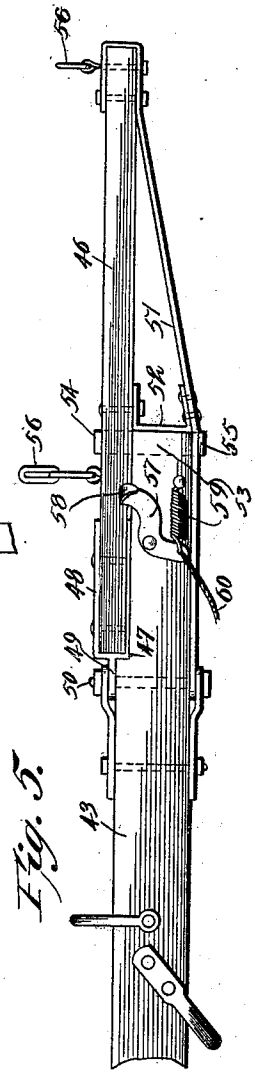


Fig. 3.

Witnesses
W. H. Walker.
C. F. Shepard.

Walter P. Smith Inventor
By his Attorneys,
Cushman & Co.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 662,605. Patented Nov. 27, 1900.

W. P. SMITH.

HARROW.

(No Model.) (Application filed Jan. 31, 1900.) 3 Sheets—Sheet 3.

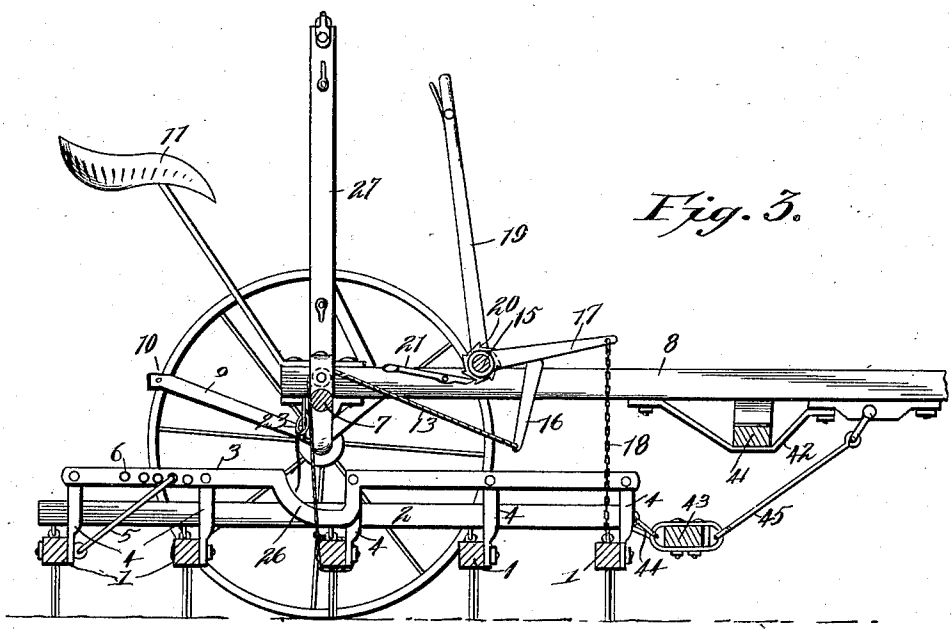


Fig. 3.

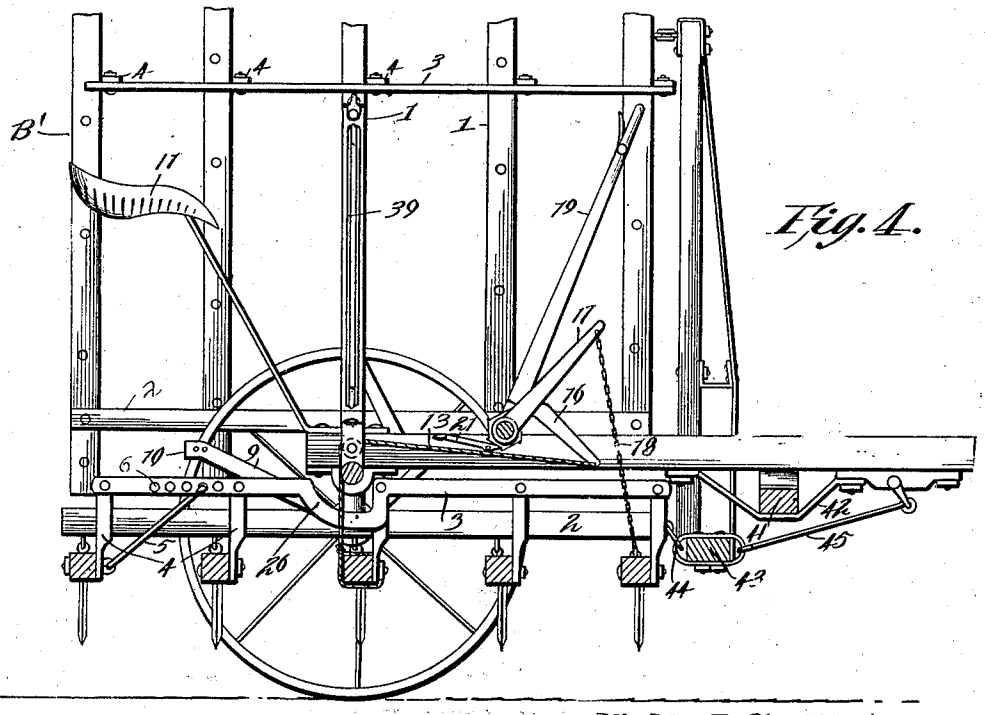


Fig. 4.

Witnesses
C. M. Walker.
F. P. Shepard.

Walter P. Smith Inventor
By his Attorneys,
C. A. Snow & Co.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

WALTER P. SMITH, OF CLARKSVILLE, IOWA.

HARROW.

SPECIFICATION forming part of Letters Patent No. 662,605, dated November 27, 1900.

Application filed January 31, 1900. Serial No. 3,495. (No model.)

To all whom it may concern:

Be it known that I, WALTER P. SMITH, a citizen of the United States, residing at Clarksville, in the county of Butler and State of Iowa, have invented a new and useful Harrow, of which the following is a specification.

This invention relates to harrows, and has for one object to improve the construction shown in my prior patent, No. 638,769, dated December 12, 1899, and also to provide an improved sectional device which may be conveniently folded, so that the machine may pass through a gateway and also may be raised from the ground when passing over roads and in other conditions when not required for use. It is also designed to provide for the maximum vertical play of the harrow-sections, so as to accommodate the latter to very uneven ground, and at the same time to preserve the strength and durability of the harrow.

A further object resides in providing improved means for elevating the central section and folding the end sections and to locate such means within convenient reach of the driver's seat, so that the operator may have the entire machine under complete control without leaving his seat, and, finally, it is designed to provide an improved draw-bar which is connected to each section, so as to insure an even draft, and is also arranged to fold with the end sections without interfering with the draft upon the entire harrow.

With these and other objects in view the present invention consists in the combination and arrangement of parts, as will be hereinafter more fully described, shown in the accompanying drawings, and particularly pointed out in the appended claims, it being understood that changes in the form, proportion, size, and minor details may be made within the scope of the claims without departing from the spirit or sacrificing any of the advantages of the invention.

In the drawings, Figure 1 is a perspective view looking at the rear of the improved harrow and showing one of the end sections in its elevated and folded position. Fig. 2 is a plan view showing all of the sections in position for use. Fig. 3 is a central sectional view from front to rear of the harrow and illustrating the means for elevating the central section. Fig. 4 is a similar view illustrating the elevated position of the central section and also the elevated and folded position of one of the end sections. Fig. 5 is a detail plan view of one end of the draw-bar and illustrating the foldable construction thereof. Fig. 6 is a detail perspective view showing the folded position of one end of the draw-bar. Fig. 7 is a detail view of the means for adjusting the brace for the central harrow-section.

Corresponding parts in the several figures of the drawings are designated by like characters of reference.

Referring to the accompanying drawings, it will be seen that the present harrow comprises three transversely-alined harrow-sections, of which the central section is designated by the letter A and the opposite end sections by the characters B and B', respectively. Each of these sections is constructed substantially as set forth in my prior patent, although they may be of any preferred form. As shown in the drawings, each section comprises a plurality of toothed beams 1, which are loosely suspended from the opposite cross-bars 2. In order that the teeth may be inclined at different angles by an oscillation of the beams, the latter are connected to an intermediate transverse rod 3, which is pivotally connected to each beam by means of a separate link 4, and this bar is held in its adjusted position by means of a pivotally-mounted hooked brace 5, which is carried by the rear beam and is designed to engage one of a series of perforations 6, formed in the rod 3. However, any other preferred means for adjusting the rod may be employed.

The central harrow-section A is supported upon the arched and wheeled axle 7, which is provided with the usual tongue 8, and the latter is supported by means of the opposite braces 9, each of which is connected to the adjacent outer end of the axle, and is extended to the rear of the adjacent wheel and is provided at its rear extremity with a suitable scraper 10 for cleaning the rim of the wheel. Supported upon the rear end of the tongue 8 is the driver's seat 11, and extending transversely across the tongue and immediately in front of the seat is an arched foot-

rest 12, which has its opposite ends supported upon the axle and at opposite sides of the tongue.

To elevate the central section, there are provided the opposite ropes 13, which are connected to the central beam of the section and extend upwardly and through the respective pulleys 14, which are mounted in the opposite ends of the arched foot-rest 12. Mounted transversely upon the tongue 8, located in advance of the foot-rest 12, and extending equally at opposite sides of the tongue is a rock-shaft 15, which is provided at each end with the angularly-related arms 16 and 17, respectively, which are located upon the forward side of the shaft and are disposed at substantially right angles to each other. The members of each pair of arms are located close together, as best illustrated in Fig. 2 of the drawings, and the arm 16 is in the form of a bell-crank, so as to be disposed at the forward side of the rock-shaft and at the same time not to interfere with the operation of the arm 17. However, the normally pendent arm 16 may form a part of the normally horizontal arm 17, as may be preferred. The forward end of each rope 13 is connected to the lower extremity of the adjacent arm 16, so that when the shaft 15 is rocked to throw the arm upwardly and forwardly the rope will be drawn upwardly through the pulley 14, and thereby elevate the central harrow-section. The forward end of each arm 17 is connected to the front beam of the central section by means of a chain or rope 18, so as to assist in the elevation of the section and to preserve the substantially horizontal position thereof.

In order that the shaft 15 may be conveniently rocked, there is provided a ratchet-lever 19, which is mounted upon the shaft at a point adjacent to one side of the tongue and designed for engagement with a ratchet-wheel 20, carried by the shaft. By this arrangement the operating-lever 19 is located in convenient reach from the driver's seat, so that the central section may be readily controlled by the operator. A suitable gravity pawl or detent 21 is mounted upon one side of the tongue and located intermediate of the rock-shaft and the foot-rest 12, so as to engage the ratchet-wheel 20 and also to be in convenient position to be raised by the foot of the driver when it is desired to free the rock-shaft.

When the central harrow-section is in its operative position, the ropes or flexible suspending connections 13 are slack, so as to provide for the maximum vertical play of the section, and thereby accommodate the latter to very uneven ground. It will thus be apparent that the section is loosely suspended from the axle and is free to swing laterally in opposite directions, and to prevent said section from engaging with the wheels, especially when the harrow is being turned, there are provided the crossed braces 22, which are preferably formed by wire cables. The outer end of each brace is provided with a ring or link 23, which loosely embraces an arched and vertically-disposed guide-rod 24, which is secured to the adjacent upright portion of the axle, and the opposite end of the brace is connected to a plate 25, which is secured to the intermediate beam of the central section and is provided with a plurality of perforations for adjustable engagement with a suitable fastening-bolt, so that the brace 22 may be conveniently tightened, as best illustrated in Fig. 7 of the drawings. By this arrangement the central section is prevented from swinging into engagement with the wheels, and the outer ends of the braces 22 are designed to slide vertically upon the guide-rods 24, so as to accommodate the braces to the movement of the section and also to the vertical adjustment thereof.

By reference to Figs. 3 and 4 of the drawings it will be seen that the adjusting-bar 3 of the central section is provided with an intermediate downwardly-bowed portion 26, which is designed to form a notch for the reception of the axle in the elevated position of the section, so that the latter may have the maximum degree of adjustment.

The means for folding each end section comprises an upright standard 27, located between the wheels and rising from the adjacent upright portion of the axle. A shorter and supplemental standard 28 rises from the outer end of the axle, exterior of the wheel, and is connected to the main standard by means of a suitable brace 29, located above the wheel. Pivoted at a point intermediate of the ends of the outer standard 28 is an arm 30, which comprises opposite parallel members that embrace the standard and are connected at their outer ends by means of a yoke-shaped stirrup 31, which is designed to embrace the standard in the elevated position of the arm. This arm is operated by means of a rope or other flexible connection 32, which extends upwardly from the outer end of the arm and passes loosely through an opening in the standard, so as to be in position for convenient operation from the driver's seat. To hold the arm in its elevated position, a suitable cleat 33 is provided upon the rear side of the main standard 27 and with which cleat the rope 32 is designed to be engaged.

Fixed to the outer end of the axle and exteriorly of the wheel is a cross-bar 34, which extends in a direction front and rear of the harrow. At each end of this cross-bar there is provided a substantially U-shaped bracket 35, which extends laterally outward from the cross-bar, and the shank of the bracket is provided with a vertically-disposed opening 36, which is disposed between the inner end of the bracket and the outer side of the cross-bar. Extending loosely through each of these guide-openings is a chain or other flexible connection 37, which has its lower end con-

nected to the inner end of one of the beams of the adjacent end section and the upper end being connected to a rod 38, which has its upper end connected to the outer end of the arm 30. Extending from the upper end of the main standard 27 and downwardly to the adjacent outer section is a suitable block and tackle 39 for raising the outer end of the section when the latter is to be folded.

From the foregoing description it will be apparent that each outer section is held in place by means of its respective block and tackle and chains 37, while at the same time the section is free to move vertically, so as to accommodate itself to uneven ground. However, there is no connection whatsoever between the harrow-sections, so that each of the latter is independent of the other, and therefore may be adjusted individually. As there is no connection between the contiguous ends of the adjacent sections, there is no danger of the latter binding upon each other during the adjusting operation.

When it is desired to elevate and fold one of the end sections, as shown in Figs. 1 and 4 of the drawings, the flexible connection 32 is operated to swing the arm 30 upwardly, and thereby raise the inner end of the section, after which the block and tackle is operated to swing upwardly and inwardly the outer end of the section, whereby the latter is both elevated and folded inwardly. In the folded position of the section, as best shown in Fig. 1 of the drawings, the beams to which the chains 37 are connected are received within the respective brackets 35, so as to effectually brace the section against accidental movement in a direction front and rear of the device. When folded, the intermediate beam of the section is designed to rest against the block or head 40, which is provided upon the upper end of the outer standard 28, so as to form an additional brace for the section.

The doubletree 41 is mounted beneath the tongue or pole 8 and is supported by means of a suitable bracket 42, which is pendent from the under side of the tongue, so as to place the draft as low as possible, and thereby relieve strain from the draft-animals. Located in rear of the doubletree and also below the latter is the main draw-bar 43, which is connected to the central section by means of suitable hooks or links 44 and to the tongue or pole by means of the draft-rods 45.

At each end of the draw-bar there is provided a supplemental foldable bar 46, the inner end of which is received within a notch 47, formed in the rear side of the main draw-bar. The inner end of the foldable bar is provided with a metallic cap 48, which has a perforate ear 49 for engagement with a transverse pivot-bolt 50, which extends through the main draw-bar. Secured to the front side of the outer end of the foldable bar is an inclined brace-rod 51, which extends inwardly across the front face of the main draw-bar and is pivotally connected to the forward end of the bolt 50. Extending between the brace 51 and the foldable bar is a transverse brace 52, which forms a shoulder for engagement with the adjacent outer end of the draw-bar. At the outer end of the draw-bar is a metal strap 53, which extends rearwardly across the lower side of the notched portion of the draw-bar, so as to form a seat, which normally supports the foldable bar in its operative position, and the rear end of this seat is provided with an upwardly-directed shoulder 54 for engagement with the rear side of the foldable bar, so as to hold the latter in place. This strap 53 also extends in advance of the front edge of the draw-bar and is provided with an upstanding lug or shoulder 55 to receive the brace-rod 51 between the draw-bar and the shoulder when the foldable bar is in its normal or extended position. The foldable bar is connected to the adjacent outer harrow-section by means of the links or hooks 56, so as to have a flexible connection with the section. When either of the outer sections is folded, the adjacent foldable bar 46 will also fold upwardly upon its pivotal connection with the main draw-bar and without interfering with the draft upon the main draw-bar.

In order that the foldable bars may not be accidentally moved upwardly by the movement of the harrow, I have provided each bar with a lock in the form of a bell-crank latch 57, which is pivoted to the upper side of the main draw-bar intermediate of the outer end of the latter and the pivotal connection of the foldable bar and designed to work transversely of the latter. The rear end of the latch overhangs the front edge of the foldable bar and is provided with an upstanding and forwardly beveled or inclined catch-head 58. At the forward end of the latch there is provided a coiled spring 59, having one end connected to the adjacent end of the latch and its opposite end connected to the main draw-bar, so that the catch end of the latch is normally held across and in engagement with the upper side of the foldable bar, whereby the latter is prevented from being accidentally turned upwardly by the movement of the harrow. To release the latch when it is desired to fold either end section, there is provided a rope or other flexible connection 60, which has one end connected to the forward end of the bell-crank latch, and the opposite end thereof is located in convenient reach of the driver, so that he may pull the rope to release the latch from engagement with the foldable bar, whereby the latter is free to be folded. When the section is again extended to its normal position, the foldable bar will engage against the inclined or beveled catch-head of the latch, so as to automatically swing the latter aside and permit of the bar being again seated upon the strap 53.

Having described the invention, I claim—

1. In a harrow, the combination with a

wheeled support, and a vertically-movable harrow-section, of a rock-shaft mounted upon the support, arms carried by the rock-shaft, radiating therefrom, and arranged in different planes, which are angularly disposed one with the other, flexible suspending connections between the respective arms and the harrow-section, and means for operating the rock-shaft.

2. In a harrow, the combination with a wheeled support, and a harrow-section, of pulleys mounted upon the support, a rock-shaft, also mounted upon the support, and in advance of the pulleys, forwardly-extending arms, and downwardly-extending arms, both of which are carried by the rock-shaft, flexible connections applied to the harrow, passing over the pulleys, and connected to the respective downwardly-extending arms, other flexible connections between the forwardly-extending arms and the harrow, a ratchet device for the rock-shaft, and means for operating the latter, to elevate the arms.

3. In a harrow, the combination with a wheeled axle, having a tongue, and a harrow-section, of an arched foot-rest, extending transversely of the tongue, and having its opposite ends supported upon the axle, pulleys mounted upon the opposite ends of the foot-rest, a rock-shaft mounted upon the tongue, located in advance of the foot-rest, and also projecting at opposite sides of the tongue, a ratchet-wheel provided upon the rock-shaft, a ratchet-lever for the ratchet-wheel, a ratchet-detent mounted upon the tongue, and located adjacent to the foot-rest, angularly-disposed arms provided at each end of the rock-shaft, flexible connections applied to the harrow-section, passed over respective pulleys, and connected to respective arms, and other flexible connections between some of the arms and the harrow-section.

4. In a harrow, the combination with a wheeled support, of a harrow-section loosely suspended from the support, vertically-disposed guides provided upon the support, and braces connected to the harrow-section and also slidably connected to the respective guides.

5. In a harrow, the combination with a wheeled support, of a harrow-section, loosely suspended from the support, vertically-disposed guides, provided upon the support, and braces connected to opposite sides of the harrow-section, extending transversely in opposite directions across the latter, and slidably connected to the respective guides.

6. In a harrow, the combination with a wheeled support, of a harrow-section, loosely suspended therefrom, vertically-disposed arched guide-rods provided at opposite sides of the support, and crossed braces connected to opposite sides of the harrow-section, the free end of each brace being provided with a link or ring, slidably engaging the respective guide-rod.

7. In a harrow, the combination with a wheeled support, and a harrow-section located outwardly from the support, of a vertically-movable arm pivoted to the support, means for raising the arm, a connection between said arm and the inner end of the harrow-section, and means for swinging upwardly and inwardly the outer end of the harrow-section.

8. In a harrow, the combination with a wheeled support, and an outer harrow-section, of means for elevating the inner end of the section, and means for swinging upwardly and inwardly the outer end of the section.

9. In a harrow, the combination with a wheeled support, and an outer harrow-section, of a standard, carried by the support, a vertically-movable arm pivoted to the standard, opposite flexible connections between the arm and the inner end of the harrow-section, opposite guides, carried by the support, and receiving the respective flexible connections, means for raising the pivotal arm, and means for elevating the outer end of the harrow-section.

10. In a harrow, the combination with a wheeled axle, of an outer harrow-section, a standard carried by the axle, an arm pivoted to move vertically upon the standard, means for raising the arm, opposite flexible connections between the arm and the inner end of the harrow-section, a bar supported upon the axle, and extending in a direction front and rear of the device, guides provided at opposite ends of the bar, and receiving the respective flexible connections, and means for elevating the outer end of the harrow-section.

11. In a harrow, the combination with a wheeled support, of an outer harrow-section, a standard carried by the support, an arm pivoted to the standard, and comprising opposite members embracing the standard, and a stirrup at the outer end of the arm, means for raising the arm, a flexible connection between the outer end of the arm and the inner end of the harrow-section, and means for elevating the outer end of the harrow-section.

12. In a harrow, the combination with a wheeled support, of an outer harrow-section, having a flexible connection with the support, and also having longitudinal toothed beams, means for elevating the outer end of the section, and brackets carried by the support, and to receive respective toothed beams, in the upright position of the harrow-section.

13. In a harrow, the combination with a wheeled support, of a harrow-section comprising toothed beams, means for elevating the outer end of the section, and opposite forked brackets carried by the support, and to engage respective toothed beams, in the upright position of the harrow-section.

14. In a harrow, the combination with a wheeled axle, of an outer harrow-section, comprising toothed beams, a bar carried by the outer end of the axle, and extending in front

and rear thereof, forked brackets, carried at the opposite ends of the bar, and means for elevating the outer end of the harrow-section, the brackets receiving respective toothed beams, in the upright position of the harrow-section.

15. In a harrow, the combination with a wheeled axle, of an outer harrow-section, a standard rising from the outer end of the axle, a bar also carried by the outer end of the axle, and extending in front and rear thereof, brackets provided at opposite ends of the bar, and having guide-openings therein, an arm located above the bar, and pivoted to the standard, means for elevating the pivotal arm, flexible connections between the arm and the inner end of the harrow-section, said connections passing through the guide-openings of the respective brackets, and means for elevating the outer end of the harrow-section, the latter being engaged by the brackets, in the upright position of the section.

16. In a harrow, the combination with a wheeled support, and a vertically-foldable harrow-section, of a fixed draw-bar, and a movable draw-bar, connected to the foldable section, and pivoted to swing vertically upon the main draw-bar, and means for rigidly connecting the draw-bar sections in the normal positions thereof.

17. In a harrow, the combination with a wheeled support, and a vertically-foldable harrow-section, of a fixed main draw-bar, and a foldable draw-bar, connected to the foldable harrow-section, said foldable bar being located at one side of the main bar, and having a brace located at the opposite side thereof, and a common pivot-bolt connecting the foldable bar and the brace with the main draw-bar.

18. In a harrow, the combination with a wheeled support, and a vertically-foldable harrow-section, of a fixed main draw-bar, a foldable draw-bar pivoted to the main bar, and also connected to the foldable harrow-section, and a seat carried by the main bar, and supporting the foldable bar, in the normal position thereof.

19. In a harrow, the combination with a wheeled support, and a vertically-foldable harrow-section, of a main draw-bar, a foldable draw-bar, connected to the harrow-section, and also pivoted to move vertically upon the main draw-bar, and a seat extending transversely from the main draw-bar, and supporting the foldable bar in its normal position, and having a shoulder for engagement with the outer side of the foldable bar.

20. In a harrow, the combination with a wheeled support, and a vertically-foldable harrow-section, of a main draw-bar, a foldable draw-bar connected to the foldable section and pivoted to the main draw-bar, and a latch to prevent accidental folding of the foldable draw-bar.

21. In a harrow, the combination with a wheeled support, and a vertically-foldable harrow-section, of a main draw-bar, a foldable draw-bar connected to the foldable section and pivoted to the main draw-bar, and a bell-crank latch mounted upon the main draw-bar and engaging the foldable draw-bar, and means for operating the latch.

22. In a harrow, the combination with a wheeled support, and a vertically-foldable harrow-section, of a main draw-bar, a foldable draw-bar connected to the foldable section and pivoted to the main draw-bar, and a spring-actuated bell-crank latch mounted upon the main draw-bar, and having a beveled or inclined catch-head engaging the upper side of the foldable bar, and means for operating the latch.

23. In a harrow, the combination with a wheeled support, and a vertically-foldable harrow-section, of a main draw-bar, a foldable draw-bar connected to the foldable section and also pivoted to the main draw-bar, and a spring-actuated latch, having an upwardly and forwardly inclined catch-head normally engaging the foldable draw-bar to lock the same, and located in the path of its downward movement for automatic operation thereby.

24. In a harrow, the combination with a wheeled support, and a vertically-foldable harrow-section, of a fixed draw-bar, and a movable draw-bar connected to the foldable section, pivoted to swing vertically upon the main draw-bar, and provided with a lateral shoulder to abut against the adjacent outer end of the fixed draw-bar.

25. In a harrow, the combination with a wheeled support, and a vertically-foldable harrow-section, of a fixed draw-bar, having a longitudinal notch or recess formed in the rear side thereof and extending outwardly through its outer end, and a movable draw-bar connected to the harrow-section, and also pivotally connected to the rear side of the fixed draw-bar, to fit within the notch or recess in the normal positions of the draw-bar sections.

26. The combination with a wheeled support, and a vertically-foldable harrow-section, of a fixed draw-bar, and a movable draw-bar connected to the foldable harrow-section, and also pivotally connected to one side of the fixed draw-bar, and having a longitudinal brace pivoted to the opposite side of said fixed draw-bar, and a transverse brace between the movable draw-bar and the longitudinal brace, to abut against the adjacent end of the fixed draw-bar, in the normal positions of the draw-bar sections.

27. In a harrow, the combination with a wheeled support, and a vertically-foldable harrow-section, of a fixed draw-bar, a strap or bar projecting transversely in opposite directions at opposite sides of the fixed draw-bar, and provided at its opposite ends with upstanding shoulders to form opposite seats,

and a movable draw-bar pivoted to one side of the fixed draw-bar and adapted to be supported by the adjacent seat, and provided with a longitudinal brace pivoted to the opposite side of the fixed draw-bar and adapted to be supported in the adjacent seat, and a transverse brace between the movable draw-bar and the longitudinal brace, to form a shoulder to abut against the adjacent outer end of the fixed draw-bar, in the normal positions of the draw-bar sections.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

WALTER P. SMITH.

Witnesses:
HARLOW T. BOUTON,
A. B. CRIPPEN.