March 12, 1968 F. M. LATHROP II, ETAL 3,372,607

SELECTIVE DRIVE MECHANISM

Filed Nov. 8, 1965 2 Sheets-Sheet 1

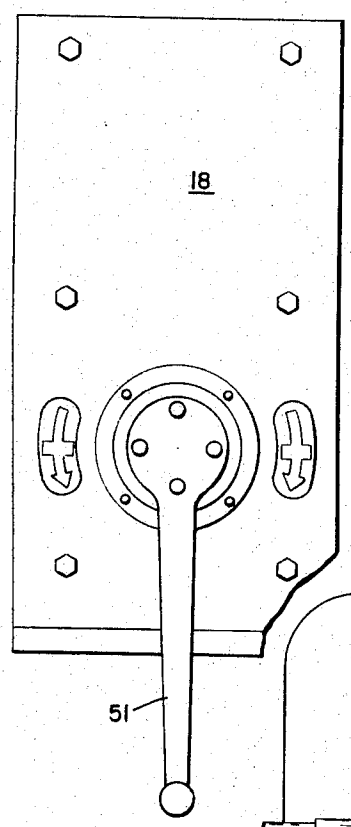


FIG_2

FIG_1

INVENTORS
FRANCIS M. LATHROP, II
BY LYLE R. VAN ARSDALE
Flehr and Swain
ATTORNEYS

March 12, 1968 F. M. LATHROP II, ETAL 3,372,607

SELECTIVE DRIVE MECHANISM

Filed Nov. 8, 1965 2 Sheets-Sheet 2

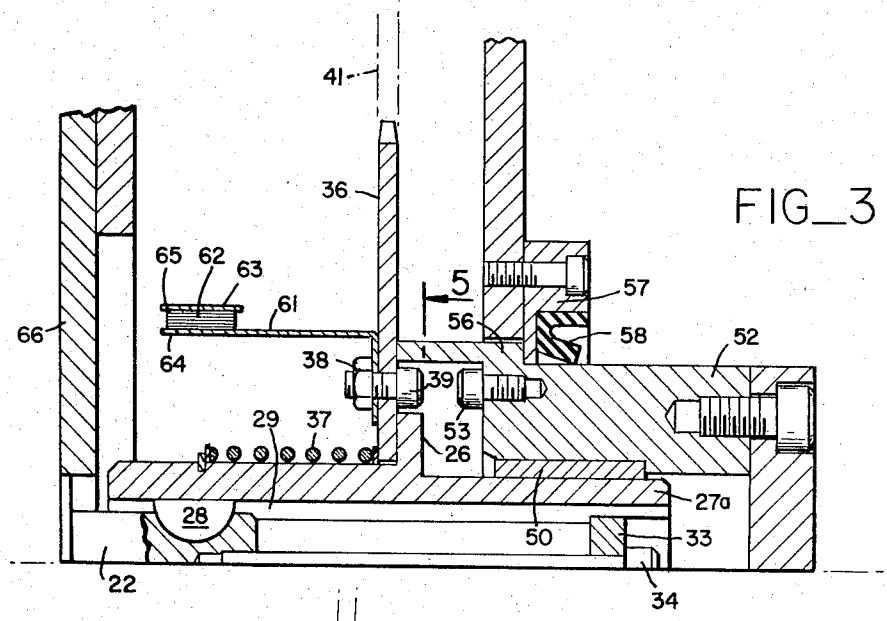


FIG_3

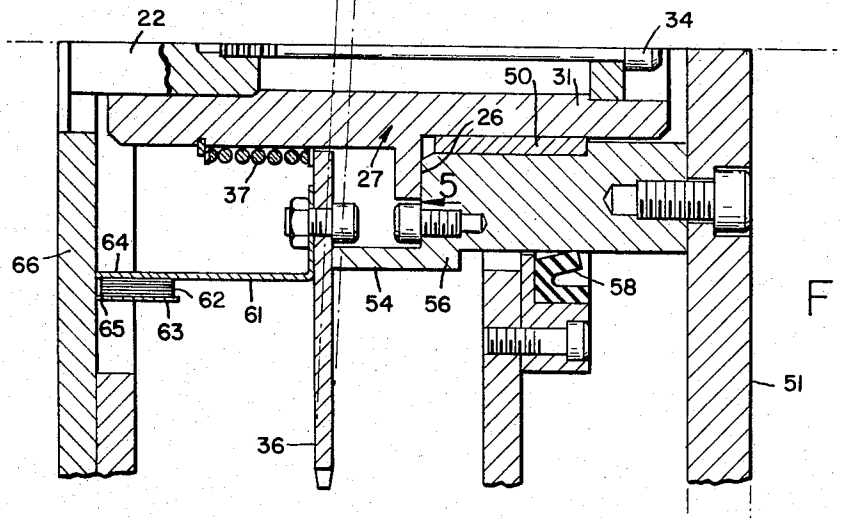


FIG_4

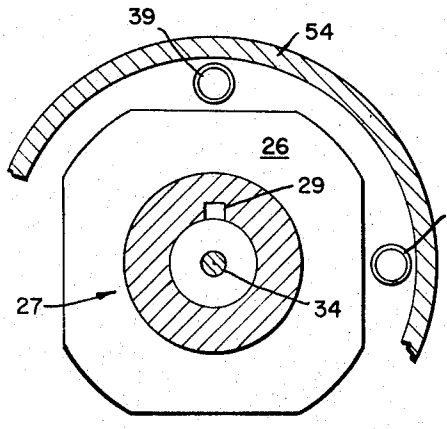


FIG_5

INVENTORS
FRANCIS M. LATHROP, II
LYLE R. VAN ARSDALE
BY
Fleckner and Swain
ATTORNEYS

United States Patent Office 3,372,607 Patented Mar. 12, 1968

3,372,607

SELECTIVE DRIVE MECHANISM

Francis M. Lathrop II, and Lyle R. Van Arsdale, Houston, Tex., assignors to M & J Valve Company, Houston, Tex., a corporation of Delaware

Filed Nov. 8, 1965, Ser. No. 506,672
7 Claims. (Cl. 74—625)

ABSTRACT OF THE DISCLOSURE

Selective drive means for either manual or motor operation of a hydraulic pump or like device. Has clutch parts including magnetic means for insuring disengagement of the motor during manual operation, the magnetic means being automatically released when the motor is energized.

SPECIFICATION

This invention relates generally to selective driving mechanisms for driving a shaft by either manual or power means. It is applicable particularly to hydraulic systems where a hydraulic pump is arranged for either manual or power operation.

Hydraulic systems using power or manually driven hydraulic pumps are employed for various purposes. Particular reference can be made to valve operating systems having a double acting cylinder connected to the valve part and supplied with hydraulic fluid from a pump. Application of hydraulic fluid to the cylinder may be controlled by a four-way type of control valve, or a reversible type of pump may be used in the manner shown in copending application S.N. 479,262, now abandoned. In any event it is desirable to provide both manual and power operating means, with provision for clutching either an operating hand crank or a motor to the shaft of the pump. Prior mechanisms for this purpose have been unsatisfactory because of mechanical complications and because they have not had certain desirable safety features. Particularly, they have not made certain that the manual means is disengaged when the driving motor is energized. Unless such disengagement is assured, workmen may be injured by rapid rotation of the hand crank when the motor is in operation.

In general, it is an object of the present invention to provide a clutch drive mechanism for selectively driving a rotatable shaft either by the use of manual means such as a hand crank, or by a power means such as an electric, pneumatic or hydraulic motor.

Another object of the invention is to provide a mechanism of the above type which is particularly adapted for use in hydraulic systems where a hydraulic pump is driven in either direction to perform various operations.

Another object of the invention is to provide clutch drive mechanism of the above character which will provide utmost safety to workmen, and which will ensure that the hand crank is disengaged when the driving motor is energized.

Further objects and features of the invention will appear from the following description in which the preferred embodiment has been set forth in detail in conjunction with the accompanying drawing.

Referring to the drawing:

FIGURE 1 is a side elevational view partly in section illustrating mechanism incorporating the present invention;

FIGURE 2 is a side elevational view looking toward the front side of the mechanism as shown in FIGURE 1;

FIGURE 3 is a side elevational view in section illustrating in detail the various parts of the clutching means;

FIGURE 4 is a view similar to FIGURE 3 but showing the parts in a different operating position; and

FIGURE 5 is a cross-sectional detail taken along the line 5—5 of FIGURE 3.

FIGURES 1 and 2 show our clutch drive mechanism together with other parts of a hydraulic system. Mounting means is provided including the base plate 10 and the upright plate 11, together with the reinforcing flanges 12. A housing is attached to this mounting and includes the vertical back wall 13, top, bottom and side walls 14, 15 and 16, and the removable front plate 18. A hydraulic pump 19 is shown secured to the plate 11 by mounting studs 21, and is provided with the rotatable shaft 22. A driving motor 23 is mounted upon the back plate 13, and has an operating shaft 24 within the housing. This motor may be any one of the conventional types, including electrical, pneumatic or hydraulic.

The hydraulic system with which our clutch mechanism has been used makes use of a reversible hydraulic pump, and therefore in this instance it is assumed that pump 19 is reversible, and the motor 23 is likewise reversible for driving in either direction.

The parts of the mechanism include the first clutch part 26 which is shown mounted upon the hub or sleeve 27, that is fixed to rotate with shaft 22. Thus it is shown engaged by the shaft key 28, and the annular shoulders 29 and 31 within the sleeve are engaged respectively by the end of the shaft 22 and by the clamping washer 33. Bolt 34 extends through the washer 33 and is threaded into the end of the shaft 22. The clutch part 26 may be squared as shown in FIGURE 5.

A member 36, formed to provide a sprocket, is loosely disposed upon the sleeve 27 and is urged by compression spring 37 against one side of the clutch part 26. Bolts 38, provided with heads 39, are secured to the member 36 and positioned to provide driving dogs for establishing driving engagement with the clutch part 26. In other words, the bolt heads 39, together with member 36, form a second shiftable clutch part.

As shown in FIGURE 1, the sprocket 36 is engaged by the driving chain 41. The drive from the shaft 24 of the motor 23 may include the countershaft 42, together with the countershaft sprockets 43 and 44. Chain 41 engages the sprocket 43, and chain 46 engages the sprocket 44 and the pinion sprocket 47 on the motor shaft 24.

For the position of the parts shown in FIGURE 3, the sprocket 36 is aligned with sprocket 43 and the driving chain 41.

The manual operating means consists of a hand crank 51 attached to the hub 52. The hub is provided with an inner bushing 50 and is journalled upon the portion 27*a* of the sleeve 27. The inner face of the hub 52 carries the driving studs 53 which are positioned whereby they can establish driving relation with the first clutch part 26. The inner end of the hub 52 also carries the annular rim 54 which extends toward and is adapted to engage with the sprocket 36.

The crank 51 together with hub 52 are adapted to move axially of the sleeve 27 between two limiting positions. One limiting position is shown in FIGURE 3, and the second in FIGURE 4. In the first limiting position the annular shoulder 56 is brought into abutment with the retaining ring 57, which carries the dust seal 58. In the second limiting position, the inner end of the hub is brought into abutment with one side of the first clutch part 26, and the dogs 53 are brought into driving engagement with the clutch part 26 as shown in FIGURE 4.

Automatically releasable means is provided for retaining the sprocket 36 in the position shown in FIGURE 4 against the urge of spring 37. Preferably this means is magnetic in character and utilizes permanent magnets. Thus an annular shell 61 is shown attached to the sprocket 36, and its free edge is provided with the permanent electromagnets 62, together with external magnet pole means 63.

Assuming that the shell **61** is made of suitable magnetic material, such as mild steel, the extremities **64** and **65** form oppositely polarized magnetic pole. When the sprocket and shell **63** are moved to the left by movement of the hub **52** to the position shown in FIGURE 4, the poles **64** and **65** are brought into contact with the steel wall **66**, and are magnetically retained in this position against the urge of the spring **37**.

The magnetic retention means described above is automatically released when the motor **23** is energized. Referring to FIGURE 4, it will be seen that the drive chain **41** is misaligned with respect to both sprockets **43** and **36**. Therefore, when the motor is energized, the pull upon the drive chain **41** serves to cock the sprocket **36**, with the result that the shell **61** is snapped loose from its magnetic retention with the plate **66**. Immediately after the magnetic retention is broken the sprocket **36** moves to the right under the urge of spring **37** to the position shown in FIGURE 3, where the dogs **39** engage the first clutch part **26**.

Operation of our clutch mechanism can be reviewed as follows. When the parts are in the position shown in FIGURE 3, the sprocket **36** has its lugs **39** in engagement with the first clutch part **26**, and therefore when the motor **23** is energized, drive is established to shaft of the hydraulic pump **19**. If it is desired to disconnect the power drive and operate the pump manually, the operator applies axial thrust against the crank **51** to shift the hub **52** to the position shown in FIGURE 4, where the lugs **53** are in driving relation with the first clutch part **26**. This movement also forces the sprocket **36** to the left to disengage the dogs **39** from the clutch part **26**. In addition, it brings the magnetic poles **64** and **65** into contact with the plate **66**, whereby magnetic retention is established. The operator may now turn the crank **51** to drive the pump **19** in either direction. Assuming that the parts are left in the position shown in FIGURE 4, when the motor **23** is energized, the magnetic retention is immediately released with movement of the sprocket **36** back to the position shown in FIGURE 3, and with simultaneous movement of the hub **52** to the right whereby its lugs **53** are disengaged with respect to clutch part **26**. Thus before any amount of turning movement can be imparted to the crank, the crank has its drive disconnected to avoid any possible injury to an operator.

It will be evident that our invention is applicable to a wide variety of apparatus and systems where it is desired to drive a shaft from either power or manual means. It is particularly useful in the application described, where both the power and manual means are reversible and are selectively applied to drive a reversible hydraulic pump.

We claim:

1. In mechanism for selectively driving a rotatable shaft, a rotatable clutch part connected in driving relation with the shaft, second and third clutch parts rotatably disposed in alignment with the first clutch part and selectively movable in an axial direction into and out of positive driving relation with the first clutch part, spring means for yieldably urging the second clutch part toward positive engagement with the first clutch part, means acting between the second and third clutch parts for displacing the third clutch part from engagement with the first clutch part when the second clutch part is moved into driving engagement with the first clutch part, means for releasably retaining the second clutch part in disengaged position against the urge of the spring means, said retaining means acting responsive to manual movement of the third clutch part to a position in engagement with the first clutch part, said last means being automatically released when driving torque is applied to the second clutch part, and means for applying driving torque to the second clutch part.

2. Selective driving means as in claim **1** in which said releasable retaining means is of the magnetic type.

3. Selective driving means as in claim **1** in which said releasable retaining means includes magnetic means of the permanent magnet type.

4. Selective driving means as in claim **3** in which the means for applying driving torque to the second clutch part includes a sprocket secured to the second clutch part and a sprocket chain engaging the same, said retaining means being automatically released by cocking of the sprocket when driving force is applied to the driving chain.

5. Selective driving means as in claim **1** in which said releasable retaining means includes magnetic means of the permanent magnet type carried by said second clutch part, and a fixed member of magnetic material adapted to be engaged by said magnetic means for retaining the second clutch part in said fixed disengaged position.

6. In means for selectively driving a rotatable shaft, a first rotatable clutch part connected in driving relation with the shaft, second and third clutch parts rotatably disposed in alignment with the first clutch part and selectively movable in an axial direction into and out of positive driving relation with the first clutch part, spring means for urging the second clutch part toward engaged relation with the first clutch part, a driving sprocket attached to the second clutch part, a driving chain engaging the sprocket, a hand crank secured to the third clutch part and rotatable for manual driving, means acting between the second and third clutch parts for displacing the second clutch part from engagement with the first clutch part when the third clutch part is moved into engagement with the first clutch part, and magnetic means for releasably retaining the second clutch part in disengaged position against the urge of the spring means, said magnetic means being made effective to so retain the second clutch part responsive to manual movement of the third clutch part to move the same into engagement with the first clutch part, said magnetic means being automatically released when power is applied to said driving chain.

7. In means for selectively driving the rotatable shaft of a hydraulic pump, a rotatable clutch part connected in driving relation with the pump shaft, second and third clutch parts rotatably and slidably disposed in alignment with the first clutch part and selectively movable in an axial direction into and out of engaged driving relation with the first clutch part, spring means for urging the second clutch part toward engaged relation with the first clutch part, means acting between the second and third clutch parts for displacing the second clutch part from engagement with the first clutch part when the third clutch part is moved into engagement with the first clutch part, a hand crank operatively connected to the third clutch part, axial movement of said hand crank serving to move the third clutch part into operative engagement with the first clutch part, a sprocket connected to the first clutch part, a chain engaging the sprocket and serving to drive the same, and magnetic means for retaining the second clutch part in disengaged position against the urge of the spring means after manual movement of the third clutch part to a position to bring it into engagement with the first clutch part, said last retaining means being automatically disengaged by cocking of the sprocket when driving force is applied to the driving chain.

References Cited

UNITED STATES PATENTS

1,131,778	3/1915	Hanson	74—625 X
2,420,552	5/1947	Morrill	74—625 X
2,529,660	11/1950	Meyer et al.	74—625 X
2,621,543	12/1952	Rossmann	74—625
2,923,170	2/1960	Pfaffenberger	74—625

FRED C. MATTERN, JR., *Primary Examiner.*

W. S. RATLIFF, *Assistant Examiner.*