Sept. 12, 1967 J. L. JUHL ET AL 3,340,942

SELF-PROPELLED LOADER

Filed Aug. 20, 1965 3 Sheets-Sheet 1

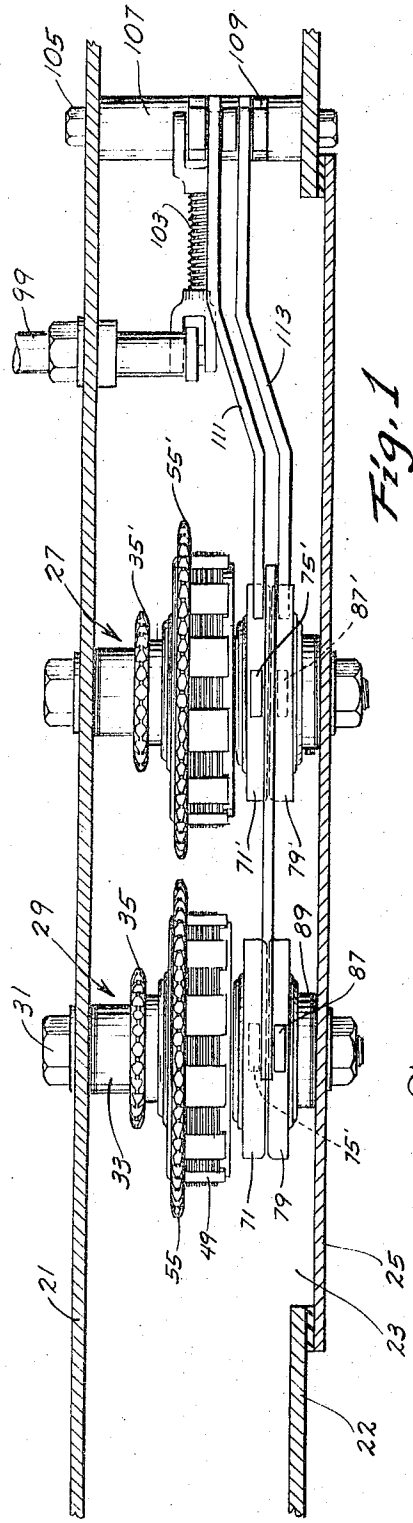

Fig. 1

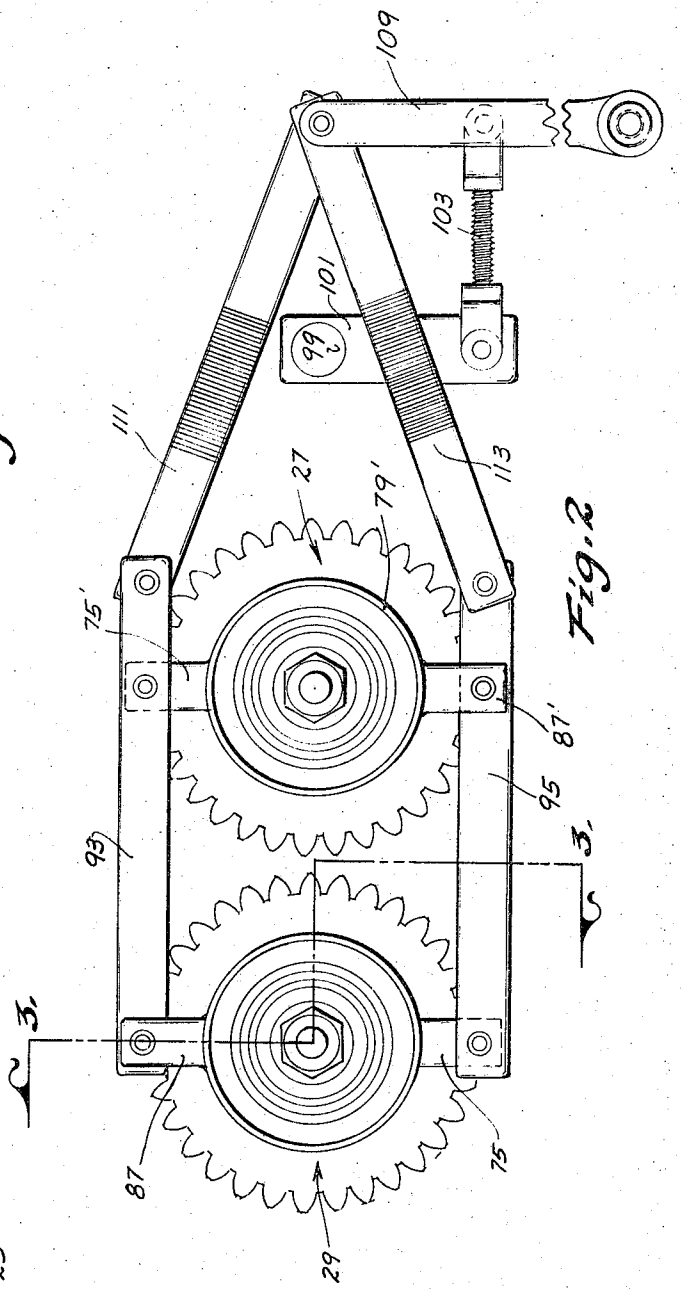

Fig. 2

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SELF-PROPELLED LOADER

Filed Aug. 20, 1965 3 Sheets-Sheet 2

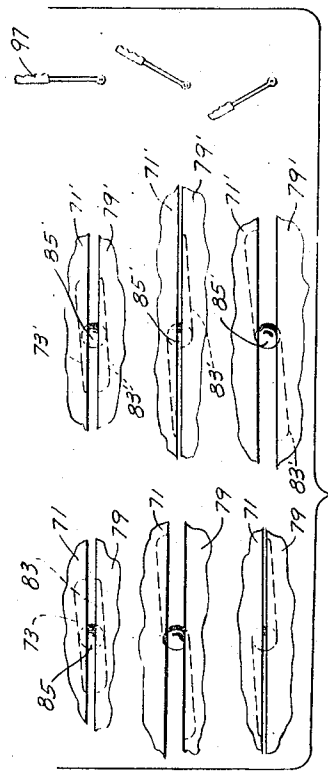

Fig. 5

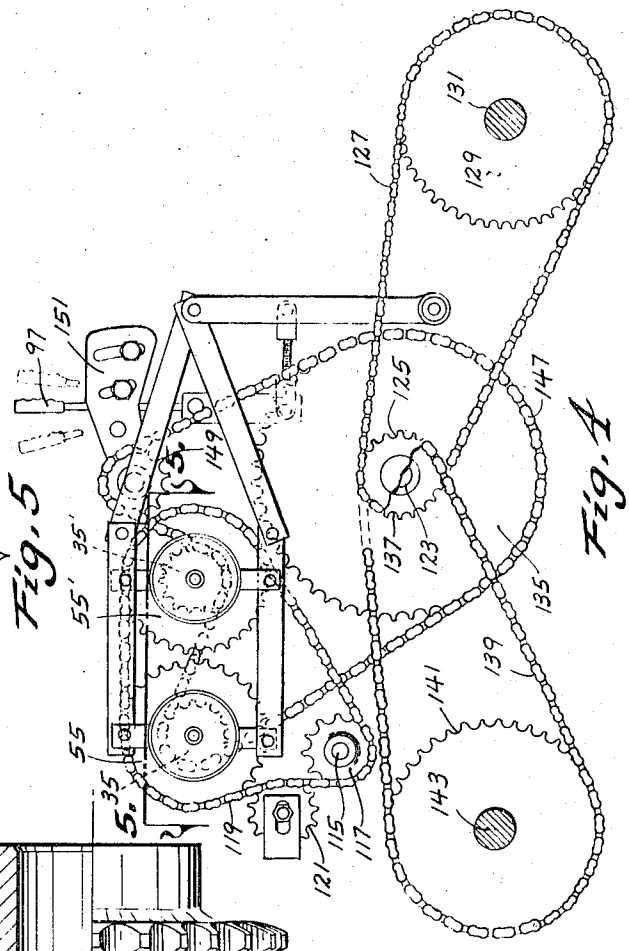

Fig. 4

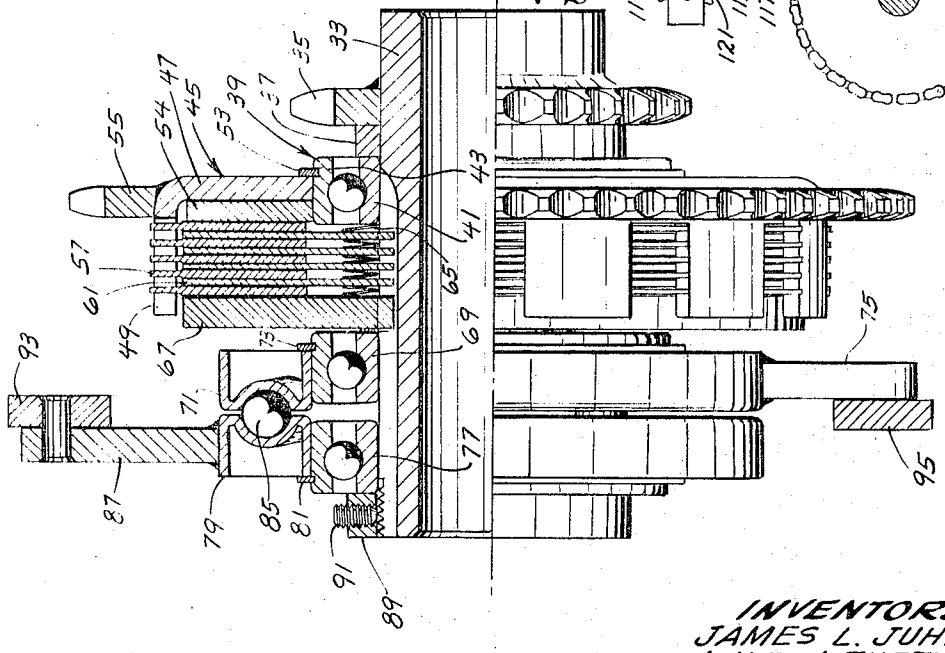

Fig. 3

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SELF-PROPELLED LOADER

Filed Aug. 20, 1965 3 Sheets-Sheet 3

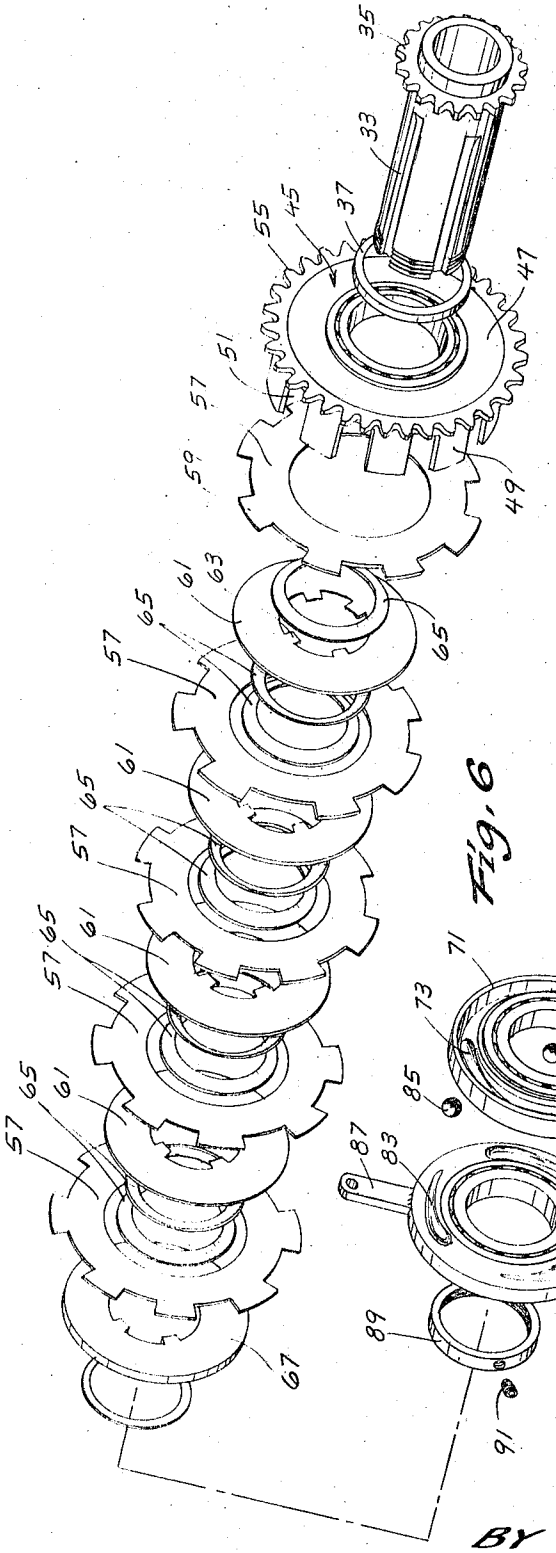

Fig. 6

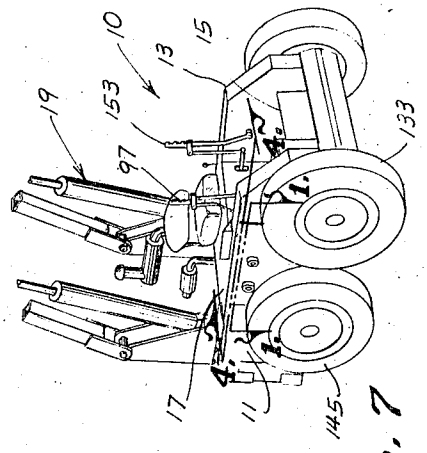

Fig. 7

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SELF-PROPELLED LOADER

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9 Claims. (Cl. 180—6.66)

ABSTRACT OF THE DISCLOSURE

A self-propelled vehicle comprising, a frame means, first and second pairs of wheels on opposite sides of the frame means and a power means adapted to selectively rotate said first and second pair of wheels in forwardly or rearwardly directions.

This is a continuation-in-part application of the application, Ser. No. 468,684, filed July 1, 1965.

This invention relates to a loader device and more particularly to a self-propelled loader.

Conventional loaders of the "front-end" type are rather large and difficult to maneuver in small spaces. Additionally, a conventional loader has a large number of controls such as levers, foot pedals, etc. which makes it difficult for the operator to efficiently operate the device.

Therefore, it is a principal object of this invention to provide a compact, self-propelled loader which can be maneuvered in a minimum amount of space.

A further object of this invention is to provide a self-propelled loader wherein the steering of the loader is accomplished by the utilization of two control levers.

A further object of this invention is to provide a loader which has a clutch mechanism associated therewith which is efficient and trouble-free.

A further object of this invention is to provide a loader which is simple in design, economical of manufacture and refined in appearance.

These and other objects will be apparent to those skilled in the art.

This invention consists in the construction, arrangements, and combination of the various parts of the device, whereby the objects contemplated are attained as hereinafter more fully set forth, specifically pointed out in the claims, and illustrated in the accompanying drawings in which:

FIG. 1 is a sectional view of the device as seen on line 1—1 of FIG. 7 with the chains removed to more fully illustrate the invention;

FIG. 2 is a side elevational view of the clutches seen in FIG. 1;

FIG. 3 is a sectional view of the rear clutch seen on line 3—3 of FIG. 2 at an enlarged scale;

FIG. 4 is a side elevational view of the device as seen on line 4—4 of FIG. 7;

FIG. 5 is a fragmentary, sectional view taken generally along line 5—5 of FIG. 7 to illustrate the relationship of the cam members with respect to the movement of the control lever;

FIG. 6 is an exploded perspective view of one of the clutches of the device; and

FIG. 7 is a fragmentary perspective view of the loader device.

The numeral 10 generally designates the loader of this invention which includes a right side 11, left side 13, forward end 15, rearward end 17 and boom means 19. As seen in FIG. 1, side 11 is comprised of an inner panel member 21 and an outer panel member 22 spaced therefrom having an opening 23 formed therein which is detachably closed by panel member 25 in any suitable manner. Side 13 is identical to side 11 and for that reason will not be described in detail.

Operatively secured to side 11 is a front clutch 27 and a rear clutch 29. Clutches identical to clutches 27 and 29 are provided on the left side of the loader as well and will not be described in detail.

Clutch 29 includes a bolt member 31 which extends outwardly through panel member 21 and which is embraced by a splined hub 33 having an externally threaded outer end and a sprocket 35 secured thereto by welding or the like adjacent its inner end. As best seen in FIG. 3, the spacer 37 embraces hub 33 outwardly of sprocket 35 and is positioned inwardly of a bearing 39 having an inner race 41 and an outer race 43. Embracing outer race 43 is a drive cup 45 having a base portion 47 and a flange portion 49 extending outwardly therefrom. As best seen in FIG. 6, flange portion 49 is provided with a plurality of notches 51 formed therein. Drive cup 45 is prevented from moving inwardly with respect to sprocket 35 by means of snap ring 53 engaging outer race 43 of bearing 39. A backing plate 54 is received by drive cup 45 and embraces outer race 43 of bearing 39 as best seen in FIG. 3. A sprocket 55 is mounted on drive cup 45 (FIGS. 3 and 6) and is secured thereto by welding or the like.

A plurality of friction discs 57 having a plurality of tab portions 59 extending therefrom which are received by the notches 51 in drive cup 45 embrace hub 33 as seen in FIG. 3. Friction discs 57 are separated from each other by a separator disc 61 positioned between each adjacent pair of friction discs. Separator discs 61 have a plurality of tab portions 63 extending from its inside diameter which are splined onto hub 33. A release spring 65 embraces hub 33 outwardly of bearing 39 and has its inside diameter engaging inner race 41 and its outside diameter engaging the innermost separator disc 61. As seen in FIG. 3, a pair of opposing release springs 65 are positioned between each adjacent pair of separator discs. A pressure plate 67 is splined onto hub 33 and is received by drive cup 45 and engages the outermost friction disc 57. A pair of release springs 65 are positioned between the outermost separator disc and the inner surface of pressure plate 67.

Embracing hub 33 outwardly of pressure plate 67 is an inner cam bearing 69 having inner and outer races and is axially movable on hub 33 to move pressure plate 67 inwardly with respect to drive cup 45. An inner cam member 71 embraces inner cam bearing 69 and is prevented from inward movement with respect to cam bearing 69 by means of snap ring 73. As seen in FIG. 6, cam member 71 is cup shaped and has a plurality of tapered cam surfaces 73 formed therein. Cam member 71 is provided with a tab member 75 secured thereto by welding or the like which extends downwardly therefrom. An outer cam bearing 77 embraces hub 33 and has inner and outer races. An outer cam member 79 embraces cam bearing 77 and is prevented from outward movement with respect to cam bearing 77 by means of snap ring 81. Outer cam member 79 is identical to cam member 71 and has a plurality of tapered cam surfaces 83 formed therein. Although cam members 71 and 79 are identical, they are positioned in an oppositely facing relationship so that the cam surfaces 73 and 83 form pairs of complimentary and oppositely facing cam surfaces into which are mounted balls 85. Cam member 79 is provided with a tab member 87 secured thereto by welding or the like which extends upwardly therefrom. It can be appreciated that because of the complimentary and oppositely facing cam surfaces just described, rotation of the inner and outer cam members in one direction with respect to each other causes the balls 85 to ride along their respective surfaces and separate the inner and outer cam members and causes inward axial movement of the inner cam member 71 with respect to hub 33. The inward axial movement of cam

member 71 causes inner cam bearing 69 to move against pressure plae 61 to move pressure plate 61 axially inwardly on hub 33 thereby overcoming the resistance of the release springs 65 and causing the friction discs 57 to frictionally engage the separator discs 61. A clutch adjusting collar 89 is threadably mounted on the outer end of hub 33 (FIG. 3) and is maintained thereon by means of set screw 91.

As stated before, front clutch 27 is identical to rear clutch 29 and will not be described in detail but structure on front clutch 27 corresponding to structure on 29 will be indicated by "'." Front clutch 27 is positioned on the loader so that tab portion 87' on outer cam member 79' extends downwardly rather than upwardly and tab portion 75' on inner cam member 71' extends upwardly rather than downwardly. Tab members 87 and 75' are pivotally interconnected by arm member 93 while tab members 75 and 87' are pivotally interconnected by means of arm member 95. A right hand control lever 97 is pivotally connected to loader 10 and has a shaft 99 extending outwardly through panel member 21 which is rotated upon pivotal movement of control lever 97. An arm member 101 is rigidly secured to shaft 99 by any convenient means and extends downwardly therefrom and has a turnbuckle means 103 pivotally connected to its lower end. A bolt member 105 extends between panel member 21 and 23 and has a sleeve 107 rotatably mounted thereon. A U-shaped arm member 109 is rigidly secured to sleeve 107 and extends upwardly therefrom and is pivotally connected to the forward end of turnbuckle 103. Arm members 111 and 113 are pivotally connected to the forward ends of arm members 93 and 95 respectively. The forward ends of arm members 111 and 113 are pivotally connected to the upper end of arm 109.

FIG. 4 illustrates the arrangement of the various chains on the right side of the loader and will now be described in detail. A jack shaft 115 rotatably extends outwardly through channel member 21 and has a sprocket 117 mounted on its outer end. Jack shaft 115 is operatively connected to the loader power means. A chain 119 extends around sprocket 117, sprocket 55 on rear clutch 29 and sprocket 55' on front clutch 27. A conventional chain tightener 121 is secured to panel member 21 and operatively engages chain 119. A shaft 123 rotatably extends outwardly through panel 21 and has a small outer sprocket 125 operatively mounted thereon. Sprocket 125 has a front axle drive chain 127 extending therearound which embraces a front axle drive sprocket 129 operatively mounted on front axle 131. Front axle 131 has a wheel member 133 operatively mounted thereon. Shaft 73 is also provided with a large intermediate sprocket 135 and a small inner sprocket 137. Sprocket 137 has a rear axle drive chain 139 extending therearound which also embraces a rear axle drive sprocket 141 mounted on rear axle 143. A wheel member 145 is operatively mounted on rear axle 143. As best seen in FIG. 4, a chain 147 extends around sprocket 135, around sprocket 149 of chain tightener assembly 151, around the lower end of sprocket 35' and around the upper and rearward end of sprocket 35.

Each side of loader 10 is provided with a front clutch assembly and rear clutch assembly and their associated mechanism and for that reason has not been shown. A left hand control lever 153 is operatively connected to a rear clutch assembly and a front clutch assembly corresponding to rear clutch assembly 29 and front clutch assembly 27 respectively.

The normal method of operation is as follows. Loader 10 is moved forwardly by moving one or both of control levers 97 and 153 forwardly from their neutral position. FIG. 4 illustrates the forward and rearward movement of lever 97 with respect to its neutral position shown in full lines. The uppermost drawing in FIG. 5 illustrates the relationship between the inner and outer cam members in the rear and front clutch when the control lever 97 is in its neutral position. It can be seen from the uppermost drawing in FIG. 5 that ball 85 in rear clutch 29 is approximately in the center of the length of the tapered cam surfaces 73 and 83. Likewise in the front clutch 27, ball 85' is substantially in the center of the length of cam surfaces 73' and 83'. The center drawing in FIG. 5 illustrates the position of the inner end outer cam members in the rear and front clutches when the control lever 97 is moved forwardly. It can be seen that inner cam member 71 in rear clutch 29 has been moved away from outer cam member 79 or in an inwardly direction while inner cam member 71' has been moved towards outer cam member 79' or in an outwardly direction. Inner cam member 71 in rear clutch 29 is caused to be moved inwardly due to the shallow portions of the complementary cam surfaces 73 and 83 being directly opposite each other. Inner cam member 71' in front clutch 27 is permitted to move towards outer cam member 79' because the deep portions of the complementary cam surfaces 73' and 83' being directly opposite each other. Inner cam member 71 is yieldably urged outwardly due to the action of the release spring 65. The lowermost drawing in FIG. 5 illustrates the relationships between the inner and outer cam members in rear clutch 29 and front clutch 27 when control lever 97 has been moved rearwardly. It can be seen that the relationship between the cam members in the rear and front clutches has been reversed from the relationship shown in the center drawing in FIG. 5.

As viewed in FIG. 4, jack shaft 115 will cause rotation of sprocket 117 in a clockwise direction which also imparts clockwise rotation of sprocket 55 in rear clutch 29 and sprocket 55' in front clutch 27 regardless of the position of control lever 97. When control lever 97 is in its neutral position, the inner and outer cam members in rear clutch 29 and front clutch 27 will assume the relationship illustrated in the top drawing in FIG. 5. When the inner and outer cam members occupy this relationship, the pressure plate 67 is not urged into engagement with the outermost friction disc 57. The rotation of sprocket 55 also causes rotation of drive cup 45 which in turn causes rotation of the friction discs 67. Because pressure plate 67 is not bearing against the outermost friction disc 57, there is no frictional engagement between the friction disc 57 and the separator discs 61 which permits rotation of the friction discs 57 without imparting rotation to the separator discs 61 which means that sprocket 55 is rotated while sprocket 35 remains in a stationary position. Front clutch 27 is in an identical position to rear clutch 29 so that sprocket 55' is rotating while sprocket 35' is in a stationary position.

When control lever 97 is moved forwardly, inner cam member 71 and outer cam member 79 are rotated in opposite directions with respect to each other due to the various arm members, tab members, etc., which connects them to control lever 97. The forward movement of control lever 97 causes outer cam member 79 to be rotated in a counterclockwise direction and causes inner cam member 71 to be rotated in a clockwise direction as viewed in FIG. 2. The forward movement of control lever 97 causes outer cam member 79' in front clutch 27 to be rotated in a clockwise direction and causes inner cam member 71' to be rotated in a counterclockwise direction as viewed in FIG. 2. When control lever 97 is moved forwardly, the shallow portions of the complementary and oppositely facing cam surfaces 73 and 83 in rear clutch 29 are caused to be positioned opposite each other so that ball 85 causes inner cam member 71 to be moved inwardly with respect to outer cam member 79. The inward movement of inner cam member 71 causes inner cam bearing 69 to be moved against pressure plate 67 and to move pressure plate 67 inwardly against the outermost friction disc 57. The inward movement of pressure plate 67 causes the friction discs 57 to frictionally engage the separator discs 61. The frictional engagement between

friction discs 57 and separator discs 61 causes the rotating friction discs 57 to cause separator discs 61 to be also rotated. The rotation of separator discs 61 causes hub 33 to be rotated due to the splined engagement between separator discs 61 and hub 33. The rotation of hub 33 causes sprocket 35 to be rotated which causes sprocket 135 to be rotated in a clockwise direction which imparts clockwise rotation to sprockets 129 and 141 as viewed in FIG. 4. The clockwise rotation of sprockets 129 and 143 imparts a forward rotational movement to wheels 133 and 145 respectively. When the control lever 97 has been moved to its forward position and sprocket 35 has been caused to be rotated in a clockwise direction as viewed in FIG. 4, sprocket 35' will be freely rotating in a counterclockwise direction without causing any internal wear of the friction discs and separator discs in the front clutch.

The rearward movement of control lever 97 causes inner cam member 71' to be moved inwardly with respect to outer cam member 79' in front clutch 27 while inner cam member 71 has been moved toward outer cam member 79 in rear clutch 29. The inward movement of inner cam member 71' with respect to outer cam member 79' causes sprocket 35' to be rotated in a clockwise direction which causes sprocket 135 to be rotated in a counterclockwise direction as viewed in FIG. 4 to cause wheels 145 and 133 to be rotated in a counterclockwise direction as viewed in FIG. 7 to impart rearwood movement to the loader 10. During the time that sprocket 35' is imparting rearward movement to loader 10, sprocket 35 in rear clutch 29 is loosely freely rotating without causing internal wear in the clutch. Thus it can be seen that forward movement of control lever 97 causes rear clutch 29 to propel loader 10 forwardly while the rearward movement of control lever 97 causes front clutch 27 to propel the loader 10 rearwardly.

When both of control levers 97 and 153 are moved forwardly, the rear clutches at each of the sides of loader 10 will be moving the wheels at each side thereof in a forwardly rotational movement while the rearward movement of both of control levers 97 and 153 will cause the front clutches at each of the sides of loader 10 to rotate the wheels at each side thereof in a rearwardly rotational movement. If desired, one of the control levers may be moved forwardly while the other control lever is moved rearwardly which causes the wheels on one side of the loader to be rotated in one direction while the wheels at the other side of the loader will be caused to rotate in an opposite direction to permit the loader to "scrub" around in its own tracks so that it may be turned in a minimum amount of space.

Thus it can be seen that an efficient clutch mechanism for a loader device has been provided which is not subject to extreme wear and which permits the loader to be operated in a minimum amount of space.

Thus it can be seen that the device accomplishes at least all of its stated objectives.

Some changes may be made in the construction and arrangement of our self-propelled loader without departing from the real spirit and purpose of our invention, and it is our intention to cover by our claims, any modified forms of structure or use of mechanical equivalents which may be reasonably included within their scope.

We claim:

1. In a loader having opposite sides,

a power means on said loader,

first and second clutch means on one side of said loader and being operatively connected to a first pair of wheels on said one side,

third and fourth clutch means on the other side of said loader and being operatively connected to a second pair of wheels on said other side,

said first and third clutch means being operatively connected to said power means and adapted to cause rotation of said first and second pair of wheels respectively in one direction at times,

said second and fourth clutch means being operatively connected to said power means and adapted to cause rotation of said first and second pair of wheels respectively in a second direction at times,

a first control means operatively connected to said first and second clutch means to selectively cause rotation of said first pair of wheels in said one direction at times and to cause rotation of said first pair of wheels in said second direction at times,

a second control means operatively connected to said third and fourth clutch means to selectively cause rotation of said second pair of wheels in said one direction at times and to cause rotation of said second pair of wheels in said second direction at times,

each of said first, second, third and fourth clutches including, a rotatable hub having inner and outer ends; said hub having at least one external axial groove formed therein and having a first drive transmitting means rigidly mounted thereon adjacent the inner end, a drive cup rotatably mounted on said hub outwardly of said first drive transmitting means and having a flange portion having at least one slot formed therein, a second drive transmitting means rigidly mounted on said drive cup, a plurality of friction discs rotatably mounted on said hub outwardly of said drive cup, each of said friction discs having at least one tab member extending therefrom in engagement with said slot, a separator disc between each adjacent friction disc, each of said separator discs being splined into said groove in said hub for rotation therewith, said friction discs having a larger inside diameter than said separator discs, a plurality of release springs operatively mounted on said hub maintaining said separator discs out of frictional engagement with said friction discs, a pressure plate splined into said groove in said hub outwardly of said friction discs and said separator discs, said pressure plate being axially movable on said hub, a first cam bearing rotatably mounted on said hub outwardly of said pressure plate and being axially movable thereon to axially move said pressure plate inwardly on said hub, a first cam member rotatably mounted on said first cam bearing, a second cam bearing rotatably mounted on said hub outwardly of said first cam bearing, a second cam member rotatably mounted on said second cam bearing, said first and second cam members having cam surfaces formed therein forming pairs of complementary and oppositely facing cam surfaces, a ball between and in engagement with each pair of oppositely facing cam surfaces whereby rotation of said first and second cam members in one direction with respect to each other causes the balls to ride along their respective surfaces and separate said first and second cam members and causes inward axial movement of said first cam member with respect to said hub, said inward axial movement of said first cam member causing said first cam bearing to move said pressure plate axially inwardly on said hub thereby overcoming the resistance of said release springs and causing said friction discs to frictionally engage said separator discs, said frictional engagement of said friction discs with said separator discs causing said first drive transmitting means to be rotated when rotational power is being supplied to said second drive transmitting means and causing said second drive transmitting means to be rotated when rotational power is supplied to said first drive transmitting means, said first control means being operatively connected to said first and second cam members in each of said first and second clutches to effect rotation thereof at times and including first and second tabs secured to said first and second cam members respectively in said first clutch, third and fourth tabs secured to said first and second cam members

respectively in said second clutch, a first linkage means interconnecting said first tab and said fourth tab, a second linkage means interconnecting said second tab and said third tab, a third linkage means interconnecting said first and second linkage means to a first control lever.

2. In a loader having opposite sides,

a power means on said loader,

first and second clutch means on one side of said loader and being operatively connected to a first pair of wheels on said one side,

third and fourth clutch means on the other side of said loader and being operatively connected to a second pair of wheels on said other side, said first and third clutch means being operatively connected to said power means and adapted to cause rotation of said first and second pair of wheels respectively in one direction at times,

said second and fourth clutch means being operatively connected to said power means and adapted to cause rotation of said first and second pair of wheels respectively in a second direction at times,

a first control means operatively connected to said first and second clutch means to selectively cause rotation of said first pair of wheels in said one direction at times and to cause rotation of said first pair of wheels in said second direction at times,

a second control means operatively connected to said third and fourth clutch means to selectively cause rotation of said second pair of wheels in said one direction at times and to cause rotation of said second pair of wheels in said second direction at times,

each of said first, second, third and fourth clutches including, a rotatable hub having inner and outer ends; said hub having at least one external axial groove formed therein and having a first drive transmitting means rigidly mounted thereon adjacent the inner end, a drive cup rotatably mounted on said hub outwardly of said first drive transmitting means and having a flange portion having at least one slot formed therein, a second drive transmitting means rigidly mounted on said drive cup, a plurality of friction discs rotatably mounted on said hub outwardly of said drive cup, each of said friction discs having at least one tab member extending therefrom in engagement with said slot, a separator disc between each adjacent friction disc, each of said separator disc being splined into said groove in said hub for rotation therewith, said friction discs having a larger inside diameter than said separator discs, a plurality of release springs operatively mounted on said hub maintaining said separator discs out of frictional engagement with said friction discs, a pressure plate splined into said groove in said hub outwardly of said friction discs and said separator discs, said pressure plate being axially movable on said hub, a first cam bearing rotatably mounted on said hub outwardly of said pressure plate and being axially movable thereon to axially move said pressure plate inwardly on said hub, a first cam member rotatably mounted on said first cam bearing, a second cam bearing rotatably mounted on said hub outwardly of said first cam bearing, a second cam member rotatably mounted on said second cam bearing, said first and second cam members having cam surfaces formed therein forming pairs of complementary and oppositely facing cam surfaces, a ball between and in engagement with each pair of oppositely facing cam surfaces whereby rotation of said first and second cam members in one direction with respect to each other causes the balls to ride along their respective surfaces and separate said first and second cam members and causes inward axial movement of said first cam member with respect to said hub, said inward axial movement of said first cam member causing said first cam bearing to move said pressure plate axially inwardly on said hub thereby overcoming the resistance of said release springs and causing said friction discs to frictionally engage said separator discs, said frictional engagement of said friction discs with said separator discs causing said first drive transmitting means to be rotated when rotational power is being supplied to said second drive transmitting means and causing said second drive transmitting means to be rotated when rotational power is supplied to said first drive transmitting means, said second control means being operatively connected to said first and second cam members in each of said third and fourth clutches to effect rotation thereof at times and including first and second tabs secured to said first and second cam members in said third clutch, third and fourth tabs secured to said first and second cam members in said fourth clutch, a first linkage means interconnecting said first tab and said fourth tab, a second linkage means interconnecting said second tab and said third tab, a third linkage means interconnecting said first and second linkage means to a second control lever.

3. In a loader having opposite sides,

a power means on said loader,

first and second clutch means on one side of said loader and being operatively connected to a first pair of wheels on said one side,

third and fourth clutch means on the other side of said loader and being operatively connected to a second pair of wheels on said other side,

said first and third clutch means being operatively connected to said power means and adapted to cause rotation of said first and second pair of wheels respectively in one direction at times,

said second and fourth clutch means being operatively connected to said power means and adapted to cause rotation of said first and second pair of wheels respectively in a second direction at times,

a first control means operatively connected to said first and second clutch means to selectively cause rotation of said first pair of wheels in said one direction at times and to cause rotation of said first pair of wheels in said second direction at times,

a second control means operatively connected to said third and fourth clutch means to selectively cause rotation of said second pair of wheels in said one direction at times and to cause rotation of said second pair of wheels in said second direction at times,

each of said first, second, third and fourth clutches including a rotatable hub having opposite ends, a first drive transmitting means rigidly mounted on said hub adjacent one end for rotation therewith, a second drive transmitting means rotatably mounted on said hub, a plurality of friction discs embracing said hub and secured to said second drive transmitting means for rotation therewith, a separator disc embracing said hub between each pair of friction discs, said separator discs being secured to said hub for rotation therewith, a pressure plate means rotatably and axially movably mounted on said hub laterally of said discs and being axially movable thereagainst at times to cause said friction discs to frictionally engage said separator discs whereby said second drive transmitting means will be rotated when rotational power is applied to said first drive transmitting means and whereby said first drive transmitting means will be rotated when rotational power is applied to said second drive transmitting means, a roller cam means rotatably mounted on said hub adapted to cause said pressure plate to axially move against said discs at times, said roller cam means

including first and second cam members rotatably mounted on said hub means, said second cam member being axially movable on said hub means to cause said pressure plate to axially move against said discs, said cam members each having cam surfaces forming pairs of complementary and oppositely facing cam surfaces, a ball between and in engagement with each pair of oppositely facing cam surfaces whereby rotation of said first and second cam members in one direction with respect to each other causes the balls to ride along their respective surfaces and separate said first and second cam members and causes said pressure plate to move against said discs,

a first linkage means connecting one of said first and second cam members of said first clutch with one of said first and second cam members of said second clutch,

a second linkage means connecting the other of said first and second cam members of said first clutch with the other of said first and second cam members of said second clutch,

a third linkage means movable in two directions and connecting said first and second linkage means with said first control means whereby movement of said third linkage means in one direction will cause the discs in said first clutch to be frictionally engaged and will cause the discs in said second clutch to be frictionally disengaged, and whereby movement of said third linkage means in said second direction will cause the discs in said first clutch to be frictionally disengaged and will cause the discs in said second clutch to be frictionally engaged,

a fourth linkage means connecting one of said first and second cam members of said third clutch with one of said first and second cam members of said fourth clutch,

a fifth linkage means connecting the other of said first and second cam members with the other of said first and second cam members of said fourth clutch,

a sixth linkage means movable in two directions and connecting said fourth and fifth linkage means with said second control means whereby movement of said sixth linkage means in one direction will cause the discs in said third clutch to be frictionally engaged and will cause the discs in said fourth clutch to be frictionally disengaged, and whereby movement of said sixth linkage means in said second direction will cause the discs in said third clutch to be frictionally disengaged and will cause the discs in said fourth clutch to be frictionally engaged.

4. The loader of claim 3 wherein said second drive transmitting means in said first and second clutches are comprised of sprockets having a chain extending therearound which is driven by said power means, said first drive transmitter means in said first and second clutches comprised of sprockets having a chain extending therearound, said chain extending around said first drive transmitting means being operatively connected to said first pair of wheels, said second drive transmitting means in said third and fourth clutches being comprised of sprockets having a chain extending therearound which is driven by said power means, said first drive transmitting means in said third and fourth clutches comprised of sprockets having a chain extending therearound, said chain extending around said first drive transmitting means in said third and fourth clutches being operatively connected to said second pair of wheels.

5. In a loader having opposite sides,

a power means on said loader,

first and second clutch means on one side of said loader and being operatively connected to a first pair of wheels on said one side,

third and fourth clutch means on the other side of said loader and being operatively connected to a second pair of wheels on said other side,

said first and third clutch means being operatively connected to said power means and adapted to cause rotation of said first and second pair of wheels respectively in one direction at times,

said second and fourth clutch means being operatively connected to said power means and adapted to cause rotation of said first and second pair of wheels respectively in a second direction at times,

a first control means operatively connected to said first and second clutch means to selectively cause rotation of said first pair of wheels in said one direction at times and to cause rotation of said first pair of wheels in said second direction at times,

a second control means operatively connected to said third and fourth clutch means to selectively cause rotation of said second pair of wheels in said one direction at times and to cause rotation of said second pair of wheels in said second direction at times,

each of said first, second, third and fourth clutches including, a rotatable hub having inner and outer ends; said hub having at least one external axial groove formed therein and having a first drive transmitting means rigidly mounted thereon adjacent the inner end, a drive cup rotatably mounted on said hub outwardly of said first drive transmitting means and having a flange portion having at least one slot formed therein, a second drive transmitting means rigidly mounted on said drive cup, a plurality of friction discs rotatably mounted on said hub outwardly of said drive cup, each of said friction discs having at least one tab member extending therefrom in engagement with said slot, a separator disc between each adjacent friction disc, each of said separator discs being splined into said groove in said hub for rotation therewith, said friction discs having a larger inside diameter than said separator discs, a plurality of release springs operatively mounted on said hub maintaining said separator discs out of frictional engagement with said friction discs, a pressure plate splined into said groove in said hub outwardly of said friction discs and said separator discs, said pressure plate being axially movable on said hub, a first cam bearing rotatably mounted on said hub outwardly of said pressure plate and being axially movable thereon to axially move said pressure plate inwardly on said hub, a first cam member rotatably mounted on said first cam bearing, a second cam bearing rotatably mounted on said hub outwardly of said first cam bearing, a second cam member rotatably mounted on said second cam bearing, said first and second cam members having cam surfaces formed therein forming pairs of complementary and oppositely facing cam surfaces, a ball between and in engagement with each pair of oppositely facing cam surfaces whereby rotation of said first and second cam members in one direction with respect to each other causes the balls to ride along their respective surfaces and separate said first and second cam members and causes inward axial movement of said first cam member with respect to said hub, said inward axial movement of said first cam member causing said first cam bearing to move said pressure plate axially inwardly on said hub thereby overcoming the resistance of said release springs and causing said friction discs to frictionally engage said separator discs, said frictional engagement of said friction discs with said separator discs causing said first drive transmitting means to be rotated when rotational power is being supplied to said second drive transmitting means and causing said second drive transmitting means to be rotated when rotational power is supplied to said first drive transmitting means.

6. The device of claim 5 wherein said first control means is operatively connected to said first and second cam members in each of said first and second clutches to effect rotation thereof at times.

7. The device of claim 5 wherein said first control means is operatively connected to said first and second cam members in each of said first and second clutches so that said first and second cam members in said first clutch are rotated in said one direction as said first and second cam members in said second clutch are rotated in an opposite direction.

8. The device of claim 5 wherein said second control means is operatively connected to said first and second cam members in each of said third and fourth clutches to effect rotation thereof at times.

9. The device of claim 5 wherein said second control means is operatively connected to said third and fourth cam members so that said first and second cam members

in said third clutch are rotated in said one direction as said first and second cam members in said fourth clutch are rotated in an opposite direction.

References Cited

UNITED STATES PATENTS

1,470,078	10/1923	Hellwarth	74—361 X
1,680,553	8/1928	Krotz	180—6.66
3,011,608	12/1961	Hansen	192—69 X
3,127,969	4/1964	Hansen	192—93
3,151,503	10/1964	Keller et al.	
3,231,117	1/1966	Melroe et al.	180—6.66 X

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