(No Model.)

C. LA DOW.

HARROW.

No. 501,886. Patented July 18, 1893.

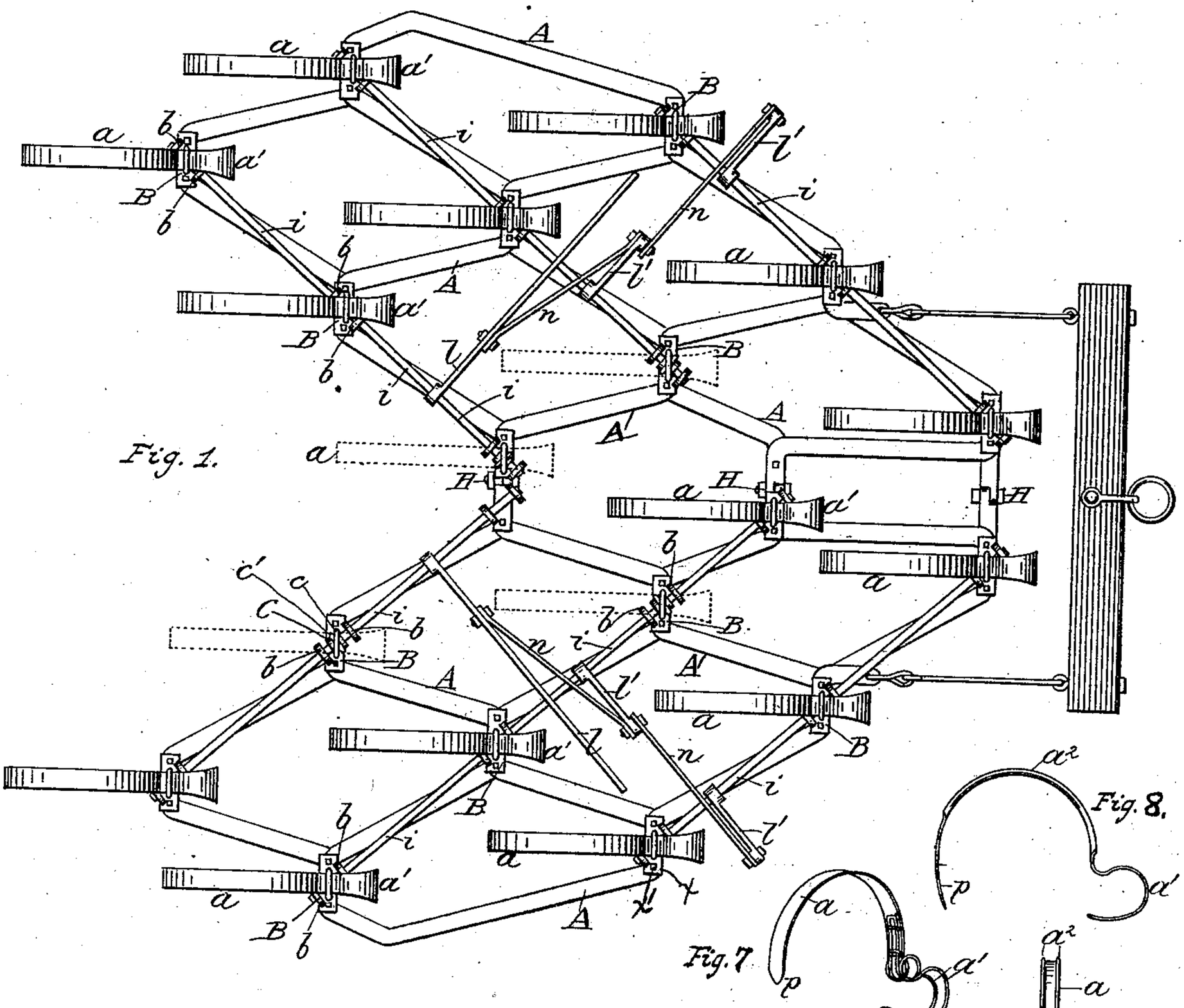

Fig. 1.

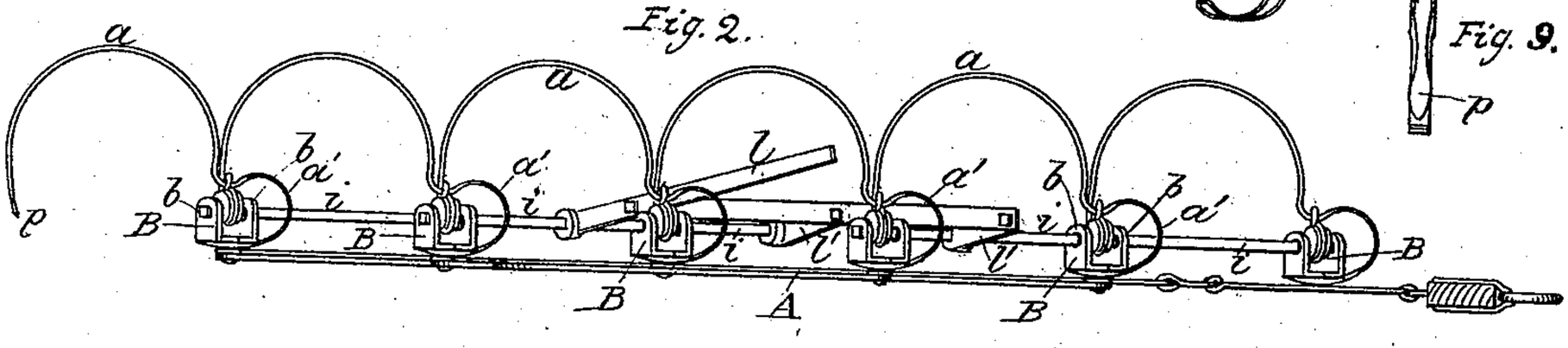

Fig. 2.

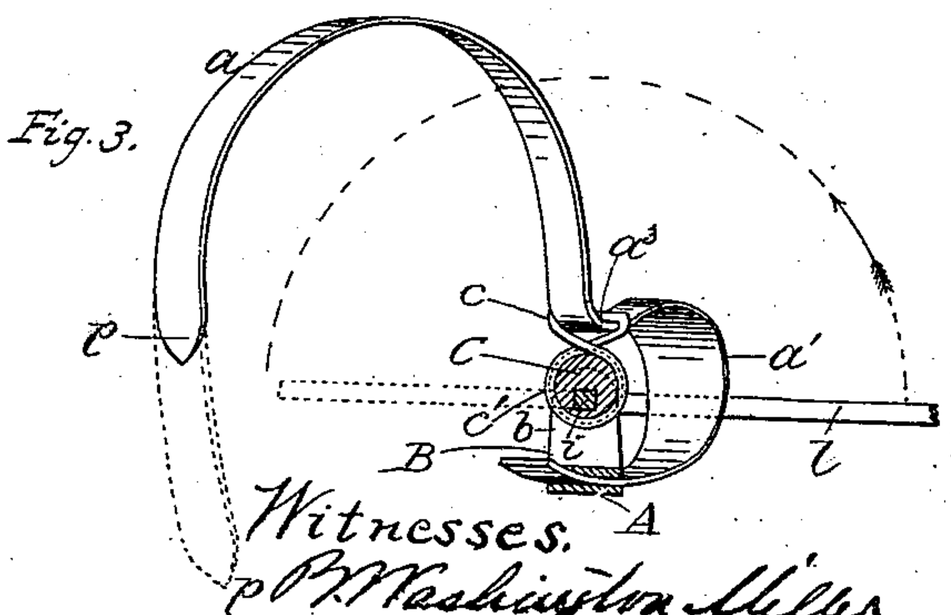

Fig. 3.

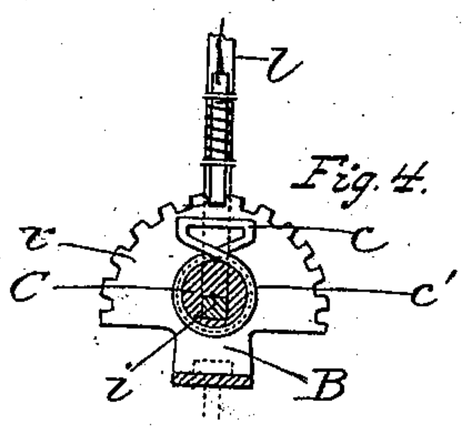

Fig. 4.

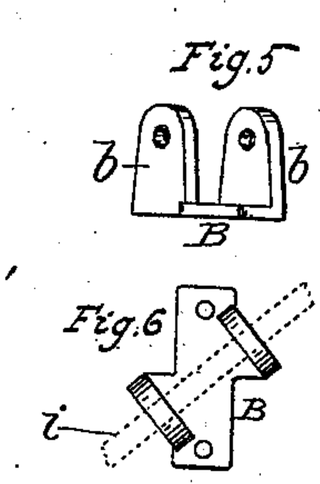

Fig. 5

Fig. 6

Fig. 7.

Fig. 8.

Fig. 9.

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UNITED STATES PATENT OFFICE.

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HARROW.

SPECIFICATION forming part of Letters Patent No. 501,886, dated July 18, 1893.

Application filed September 8, 1891. Serial No. 405,089. (No model.)

To all whom it may concern:

Be it known that I, CHARLES LA DOW, a citizen of the United States, residing at Albany, in the county of Albany and State of New York, have invented certain new and useful Improvements in Harrows, of which the following is a specification.

My invention relates particularly to that class of harrows in which spring teeth are employed to stir the soil, but my improvements are applicable to machines of different kinds and employed for other purposes.

In applying my invention to a spring tooth harrow, I preferably employ curved teeth of the Garver type mounted on a rigid frame provided with a series of tooth-bearing portions, each of which carries a single tooth, and the frame bars radiate from the tooth-bearing portions to brace the supports of the teeth.

In this class of harrows, in order to vary the pitch or depth of cut of the teeth, it has heretofore been necessary to loosen the bolts which clamp the teeth and frame together, and to adjust each tooth separately. This operation requires considerable time, and involves the use of tools. It is also difficult to set all the teeth to work uniformly and penetrate the soil to the same extent.

The primary object of my invention is to provide means for adjusting the teeth to vary their pitch, or the position of their points, without loosening their attachment to the frame. Harrows have, of course, been provided with means for adjusting the pitch of all the teeth, but, so far as I am aware, no means have been heretofore provided for adjusting the teeth without the use of hinges, or without unfastening the teeth relatively to their frame. In my Patent No. 494,538, of March 28, 1893, I have shown and described a spring tooth harrow of the modern type, and have claimed broadly means for adjusting the teeth in this class of harrows. In that case the teeth were adjusted by moving one part of the frame relatively to the other, two duplicate frames being employed, connected by links and adjusted by lever mechanism. In the present case, the frame and teeth are secured together rigidly, and in order to adjust the teeth to vary their pitch or depth of cut, I do not move the frame, or any part thereof, or move the teeth relatively to the frame, but provide means for adjusting the teeth by springing them from one position to another, the teeth being held under tension in one position, and when this tension is released by their own resiliency, moved to another.

In the accompanying drawings, illustrating one way of carrying out my invention, Figure 1 is a plan view of a complete spring tooth harrow of the modern type, with my improvements applied. Fig. 2 is a side elevation thereof. Fig. 3 is a detail view on an enlarged scale, showing the manner of connecting a tooth to the frame. Fig. 4 is a detail view of adjusting mechanism, which may be employed. Figs. 5 and 6 are views of one of the brackets forming part of the tooth-adjusting mechanism. Figs. 7, 8 and 9 are detail views of teeth having modified constructions.

The frame shown in the drawings is of the same general construction as that shown in my Patent No. 455,260, of June 30, 1891, and is of a general butterfly, A, or heart-shape. The frame bars A A′, are arranged diagonally across the line of draft, and the teeth *a*, are arranged in diagonal series in order that they may more readily drop weeds and rubbish, as the implement proceeds.

As shown, the frame is made in two sections hinged together at H, and each section has a series of tooth-bearing portions, steps or offsets *x*, each of which carries a single tooth. The offsets of the bars A, overlap those of the bars A′, and the shanks of the teeth are clamped between the offsets of different bars and held by bolts *x*′. The arrangement is such that each tooth-bearing portion of the frame is braced by the frame bars which radiate in different directions from it, and each tooth, (except those at the rear of the machine,) works in its own individual opening in the frame, which is substantially diamond-shaped. The utility of this arrangement is that when the teeth are adjusted in the manner hereinafter explained, they are more effectively freed from weeds, rubbish, &c., by the frame bars, each tooth being inclosed by frame bars and thus separated from all the others. Weeds will not get tangled

up between two or more teeth, as would be the case if a plurality of teeth were arranged in close proximity and worked in the same openings.

Of course I am aware that it is common to arrange the teeth and frame in this general way. Numerous patents heretofore granted show it; but this arrangement is especially advantageous when devices are employed for simultaneously adjusting all the teeth to clear them of rubbish. This feature is claimed more broadly in my application above mentioned, but it is also claimed in connection with my present improvements. In the present case, the teeth are held down to their work under tension, and by simultaneously releasing the tension of all the teeth, they simultaneously spring up either above the frame to clear themselves of weeds, rubbish, &c., or simply rise to the desired extent to vary the pitch or positions of their points, according as they are controlled by their lever-governing devices.

In Fig. 3, the tooth *a*, is shown as provided with a curved spring portion or shank *a'*, which is more resilient than the body of the tooth. As here shown, the shank *a'*, is made thinner than the body A, and somewhat wider. This may be accomplished without loss of any of the stock, and maintains the strength of the tooth, while providing the desired difference in resiliency. The same result may be accomplished as shown in Fig. 7, by providing a supplemental spring shank; or, as shown in Figs. 8 and 9, by stiffening the main body portion of the tooth at a^2, cutting away or reducing the width of the point *p*, and likewise that of the curve shank *a'*. Other ways might be suggested. The ends of the shanks are clamped between the overlapping offsets of the frame bars by bolts *x'*, but obviously, other ways might be employed for rigidly connecting the teeth to the frame. This way, however, affords convenient means for individually adjusting each tooth, it being understood that when the teeth are once adjusted in the frame it is not often that they require individual adjustment, as, by my improvements, the teeth are all simultaneously adjusted to vary their pitch or depth of cut.

At each tooth-bearing portion of the frame, is mounted a bracket B, having bearing lugs *b*, for rock bars or rods *i*, forming part of the tooth-adjusting mechanism. I have shown three such rods on each side of the frame; they are preferably square in cross section and extend through square perforations in the levers *l l'*. The rock bars are arranged diagonally in the same general direction as the bars A, and extend through the perforations in the lugs *b*, being free to rock therein. The rock bars *i*, carry a series of eccentrics C, one for each harrow tooth. These eccentrics are rigidly secured to the rock bars and engage with links *c*, connected to the teeth at a^3, between their body portions and their resilient shanks. Each link rests in a groove *c'*, in the eccentric, so that it is held in proper working position. The teeth are so connected to the frame and to the eccentrics, that when free, they occupy the position shown in Fig. 3 with their points above the frame bars, the resiliency of the teeth holding them in this position; and, by turning the eccentrics by means of the rock bars, the points of the teeth may be lowered, as indicated by dotted lines in Fig. 3, and held against the force of the spring shanks in working position. I do not limit myself to this particular method of springing the teeth.

It is obvious that the position of the teeth may be adjusted to any desired extent, by a corresponding movement of the eccentrics, and that when the eccentrics are moved suddenly from the position which they occupy in holding the teeth down to their work, the teeth will simultaneously and instantaneously spring up above the frame and shake off and clear themselves from weeds, rubbish, &c.

In Fig. 1, I have shown each section of the frame, as provided with a series of levers *l, l'*, connected by links *n*, which are self-locking, but a single lever may be connected with all the rock shafts to adjust all the teeth simultaneously in both sections of the frame. Instead of employing levers with lock joints, I may employ a lever, or levers, provided with detent mechanism engaging a toothed segment *r*, as shown in Fig. 4, but any other device may be employed for simultaneously releasing the spring-controlled teeth, or putting them under tension, and holding them. The levers shown in Figs. 1 and 2 are so arranged that they may be folded down among the harrow teeth, so as not to project above them, and the rock bars are so arranged that they do not interfere with the proper working of the teeth nor prevent them from clearing themselves effectively.

While I have described my invention as applied to a spring-tooth harrow having a frame of the modern type and provided with teeth of the Garver type, I wish it understood that I do not limit myself to this kind of teeth, nor to this kind of frame. The frame may be of wood or metal and of any form, and the teeth may be operated by other mechanism than that herein shown. The teeth may be either resilient in themselves, or be attached to other springs, or provided with other means for holding them under tension.

I have shown and described the best way now known to me of carrying out my invention, and, while I claim the special organization shown, and the details of construction, I wish it understood that my invention is broader and more far reaching; for, so far as I am aware, I am the first to make a machine whose teeth can be adjusted as to pitch without moving the support on which they are mounted, and without interfering with the rigid connection between the ends of the teeth and the frame; or, in which harrow teeth are provided with means for holding the points

of the teeth to their work under tension and with devices for releasing this tension to adjust the position of the points, or to cause the teeth to spring above the frame to clear themselves of rubbish.

What I claim is—

1. The combination of a harrow frame, and a series of yielding teeth rigidly secured to stationary portions of the frame, and lever devices for varying the elevation of the points or working ends of the teeth by bending the yielding portions of the teeth.

2. The combination of a harrow frame, and a series of yielding teeth rigidly secured to stationary portions of the frame, in combination with means for bending the teeth in rear of their fastened portions.

3. In a harrow, a frame, spring teeth mounted thereon with their points held out of contact with the ground when in a normal position by spring tension, in combination with means adapted to spring the teeth so that their points shall enter the ground and be held under spring tension.

4. In a harrow, a draft frame, and spring teeth supported thereon, in combination with means adapted to hold the teeth to their work under tension and to release them from pressure to permit them to assume a position with their points above the frame by their own recoil.

5. In a harrow, a draft frame and spring teeth rigidly secured thereto, yielding connections between the working portions of the teeth and the frame, and means for holding the teeth under tension in different positions and for allowing them to quickly assume another position by means of their own volition or resiliency when the tension is removed.

6. In a harrow, a frame provided with a series of tooth-bearing portions, a series of spring teeth mounted thereon, and a device connected with the teeth for bending them between their points and their fastened portions.

7. In a harrow, the combination of a frame having a series of tooth-bearing portions, a series of spring teeth mounted thereon, a rock shaft carrying eccentrics and connections between the eccentrics and the teeth for varying the elevation of the working ends of the teeth.

In testimony whereof I have hereunto subscribed my name.

CHARLES LA DOW.

Witnesses:

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