

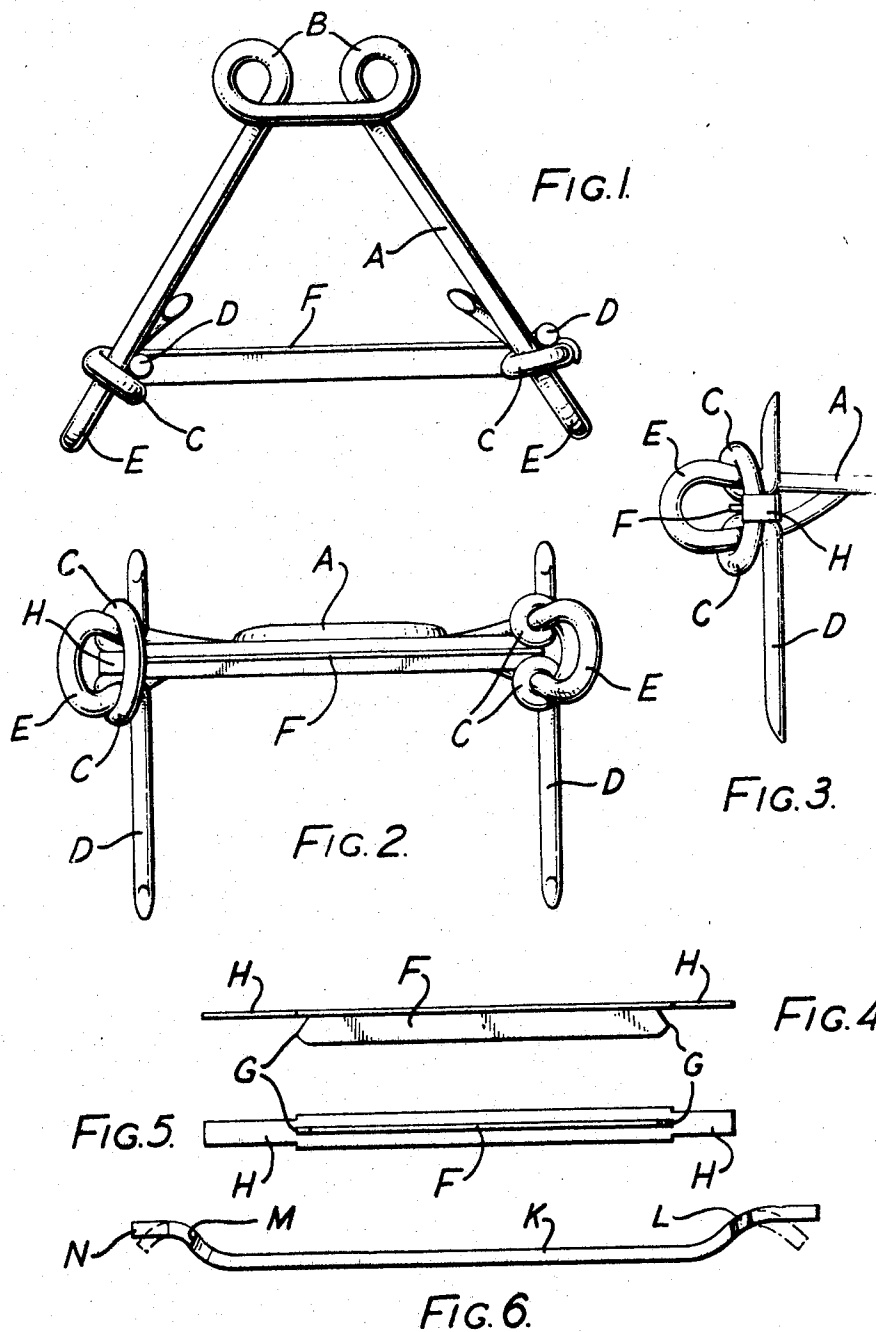
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FLEXIBLE HARROWS

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3 Sheets-Sheet 1



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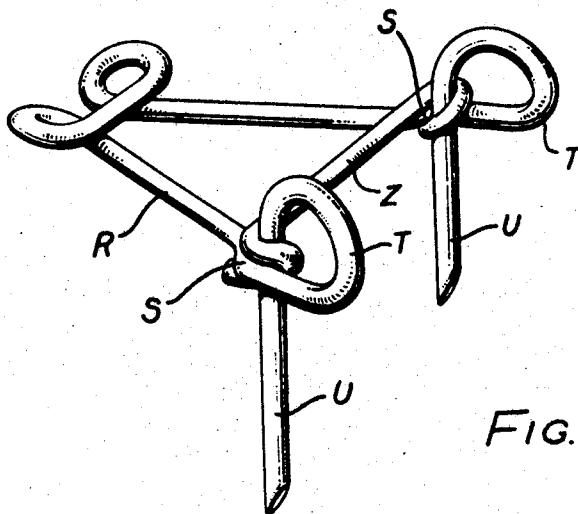
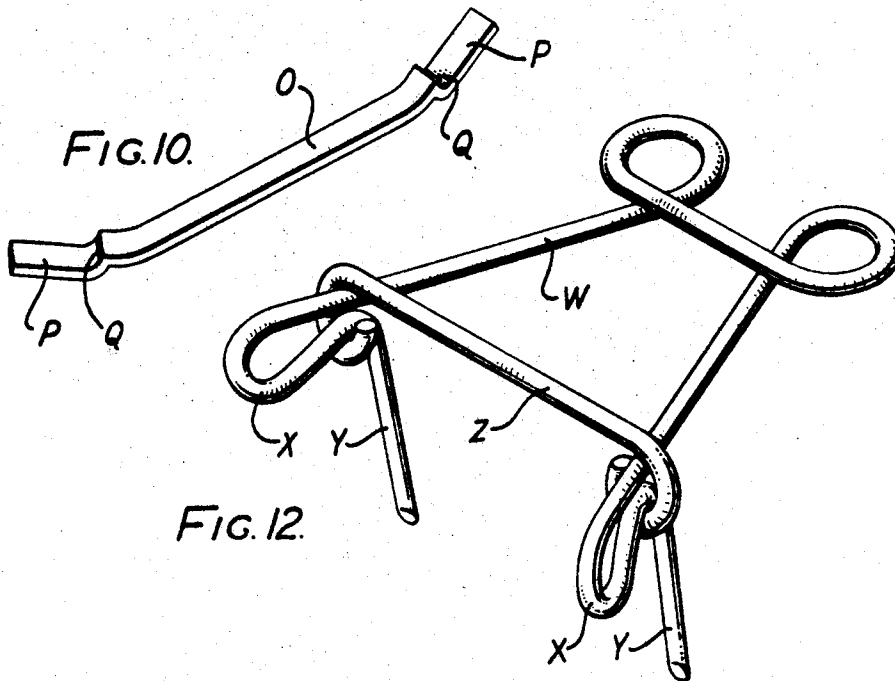


FIG. 13.

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FLEXIBLE HARROWS

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6 Claims

ABSTRACT OF THE DISCLOSURE

A harrow link comprises a body portion produced from a single length of metal rod in the shape of a U with divergent arms. Spaced eyes are formed at the inner ends of the arms by curling the rod in the general plane of the body portion. Closed loops are formed at the outer ends of the arms by curling the rod in planes substantially perpendicular to that of the eyes. A pair of double-ended tines are formed from separate lengths of rod each having its central part curled into two eyes which are threaded over opposite sides of one of the loops before closure of the latter. The end parts of the tine then extending substantially in the plane of the loop, and a reinforcing strut is positioned by bending over both ends thereof. After passage through the loop each strut end has at least one shoulder to locate the adjacent tine against inward displacement.

This invention relates to flexible harrows of the type which comprises a plurality of interlinked elements each produced by bending a length of hard steel rod to provide two spaced eyes in a generally horizontal plane between two mutually-divergent arms each bent into a generally vertical loop and then either continued more or less at right angles to itself to form a tine, or having secured thereto a separate tine made by bending a length of similar material to provide two eyes and threading these over the upper end lower parts of said loop before wholly or partly closing the latter.

In practice, the above-mentioned elements or links are connected together in course of manufacture by hooking one or both vertical loops of each link into the central eyes of other links and thereby producing a flexible mat intended in use to be drawn over the ground with the central eyes of its several links either foremost or rearmost, accordingly as the surface being worked is soft or hard. When separately-formed tines are employed, the eyes produced in each may be non-symmetrically arranged, so that the straight end parts of the tine are of different length, the harrow being operated either way up according to the depth of working required.

Experience shows that very frequently the driver of a tractor connected to a flexible harrow of the type referred to, will unroll the latter on the ground, so that most of its tines become deeply embedded, and subsequently start his vehicle so abruptly that a violent jerk is transmitted through the towing chains to the leading rows of harrow links. As a result the harrow tends to jump bodily forwards and again bites deeply into the ground so that it receives an only slightly less violent jerk when the tractor takes up the momentary slack in the towing chains, and this process may be repeated several times before the harrow is working evenly.

If a flexible harrow is frequently subjected to this kind of treatment, there is a tendency for at least one of the more heavily-stressed links (i.e. those at or near the ends of the two or three foremost rows) to fracture adjacent one or other of its central eyes, due to fatigue of the metal set up by the repeated torsional loading of this part of the link under the influence of tractive shocks, whose

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effect is to draw the tines inwards. The breakage of any one link through this cause throws an additional strain upon adjacent links and, if not attended to, will eventually result in failure of a whole section of the harrow.

The object of the present invention is to eliminate in a simple manner the abovementioned risk of link breakage in flexible harrows of the type referred to.

According to this invention, such a harrow has some or all of its links individually reinforced by a strut which extends between the generally vertical loops thereof but leaves the tines effectively exposed, the extremities of such strut being curled around the link arms or around the anchorage portions of the separately-formed tines (if used) and being located by virtue of the configuration of said arms and/or tines.

When separately-formed tines are employed, each strut may be formed near opposite ends with lateral shoulders or notches adapted to abut or receive (as the case may be) the upper and lower parts of the loops in the adjacent link arms, the terminal parts of the strut beyond such shoulders or notches embracing the tines between the two eyes formed on each. Alternatively, each strut may be cranked near opposite ends to abut the adjacent arms of the link, its terminal portions being curled around such arms and located in contact with the associated tines by closure of the loops on which the latter are mounted.

In a case where the tines are extensions of the link arms beyond the vertical loops in the latter, the strut ends may be upset and curled as aforesaid but located by engagement with cranked parts of the arms, or they may be curled around the loop-forming parts of the arms so as to locate the tines against cranked parts of the latter. Alternatively, when each combined arm and tine has an S bend defining the loop therein, the adjacent end of the strut may be curled around the arm so as also to embrace the latter at the junction of its loop- and tine-forming parts.

Referring to the drawings:

FIG. 1 is a plan view of a double-tined harrow link reinforced in accordance with the invention,

FIG. 2 is an end elevation thereof, and

FIG. 3 is a fragmentary side elevation,

FIGS. 4 and 5 are respectively a plan and side elevation of the reinforcing strut shown in FIGS. 1 to 3, before application to a link,

FIG. 6 is a view corresponding to FIG. 4 but showing an alternative form of strut,

FIG. 7 is a cross-sectional view showing the strut of FIG. 6 in position on a double-tined link,

FIGS. 8 and 9 are views corresponding respectively to FIGS. 1 and 2 but showing yet another form of strut,

FIG. 10 is a perspective view of the strut shown in FIGS. 8 and 9 before application to a link,

FIG. 11 is a fragmentary perspective view showing the strut of FIGS. 8 to 10 applied to a single-tined link, and

FIG. 12 shows an alternative form of single-tined link provided with a reinforcing strut,

FIG. 13 shows yet another form of single-tined link reinforced in accordance with the present invention.

In the example illustrated in FIGS. 1 to 3, the link A is formed in known manner with circular eyes B adjacent, and at opposite sides of, its midpoint and each end portion thereof is bent into a hook which after engagement with closely-spaced circular eyes C on the associated tine D, is converted into a closed loop E.

The reinforcing strut F (see FIGS. 4 and 5) consists of a length of relatively light T iron whose web is cropped for a suitable distance from each end thereof, the part left having its extremities V shaped at G to locate against the external peripheries of the adjacent tine eyes C when the strut F is sprung into position with its web directed relatively to the link A.

The head flange of the strut, which under these conditions lies in front of the tines D has its webless end parts H reduced in width and bent around the juxtaposed parts of the eyes C, as closely shown in FIGS. 2 and 3, from which it will be noted that, following the usual practice, the left and right-hand tines D are fitted respectively inside and outside the adjacent loops E.

In producing the strut F, it is preferred to crop the web from a length of T iron at suitable intervals, the residual parts of the web having their ends V-shaped as at G in the same operation. Subsequently the cropped sections of the T iron are reduced in width and cut across (for example, by means of an H section tool) to form the end parts H of several separate struts.

The modified strut K shown in FIGS. 6 and 7 is formed from stout strip metal with its ends cranked as shown. One such end has opposed marginal notches L whilst the other end is reduced in width to provide corresponding shoulders M and terminates in a relatively narrow tongue N.

This arrangement enables the strut K to be threaded flatwise through the narrower ends of the loops E and then rotated through approximately 90 degrees about its longitudinal axis so that the upper and lower parts of these loops engage in the notches L and shoulders M whilst the cranked ends of the strut abut against the tine eyes C. The strut F is retained in this operative position by bending the tongues around the juxtaposed parts of the adjacent eyes C, and the notched end of the strut may be similarly treated if desired.

FIGS. 8 and 9 show an alternative construction in which the strut O is again formed from strip metal but is bent in its own plane near each end so that, when applied to the link A, its terminal portions P will lie at right angles to the loops F.

Each of these terminal portions P is cranked, by an amount approximately equal to the diameter of the rod from which the link A is formed, so as to provide a radiused shoulder Q adapted to abut the upper part of the adjacent loop E at its inner side.

The strut O, initially of the shape shown in FIG. 10, can be threaded through the loops E after the latter have been closed and at a position between the ends of such loops and the tine eyes C, its terminal portions P being then bent upwards and inwards so as closely to embrace the upper parts of the loops E and to hold the strut O in contact with the tines D.

Although the tines D are illustrated as made from round-section material similar to, but lighter than, that used in the link A, it should be understood that the bracing means described is equally applicable in cases where the tines are of square or other non-circular cross-section.

As shown in FIG. 11, the form of strut just described is equally applicable to a single-tined link R of the known shape in which the divergent arms are first cranked outwardly at S and then bent upwards and downwards to form the loops T, so that their terminal portions (constituting the tines U) engage within the crankings S and are thereby restrained against outwards displacement under load.

The shape of the strut O in plan view is such that its terminal portions P lie at right angles to the crankings S of the link R and when bent inwards around these crankings as shown they are effectively located at the inner sides of the tines U to prevent inward movement of the latter.

FIG. 12 shows the application of the invention to another form of single-tine link W, each arm of which is given an S bend in a substantial vertical plane to produce a closed loop X and a tine Y, the reinforcing strut Z in this case being formed from a length of similar rod-
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ding whose terminal portions are bent around the arms of the link W so as to engage in the angles between the tines Y and the lower parts of the loops X.

FIG. 13 shows a variant of the construction shown in FIG. 11, the link arms again having outward crankings S engaged by the tines U but being reinforced in this case by a strut Z formed of rod-
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ding, each of whose ends is curled inwardly through the adjacent loop T before being bent around the associated tine U and under the cranking S.

What is claimed is:

1. A harrow link comprising a body portion produced from a single length of metal rod in the shape of a U with divergent arms, spaced eyes formed at the inner ends of said arms by curling said rod in the general plane of said body portion, closed loops formed at the outer ends of said arms by curling said rod in planes substantially perpendicular to that of said eyes, a pair of double-ended tines formed from separate lengths of rod each having its central part curled into two eyes which are threaded over opposite sides of one of said loops before closure of the latter, the end parts of said tine then extending substantially in the plane of said loop, and a reinforcing strut positioned by bending over both ends thereof, after passage from said loop each strut end having at least one shoulder to locate the adjacent tine against inward displacement.

2. A harrow link according to claim 1, in which said strut has opposite ends curled around said arms between the tines and the eyes.

3. A harrow link according to claim 1, in which said strut is of flat section and cranked near opposite ends to engage the inner sides of said arms.

4. A harrow link according to claim 1 in which said strut has opposite ends passing through said loops adjacent said tines and curled around the adjacent arms.

5. A harrow link according to claim 4 in which said strut is formed of flat-section metal and cranked near opposite ends, each such end being passed through one of said loops so that the crank therein engages the latter and being curled around the same part of said arm.

6. A harrow comprising a plurality of links as claimed in claim 1, said links each having at least one loop engaged with an eye of an adjacent link and collectively forming a flexible structure.

References Cited

UNITED STATES PATENTS

389,593 9/1888 Parmiter ----- 172—612

FOREIGN PATENTS

6,485 5/1916 Great Britain.
724,935 2/1955 Great Britain.

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