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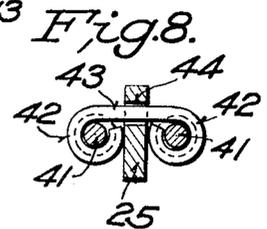
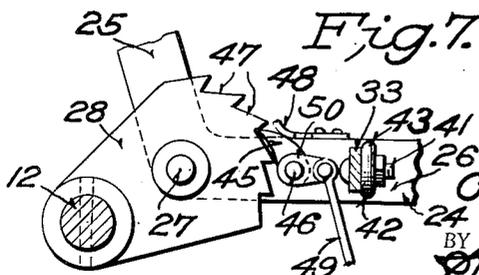
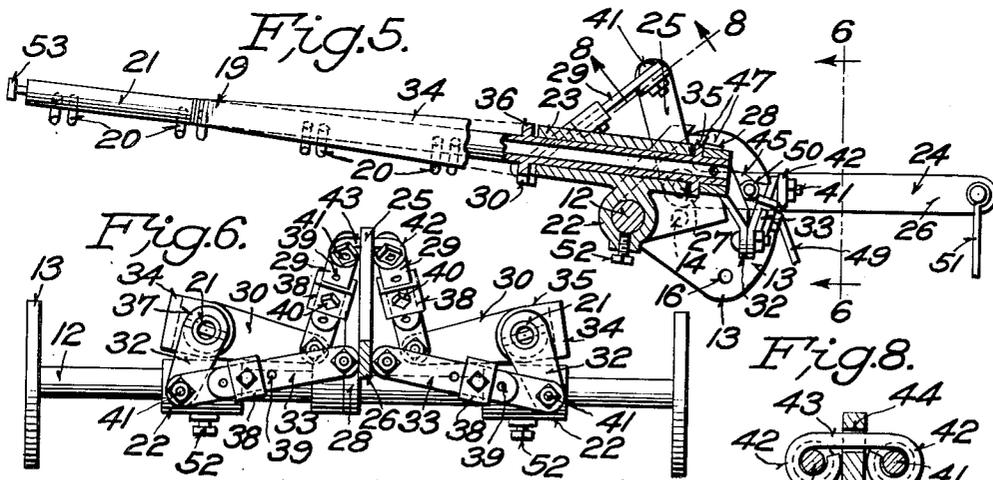
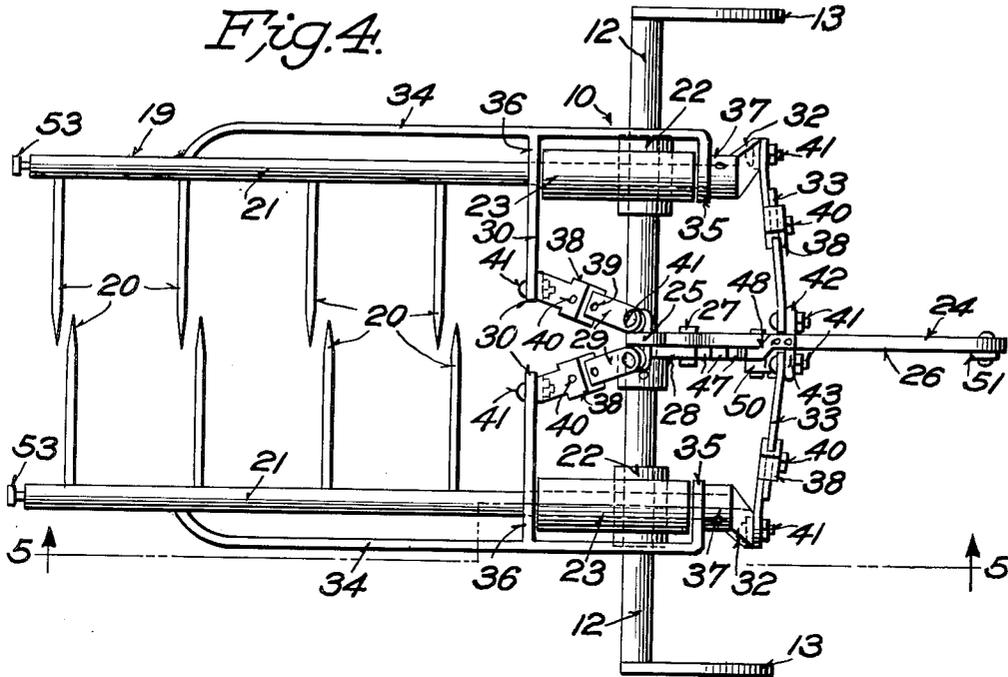
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GRAPPLING ATTACHMENT FOR LOADERS AND STACKERS

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2 SHEETS—SHEET 2



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## GRAPPLING ATTACHMENT FOR LOADERS AND STACKERS

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11 Claims. (Cl. 214-147)

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My invention relates generally to loaders and stackers used for handling hay, grain, corn shocks, manure, rocks, barrels, etc., and it relates more particularly to a load grappling attachment which may be substituted for the usual hay fork or load holder on the swinging boom of a loader such as commonly used on farms.

One object of the invention is to provide an attachment of this character with an open front portion having opposed teeth-carrying members which may be pushed by the tractor into a stack of hay while the teeth project downwardly from the opposed members, the latter being then rotated on their longitudinal axes to swing the opposed rows of teeth upwardly and inwardly towards each other to pick up a load of hay or the like.

Another object of the invention is to provide a fork-like grappling device of this character in which the teeth-carrying members are not only axially rotatable but are also mounted for lateral sliding movement toward and from each other.

Another object is to provide a load pick up device of this character in which a single operating means simultaneously rotates the teeth-carrying members and causes them to be bodily moved toward and from each other.

With the above and other objects and advantages in view, the invention resides in the novel combinations and arrangements of parts and the novel features of construction hereinafter described and claimed, and illustrated in the accompanying drawings which show the present preferred embodiment of the invention.

In the drawings:

Fig. 1 is a top view, with parts in section and looking in the plane of line 1-1 of Fig. 2, of the grappling device or attachment, the parts being in one of the open positions of the device so that its front end may be pushed into a haystack;

Fig. 2 is a side view with the parts in the position shown in Fig. 1;

Fig. 3 is a sectional view with the parts in the same position and looking in the plane of the irregular dotted line 3-3 of Fig. 2;

Fig. 4 is a top view of the device with the parts in one of the closed or hay grappling positions;

Fig. 5 is a vertical longitudinal sectional view taken substantially on the irregular dotted line 5-5 in Fig. 4 looking in the direction of the arrows;

Fig. 6 is a vertical transverse sectional view taken on the line 6-6 of Fig. 5 looking in the direction of the arrows;

Fig. 7 is a detail sectional view on a slightly

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enlarged scale to show the pawl and ratchet device for holding the lever in adjusted position; and

Fig. 8 is a detail sectional view taken on the line 8-8 in Fig. 5 looking in the direction of the arrows.

Referring more in detail to the drawings the numeral 10 denotes as a whole my improved grappling device which is adjustably and detachably mounted at the upper end of a swinging boom of a tractor, loader or stacker of the types commonly used on farms. The boom is usually a frame-like structure that includes horizontally spaced bars which are conventionally illustrated in dotted lines at 11 in Fig. 1 and from which the usual hay fork is supported.

The device or attachment 10 includes a main supporting element 12 in the form of a transverse cylindrical shaft having welded or otherwise fastened to its ends parallel upright attaching and adjusting plates 13. These plates may extend rearwardly from the ends of the shaft 12 and are shown as disposed in contact with the opposed faces of the bars 11. The plates 13 are formed in their intermediate portion with aligned openings 14 to receive pivots 15 which may be in the form of bolts that pass through the bars 11. The plates 13 are also formed with arcuate series of holes 16 concentric with the pivot bolts 15 and any of the holes 16 may be brought into register with holes formed in the bars 11 to receive adjusting and fastening bolts 17. When the bolts 17 are removed the plates 13 may be turned on their pivots 15 to raise or lower shaft 12 and change its position relative to the boom 11 for a purpose hereinafter explained.

Supported by and projecting forwardly from the shaft 12 are two horizontally opposed load grappling members 19 each of which preferably comprises a straight row of spaced teeth or prongs 20 projecting radially from an axially rotatable element 21 in the form of a rod or tube. While I have shown the load-engaging means 20 of the grappling members in the form of rows of teeth, it is obvious that other forms of load-engaging means which project laterally or radially from the members 21, may be used. These rake-like or fork-like grappling members 19 are not only mounted for rotary or swinging movement on their longitudinal axes 21 but they are mounted for horizontal sliding movement toward and from each other along the supporting shaft 12 on opposite sides of the center of the latter and also for vertical swinging movement about the shaft. This mounting

of the two grappling members comprises two cylindrical or sleeve-like bearings 22 which both slide and rotate on journal portions of the shaft 12 and which have fixed on their tops similar cylindrical bearings 23 in which the rear portions of the tooth-carrying rods or arms 21 are rotatable. The axes of the bearing sleeves 22, 23 are in planes at right angles to each other and the two cylindrical sleeves may be welded together or otherwise formed. The toothed arms 21 rotate freely in the sleeves 23 and the sleeves 22 both slide and rotate freely on shaft 12 so that each grappling member 19 may rotate on its axis, swing vertically about the shaft 12 or slide lengthwise of the latter, or simultaneously rotate, swing and slide.

To operate the two grappling members 19 and move them in unison or substantially in unison, I preferably provide a lever 24 and suitable links between it and radial arms on the toothed rods. The lever 24 is a bell-crank having a short arm 25 and a long arm 26; and it is pivoted at its angle on a pivot 27. The lever is disposed vertically in the center of the attachment and its pivot 27 is carried by an upright plate or bracket 28 which is suitably fixed to the shaft 12 and projects in an upward and rearward direction. The lever pivot 27 is thus disposed rearwardly of the shaft 12 and slightly above the axis of the latter, the short arm 25 projecting forwardly above and across the shaft and the long arm 26 projecting upwardly and rearwardly.

The two grapples 19 may be simultaneously actuated by only two links 29 connected between the short arm 25 of the lever and two radial arms 30 on the tooth carrying rods or shafts 21. It will be seen upon reference to Figs. 1, 2 and 3 in which the grapple is shown in one of its "open" positions, the teeth or prongs 20 extend in a downward direction but they may be swung upwardly and inwardly to one of its "closed" positions, shown in Figs. 4, 5 and 6, when the long arm 26 of the lever is moved rearwardly and downwardly. That causes the short end 25 to swing upwardly so that the links 29 pull upwardly on the arms 30 to not only rotate the rods 21 in their bearings 23 but to slightly swing the rods 21 in an upward direction about the shaft 12 and also slide the bearings 22 slightly away from each other on the shaft 12 depending upon the load between the opposed rows of teeth 20. It is to be understood that the device when in its open position has its open front end pushed into a shock or stack of hay or the like, before the lever is actuated to cause the grappling members 19 to pick up a load. When the parts are in an open position the toothed arms or rods 21 may be inclined slightly in a downward direction and when closed they will be inclined upwardly to a greater or lesser extent. Such inclination of the toothed arms 21 may be changed by adjusting the plates or brackets 13 about their pivots 14 by placing the bolts 17 in the proper holes 16, since the extent of downward swinging movement of the toothed arms around the shaft 12 is limited by the engagement of the short arm 25 of the lever with the shaft 12 as shown at 31 in Fig. 2.

Instead of using only the links 29 and arms 30 to move the toothed arms 21, I may use two additional arms 32 and links 33, the latter being connected between the long arm 26 of the lever and the arms 32 which are fixed to the extreme rear ends of the arms or rods 21. The rear arms 32 are shorter than the front arms

30 and extend radially from the toothed rods in a different direction from that of the arms 30, but the pivotal connections of all four links 29, 29, 33, 33 with the lever arms 25, 25 are the same distance from the pivot 27 of the lever. Hence when the long arm 26 of the lever is swung rearwardly and downwardly to move the grappling members to closed or load gripping positions, the links 33 will bear down on the rear arms 32 and the links 29 will lift up on the front arms 30 to cause the above described actuation of the grappling members 19 in picking up a load of hay or the like. It will be understood that there is no one "open" position and no one "closed" position, since in either of these so-called open and closed positions the arms 21 may be inclined more or less, the teeth 20 of the opposed rows may be more or less angularly disposed or related and the bearings 22 may be variously spaced apart.

Each of the grappling members 19 is preferably provided with a longitudinal strap-like brace 34 spaced from its side opposite to that from which the teeth 20 project. The longitudinally curved and reduced front ends of the braces 34 are welded to the rods 21 inwardly of the front ends of the latter, and at their rear ends are right-angular projections 35 which may be welded to portions of the rods projecting rearwardly through the sleeves 23. The brace ends or projections 35 about the rear ends of the sleeves 23 to limit endwise movement of the rods in one direction in the sleeves. Such movement of the rods in the opposite direction is limited by the arms 30 which are extended as at 36 and welded to the braces 34. At least those portions of the rods 21 which extend through the bearing sleeves must be cylindrical and they may be solid or tubular. The arms 32 are formed with cylindrical hub portions 37 which fit on the ends of the rods 21 projecting beyond the brace ends 35 and they may be removably and adjustably fastened by set-screws, bolts or the like.

The links 29 and 33 are preferably made longitudinally adjustable or extensible to permit the grappling members 19 to be initially set at different distances from each other on the shaft 12 according to the nature and size of the load to be lifted by the device. Each of these links may be formed from two flat metal straps which are overlapped more or less and have longitudinal rows of holes to be brought into register to receive fastening bolts. As shown one of the straps of each link is formed at its inner end with a rectangular loop 38 to slidably receive the other strap, the latter being formed with a longitudinal row of holes 39 any one of which may receive a bolt 40 which passes through holes in the loop 38. The pivotal connections between the outer ends of the links 29 and 33 and the arms 30 and 32 respectively may be effected by nut-carried bolts 41. In effecting the pivotal connections of the inner ends of the links 29 and 33 with the two arms 25 and 26 respectively of the lever, similar bolts 42 may also be used but as shown in Fig. 7 these bolts pass through eyes 42 formed by bending the ends of a rod 43 which has a straight cylindrical portion freely rotatable in a cylindrical opening 44 formed in the lever. All of the pivotal connections of the links are loose, and as above noted the rods 21 rotate freely in their bearing sleeves 23 and the bearing sleeves 22 are freely slidable and rotatable on the shaft 12 so that the entire structure of the grapple is rather loose-jointed. The two grappling mem-

bers may therefore adapt themselves to the load but will be actuated as above set forth when the lever 24 is operated.

While the engagement of the lever arm 25 with the shaft 12, as shown at 31 in Fig. 2 will limit the downward swinging movement of the grapples 19, some means must be provided for holding the lever 24 after it has been actuated to move the grapples to a more or less closed position, unless the lever or all of the links are positively moved in both directions, as by a hydraulic operating mechanism. The lever holding or locking means shown consists of a pawl 45 pivoted at 46 on the long arm 26 of the lever and engageable with an arcuate series of ratchet teeth 47 formed on the edge of the bracket plate 28 concentric with the lever pivot 27. The pawl which is at one end of a pivoted lever, is actuated toward the ratchet teeth by a spring 48 and may be retracted by a pull rod or other connection 49 attached to the other end of the pawl lever. The plate 28 is formed with a hub 50 which may be adjustably secured to the shaft 12 by a set screw, bolt or the like. As above noted the lever may be hydraulically operated but I have shown a pull rod or the like 51 pivotally connected to the extremity of its long arm 26.

Under some conditions, as when rocks or other heavy materials are to be lifted by the device, it may be desirable to lock the bearings 22 on the shaft 12. That may be done by providing them with set screws 52 to engage the shaft. In such a case it may also be desirable to connect the outer ends of the toothed arms 21 to prevent them from spreading apart. I may therefore provide at the outer or front ends of the arms hooks or headed studs 53 with which the links of a connecting chain (not shown) may be easily engaged and disengaged.

It is believed the operation and use of my grapple or load pick-up device will be understood from the foregoing detailed description. With the device supported on the boom in its open position, the tractor is operated to force the open front into a stack of hay or the like. The operating mechanism is then actuated to move the device to a more or less closed position to support the material between the two grappling members. The tractor may then be operated to move the load to the desired place and the mechanism is then operated to release the load.

From the foregoing, taken in connection with the accompanying drawings, it will be seen that novel and advantageous provision has been made for carrying out the objects of the invention, and while preferences have been disclosed, attention is invited to the possibility of making variations within the scope of the invention as claimed.

I claim:

1. In a grappling device for mounting on a swinging boom of a loader, a pair of laterally opposed forwardly-and-rearwardly-extending grappling members, each having a longitudinal row of load-engaging teeth, means for supporting said grappling members from their rear ends to permit their front ends to be pushed into a stack of hay or the like, said means including an elongated supporting element to extend transversely of a boom, and horizontally spaced bearing members on said element in which said grappling members are axially rotatable, and means for actuating said grappling members including arms projecting radially from said members, links connected to said arms and means for simultaneously moving said links.

2. The structure of claim 1 in which said bearing members are mounted on said element for rotation on an axis at right angles to the axis of rotation of said grappling members.

3. The structure of claim 2 in which said bearing members are also mounted for sliding movement toward and from each other on said element.

4. In a grappling device for mounting on a swinging boom of a loader, a pair of laterally opposed forwardly - and - rearwardly - extending grappling members, each having a longitudinal row of load-engaging teeth, means for supporting said grappling members from their rear ends to permit their front ends to be pushed into a stack of hay or the like, said means including an elongated supporting element to extend transversely of a boom, said element having horizontally spaced journals, slides mounted on said journals for rotary movement and also for sliding movement toward and from each other, bearings fixed to said slides and disposed in parallel planes at right angles to the journal portions of said element, said members being axially rotatable in said bearings, arms projecting radially from said members, links connected at one end to said arms, and an actuating lever supported from said element and connected to the other ends of said links.

5. The structure of claim 4 in which each of said links is composed of two overlapped sections slidably engaged for varying the length of the link, and means for fastening the sections of each link in adjusted positions.

6. The structure of claim 4 in which each of said members has two of said radial arms projecting in different angular relations, in which said lever is a bell crank with two angularly related arms, and in which there are two pairs of said links, one pair of the latter being connected to one of the lever arms and to one of the radial arms of each member, and the other pair of links being connected to the other lever arm and to the remaining radial arms of the two members, the link pivots on the two lever arms being at the same distance from the fulcrum of the lever.

7. A grappling device for mounting on a swinging boom of a loader comprising a supporting element for disposition transversely of a boom, said element having cylindrical portions, a pair of sleeves slidably and rotatably mounted on said cylindrical portions in longitudinally spaced relation along said element, a second pair of sleeves fixed to said first pair at right angles to the same, a pair of laterally-opposed elongated grappling members projecting outwardly from said element and having adjacent their inner ends cylindrical portions rotatably mounted in the sleeves of said second pair, load-engaging means projecting radially from each of said grappling members, and operating means for simultaneously rotating said grappling members, and sliding and rotating said first pair of sleeves.

8. The structure of claim 7 in which said operating means includes a radially projecting arm on each of said grappling members, a lever supported from said element adjacent its center, links connecting said radial arms to said lever, and means for holding said lever in different positions of adjustment.

9. The structure of claim 7 in which said operating means includes an angular lever having long and short arms, a ratchet plate fixed to said element adjacent its center, a pivot connecting

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said lever at its angle to said plate at a point spaced from said element to permit the short arm of said lever to engage said element to limit the swinging movement of the lever in one direction, said plate having an arcuate series of ratchet teeth concentric with the lever pivot, a movable pawl on said lever to coact with said ratchet teeth, a first pair of radial arms on said grappling members adjacent their inner ends, a second pair of radial arms on the inner ends of said grappling members and disposed in different angular relations from those of said first pair, and two pairs of links connecting said radial arms with said lever, the links of one pair being pivoted to the first pair of arms and to the short arm of the lever and the links of the other pair being pivoted to the second pair of arms and to the long arm of the lever, the link pivots on both arms of the lever being at the same distance from the pivot of the lever.

10. For use on a boom, an elongated supporting element mounted transversely of said boom, two bearing members slidably and rotatably mounted on said element and disposed on opposite sides of the center of the latter, two elongated and laterally opposed grappling members projecting outwardly from said element and having their inner ends rotatably mounted on said bearing members, load-engaging means projecting radially from each of said grappling

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members, and means for simultaneously rotating said grappling members about their pivotal axes, and sliding and rotating said bearing members on said supporting element.

11. In combination, a supporting shaft, means at the ends of said shaft for mounting it transversely of a boom, two bearing members disposed in spaced relation and mounted for both longitudinal sliding and rotary movements on said shaft, two elongated and laterally opposed grappling members projecting outwardly from said shaft and having their inner ends rotatably mounted on said spaced bearing members, load-engaging means projecting radially from each of said grappling members, an arm projecting radially from each of said grappling members, a movable operating element, and link connections between said element and said radial arms.

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