(No Model.) 3 Sheets—Sheet 1.

W. M. BRINKERHOFF, L. W. STEVENS, L. D. SWART, A. W. STEVENS & A. M. NYE.

HARROW.

No. 428,329. Patented May 20, 1890.

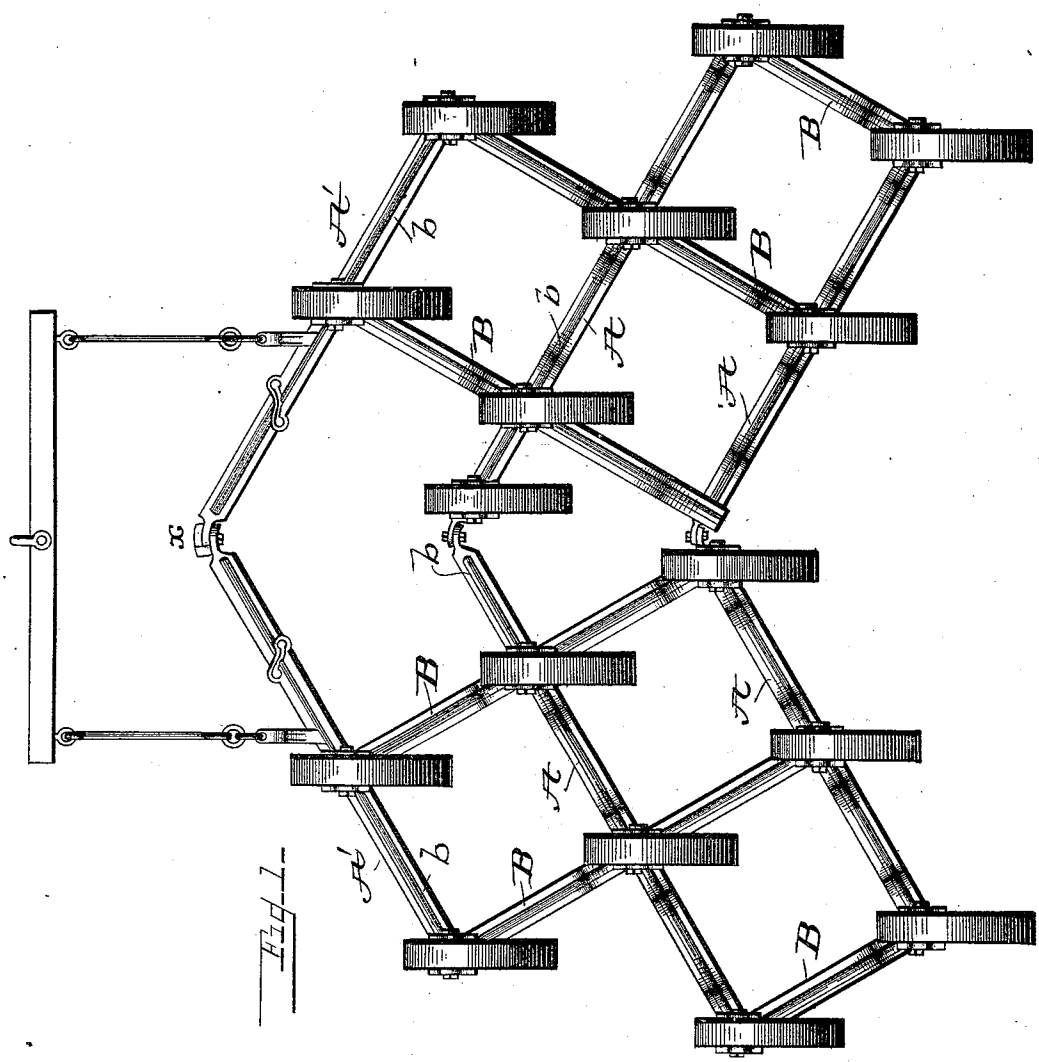

Fig. 1.

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Fig. 5.

Fig. 2.

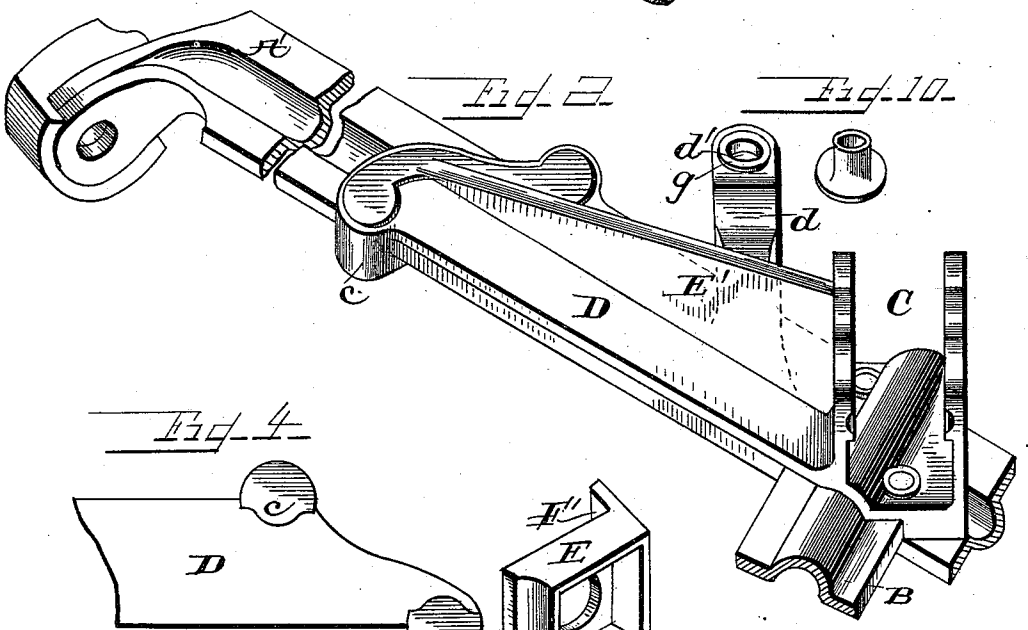
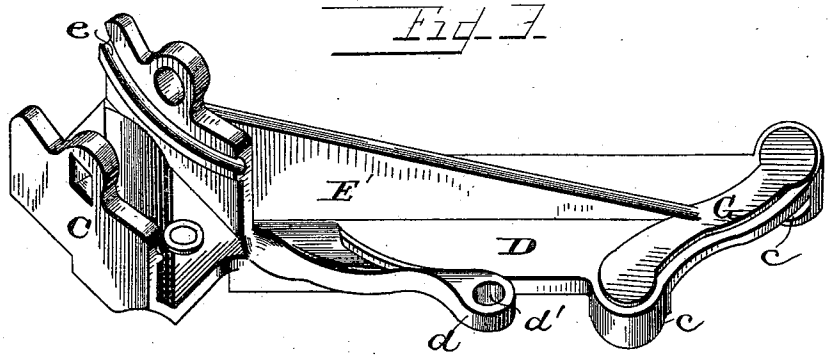


Fig. 10.

Fig. 4.

Fig. 11.

Fig. 3.



Witnesses

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Fig. 6.

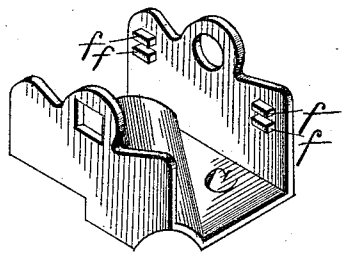


Fig. 7.

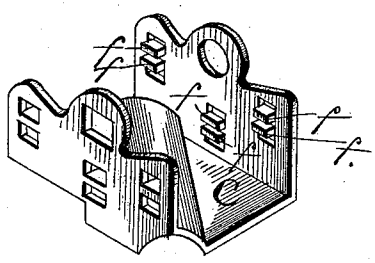


Fig. 8.

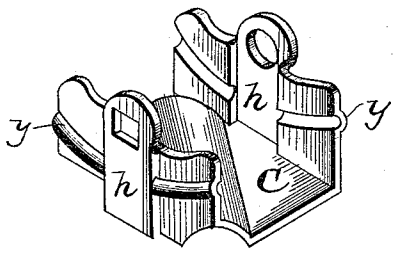
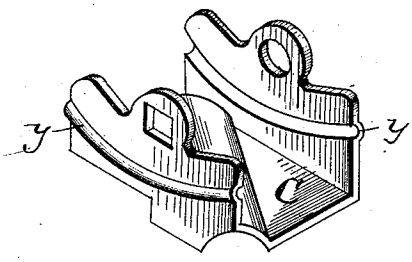


Fig. 9.



Witnesses

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UNITED STATES PATENT OFFICE.

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HARROW.

SPECIFICATION forming part of Letters Patent No. 428,329, dated May 20, 1890.

Application filed January 17, 1890. Serial No. 337,235. (No model.)

To all whom it may concern:

Be it known that we, WARREN M. BRINKERHOFF, LE ROY W. STEVENS, LESTER D. SWART, ABRAM W. STEVENS, and ALBERT M. NYE, citizens of the United States, residing at Auburn, in the county of Cayuga and State of New York, have invented certain new and useful Improvements in Harrows; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

Our invention relates to harrows; and it consists of the certain novel features of construction of the same fully disclosed in the following specification and claims, reference being had to the accompanying drawings.

The main objects of our invention are to provide a construction by means of which the harrow may be folded and made to occupy a small space when out of use, or for purposes of packing, and to provide an attachment for the front draft-bar which acts to strengthen the bar.

Other objects which we have in view are to provide a tooth-clip which will avoid the necessity of having the curved seat ordinarily employed in this class of harrows, and to form a guard for the bolts and hinges used to connect the parts of the harrow.

In the drawings, Figure 1 is a plan view of a harrow with our improvement. Fig. 2 is a perspective view showing a draft-bar provided with the clip attachment. Fig. 3 is a perspective view of our clip attachment. Fig. 4 shows a portion of the under side of the same. Fig. 5 represents an inner extremity of one of the draft-bars. Figs. 6, 7, 8, and 9 are perspective views of different forms of tooth-clips. Fig. 10 represents a bushing or lining which may be used in connection with the eye, provided in the part adapted to engage the draft attachments. Fig. 11 is a view of the guard for the hinge-joint and bolt-head.

Similar letters indicate identical parts throughout the drawings.

The frame of the harrow is composed of the intersecting ribbed draft-bars A A and cross-bars B B, and is preferably made in two parts, which are hinged together, as hereinafter described. The bars, as shown in the drawings, are constructed with the ribbed portion *b* upon their inner surface, thus leaving the concave surface upon the under side. The concave faces of the inner ends of the draft-bars are then pressed together, furnishing a double thickness, and are bent downwardly, as shown in Fig. 5, to form a hinge-joint. By this construction a very desirable form of hinge is obtained, and the ends of the bars being bent downward and the teeth located in proper relation to each other the parts when folded bring the bars in the respective parts close together and thus greatly lessen the space ordinarily occupied by the harrow.

In practice it has been found that the bolts and hinges connecting the parts of the harrow wear away very rapidly, and in order to avoid this and to protect these parts we employ the device shown in Fig. 11, and which may be termed a "guard." This guard consists of a device of any suitable material, but which is preferably of malleable iron, formed substantially as shown in the drawings. It is composed of a main portion E, having an opening through it for the passage of a bolt, and is provided with recesses F' F^2 for the reception of the forward ends of the draft-bars which form the hinge and for the head of the bolt, respectively. By this construction the wear on the head of the bolt and on the knuckles of the hinge is much reduced. The mode of attaching the guard to the harrow is shown at X, Fig. 1.

The front draft-bar A′ is straight, and is provided with our improved strengthening device. This device is preferably constructed as shown in Figs. 2, 3, and 4, and consists of the clip C, which may be of any of the forms shown in the drawings, having a laterally-extending arm O projecting therefrom and being provided with a re-enforcing flange E′. The outer extremity of the arm O is provided with a portion G, which is of greater breadth than the width of the bar to which it is secured, and is preferably of the form shown in

the drawings. The under side of the broad portion of the arm is provided with lugs *c*, which, when in position, project over the under surface of the bar. These lugs are placed at a distance apart which is greater than the width of the bars, but are so located that when the clip is in position the lugs will engage and clamp the edges of the bars, as shown in Fig. 2. There is also attached to the arm O, preferably integrally, the projection *d*, provided with an eye *d'*, for engaging the draft attachments.

In order to preserve the part *d*, we may provide the eye *d'* with a bushing or lining *g* of suitable material.

Instead of making the parts integral, as described, it is obvious that they may be made separate and joined in any desirable manner.

Instead of the tooth-clip C, provided with the curved seat *e e*, as represented in Fig. 3, we may, if we prefer, use the forms of clips shown in Figs. 6, 7, 8, and 9. The clips shown in Figs. 6 and 7 are provided with inward projections *f f*, so located and arranged as to form a seat for the tooth, and having its sides provided one with a square and the other with a circular opening for the reception of a bolt, the shank of which is held from turning by the sides of the square opening.

The clip shown in Fig. 7 is preferably made of sheet metal and the inward projections *f f* are formed by punching and bending portions of the sides so as to engage the tooth.

The forms of clip shown in Figs. 8 and 9 are also constructed, preferably, of sheet metal, and portions of the sides of the clip are pressed outward to form grooves *y*, which engage the tooth. The form represented in Fig. 8 is provided near its central portion with a vertically-extending part *h*, forming a seat for the bolt-head or nut. This part of the wall extends outward far enough to allow the tooth to rest in the grooves *y* on either side thereof.

To place the clip and strengthening device in position, the broad part G of the arm D is placed upon the bar A', at right angles to the same, and as the lugs *c* are a greater distance apart than the width of the bar they will drop below the bar, the tooth-clip at this time being out of position. The clip is then moved into place, which brings the part G into an oblique position, as shown in the drawings, when the lugs will clamp the edges of the bar and be firmly held in place. The clip is then secured by rivets or other suitable devices.

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

1. A harrow-frame consisting of two or more parts movably connected and composed of draft and cross bars, the front draft-bar being provided with a strengthening device whose main body lies parallel with the bar and which is re-enforced intermediate its ends against upward and downward strains, said strengthening device being secured at or near its forward end to the bar, substantially as described.

2. A harrow-frame consisting of two or more parts movably connected and composed of draft and cross bars, the front draft-bar being provided with a strengthening device located on top of the bar, whose main body lies parallel with the bar, and which is re-enforced intermediate its ends against upward and downward strains, said strengthening device being secured at or near its forward end to the bar, substantially as described.

3. A harrow-frame consisting of two or more parts movably connected together and composed of intersecting draft and cross bars, the front draft-bar being elongated in horizontal cross-section, and provided with a combined tooth-clip and strengthening device formed integral with said clip, substantially as described.

4. A harrow-frame consisting of two or more parts composed of intersecting draft and cross bars, the inner ends of the said draft-bars of the respective parts being curved downwardly and connected by means of bolts and nuts provided with guards, substantially as described.

5. A harrow-frame consisting of two or more parts composed of cross-bars and corrugated intersecting draft-bars, the inner faces of the corrugations of the adjacent ends of said draft-bars of the respective parts being bent downwardly and pressed together and the said ends movably connected, substantially as described.

6. In a harrow-frame, an arm secured at one end adjacent to the intersection of the bars, and extending therefrom parallel with the bars, and provided with an additional attaching construction integral therewith, substantially as described.

7. A clip for a harrow-tooth, provided with tooth-engaging portions stamped or pressed from the surface of the walls of said clip, substantially as described.

8. In a harrow-frame, a clip and a laterally-projecting arm engaging a bar of the frame by means of lugs, substantially as described.

9. In a harrow-frame, an arm secured at one end adjacent to the intersection of the bars, and extending therefom parallel with the bar, and being provided with an additional engaging construction, consisting of lugs extending downwardly and inwardly and engaging the edges of said bar, substantially as described.

10. A strengthening device for harrow-frame bars, consisting of an arm which extends along the bar and is provided with lugs or projecting parts having a greater space between them than the width of the bar, but adapted to engage opposite sides of the bar when placed in alignment therewith, substantially as described.

11. A clip for a harrow-tooth, having a laterally-projecting arm extending therefrom, said arm forward of its clip-engaging portion

being provided with a construction for rigidly engaging a harrow-frame bar and preventing the separation of the arm and bar, substantially as described.

12. A clip for a harrow, the tooth-engaging parts of which are formed by outwardly-extending portions of the side walls of the clip, the said clip being provided with a seat for a bolt-head or nut intermediate the ends of the said outwardly-extending portion, substantially as described.

In testimony whereof we affix our signatures in presence of two witnesses.

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LE ROY W. STEVENS.
LESTER D. SWART.
ABRAM W. STEVENS.
ALBERT M. NYE.

Witnesses:
WALTER A. NYE,
E. H. HERRLING.