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FLUID MOTOR WITH VALVE DISK AND CUSHIONING MEANS

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2 Sheets-Sheet 2

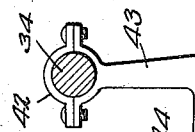
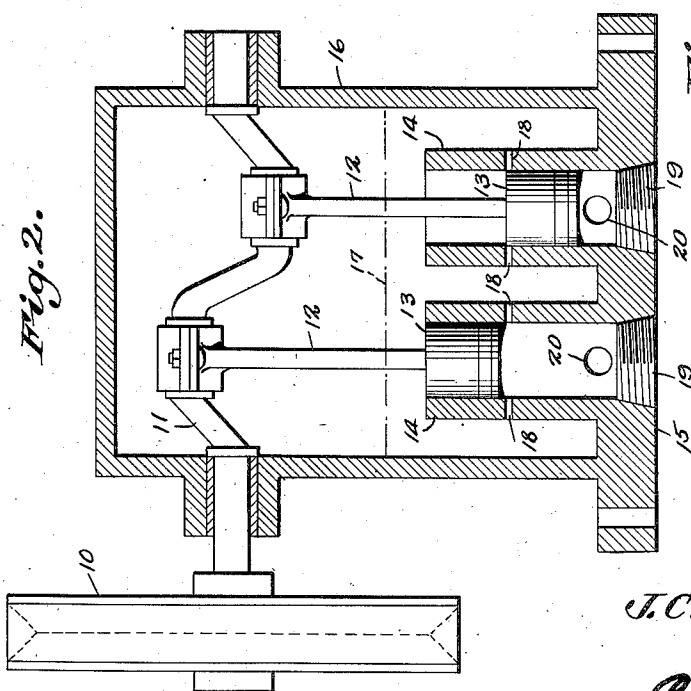
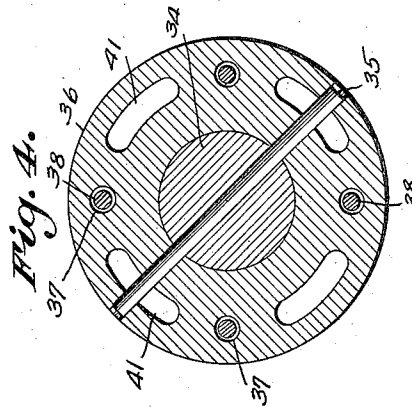
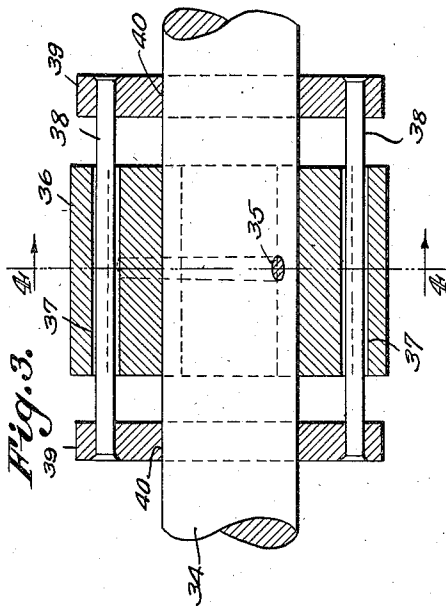


Fig. 5.



Fig. 6.

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FLUID MOTOR WITH VALVE DISK AND CUSHIONING MEANS

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2 Claims. (Cl. 60—54.6)

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This invention relates to a hydraulic hedge clipper or mower of the reciprocating knife type, adapted to clip hedges, lawns, or the like. In particular, the construction is adapted especially for the clipping of hedges.

An important object of the invention is to provide an improved hydraulic clipper of the character described, wherein the knife action will be smoother, more quiet, and less damaging on the parts associated with the knives.

Other important objects of the invention are to provide a hydraulic clipper that will be durable, relatively light, capable of manufacture at comparatively low cost considering the advantages attained thereby, and having a minimum of parts arranged in a manner whereby they will not readily get out of order.

With the foregoing and other objects in view which will appear as the description proceeds, the invention consists of certain novel details of construction and combinations of parts herein-after more fully described and pointed out in the claims, it being understood that changes may be made in the construction and arrangement of parts without departing from the spirit of the invention as claimed.

Referring to the drawings

Figure 1 is a view partly in top plan and partly in longitudinal section, of a hydraulic clipper constructed in accordance with the invention.

Figure 2 is a vertical section through a motor casing embodied in the invention.

Figure 3 is an enlarged longitudinal section through a piston and centering valve arrangement.

Figure 4 is a section on line 4—4 of Fig. 3.

Figure 5 is a section taken substantially on line 5—5 of Fig. 1.

Figure 6 is a section taken substantially on line 6—6 of Fig. 1.

Referring to the drawings in detail a V belt leading from any suitable motor (not shown) is adapted to power a drive wheel 10, for the purpose of rotating crank shaft 11, to which are connected the reciprocating connecting rods 12 carrying pistons 13 that reciprocate in the cylinders 14 integral with the bottom plate 15 of a fluid casing 16. Said casing 16 is filled with fluid to a suitable level, indicated in the present instance at 17. Compensator ports 18 are formed in the respective cylinders 14, to permit fluid to flow into or be forced from the cylinders responsive to reciprocation of the pistons 13, and a fluid outlet is provided for each cylinder, said fluid outlet

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being designated 20. The cylinders are normally closed by means of the plugs 19.

Extending from the outlets 20 are the hoses 21 and 22, these being of any suitable length sufficient to permit clipping operations with ease. A plate 23 has cast integrally therewith a generally cylindrical cylinder housing 24, having at its ends the annular flanges or collars 25, adapted to receive the hose couplings 26, whereby the hoses 21 and 22 may be coupled into the respective ends of the cylinder housing 24.

Also formed in the collars 25 of the cylinder or piston housing 24 are vent openings in which are positioned the air vent plugs 27.

The piston housing 24 is formed with a smooth walled end to end bore 28, and the ends of this bore are closed by the annularly flanged cylinder heads 29, from the inner surface of which extend the studs 30, whereby the heads 29 can be aligned with the bore 28, and integrally formed with the studs 30 and extending inwardly of the ends of bore 28 are the nipples 31.

The outer ends of the cylinder heads 29 are formed with the threaded sockets 32, receiving the tightening nuts 33, designed to prevent leakage of fluid from the bore 28 of the piston housing.

Reciprocating in the opposed piston or cylinder heads 29 is the elongated piston rod 34, that projects beyond either end of the cylinder or piston housing 24, as readily seen from Fig. 1.

Referring now to Figs. 3 and 4, there is fixedly secured to the piston rod 34, intermediate the ends of the piston rod, the piston 35, that is pinned to the rod 34 by means of the cross pin 35. Piston 36 is formed as a centrally apertured collar or ring, as readily seen from Fig. 4.

Formed in the marginal portion of the piston head 36 are openings 37, that extend transversely through the piston head, so as to provide communication between the opposite sides thereof. In the present instance, as clearly seen from Fig. 4, four such openings are provided, but this number may be increased or decreased as desired. In any event, there is extended through each opening 37 a tie pin 38, and it may be noted from Figs. 3 and 4 that the openings are of notably greater diameter than the diameter of the tie pin, so as to provide a clearance for the passage of fluid through the openings during reciprocation of the tie pin in the piston head.

To the ends of the tie pin are fixedly secured the opposed valve discs 39, which as seen from Fig. 3, are of slightly less diameter than the diameter of the piston head, so as to provide a clearance between the periphery of the respective

discs 39 and the wall of the bore 28, said clearance permitting the passage of oil or the other fluid used around the valve discs.

Said valve discs are respectively formed with central openings 40, through which is slidably extended the piston rod 34.

Also formed in the piston head 36, as may be noted from Fig. 4, are the wide transversely disposed fluid passages 41, that supplement the openings 37 in permitting the passage of fluid between opposite sides of the piston head.

By means of clamps 42, the projecting ends of the piston rod 34 are made rigid with the up-standing ends 43 of arms 44 that are integral with the movable knife 45, having teeth 46. Thus, reciprocation of the piston rod 34 reciprocates at high speed the knife 45.

Formed in the knife 45 are elongated slots 47, through which extend the pins 48, that also extend through the stationary knife 49 having the teeth 50, and through the cover plate 51, also stationary, that is secured to the stationary knife 49 by a plurality of rivets 52 or similar fastening means. Rivets 52 pass through end spacer blocks 53 and an elongated middle spacer block 54, whereby a space is defined between the fixedly connected cover plate and stationary knife, within which space the movable knife 45 is adapted to be reciprocated.

In operation, it will be understood that on rotation of the drive wheel 10, the pistons 13 will be alternately reciprocated, so that as fluid is forced through hose 21, it will be withdrawn through hose 22, and vice versa. Thus, the fluid is forced under pressure into one end of the bore 28, while being withdrawn from the other end.

As a result, and assuming that fluid is about to be forced through the hose 22, considering the position of the parts in Fig. 1, it will be observed that said fluid will flow around the nipple 31 at the right of the piston housing 24, and will be forced under pressure against the outer surface of the right hand valve disc 39. As a result, the piston head 36 will be forced to the left in Fig. 1. As soon as the left hand valve disc 39 comes against the left nipple 31, the fluid, still exerting force toward the left, bears upon the peripheral portion of the piston head 36, and continues to force it to the left, although the two valve discs 39 will of course now be stationary. As the piston head 36 begins this last movement between the valve disc 39, fluid moving through the clearance openings 37 and 41 will cushion the final impact of the piston head.

This operation will result when the piston head moves to the right, back to the position illustrat-

ed in Fig. 1. Thus, rapid reciprocation of the movable knife 45 is obtained, and it may be noted that at the very end of the travel of the movable knife in either direction, the movement is slowed imperceptibly, to relieve impact upon the parts which would otherwise result.

What is claimed is:

1. In a fluid motor a cylinder having closed ends; means at opposite ends of the cylinder for forcing fluid into said opposite ends alternately; a piston mounted for reciprocation within said cylinder under pressure of said fluid, said piston having ports extending therethrough; and valve discs mounted on opposite faces of said piston and alternately closing said ports, said valve discs adapted to be opened by contact with the end walls of the cylinder for cushioning the blow of the piston against said end walls.

2. In a fluid motor a cylinder having closed ends; means for forcing fluid into said cylinder, said means adapted to alternate said fluid pressure between said ends of the cylinder; a piston mounted for slidable reciprocation within said cylinder under pressure of the fluid forced therein, said piston having a snug wiping fit against the wall of the cylinder and having ports formed therein; valve discs mounted on opposite faces of said piston, said valve discs being of substantially less diameter than the diameter of the piston to provide clearance spaces between the peripheries of the valve discs and the wall of the cylinder, said discs adapted to close the ports of the piston when forced against the face of the piston; and rods rigidly connecting said valve discs and slidable in the piston, whereby as the piston will approach one end of the cylinder the valve disc on one face of the piston will be engaged by the cylinder end for forcing the opposite valve disc out of port closing position for passage of fluid through the piston to cushion the blow of said piston.

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