

(12)

IMPROVEMENTS IN DRIVE MECHANISMS

The invention relates to drive mechanisms, and more particularly but not exclusively to drive mechanisms for opening and closing gates.

5 Mechanisms are known for opening and closing gates in which a motor rotates a gate through a gear mechanism, such as a worm gear. A difficulty arises, however, in providing satisfactory means for allowing manual operation of the gates, should the need arise.

10 According to the invention there is provided a mechanism for opening and closing gates, which mechanism comprises input means adapted to be driven by a motor, output means from the mechanism for moving a gate, which output means is movable about an axis of rotation, and means for transmitting move-
15 ment from the input means to the output means, which transmission means comprises clutch means for allowing manual operation of the gate and a gear mechanism, which clutch means comprise a clutch pressure plate, a friction plate and spring means for urging the pressure plate against the friction plate with a predetermined
20 force to allow manual operation of a gate by slipping of the clutch means when a predetermined moment is applied about the axis of rotation of the output means, the friction plate being a gear wheel of the gear mechanism.

The clutch means are preferably enclosed within a
25 clutch housing, and the housing is preferably filled with lubricating fluid.

The output means, the gear wheel, and the clutch
30 pressure plate are preferably mounted for rotation about a common axis.

The output means and the clutch pressure plate are preferably fixed for rotation on a common shaft, and the gear wheel is preferably mounted on the shaft to allow
35 relative rotational movement between the gear wheel and the shaft.

The gear wheel may be rotatably mounted on a mounting element fixed for rotation with the shaft, the mounting element having abutment means for providing an axial stop against axial movement of the gear wheel under bias of said spring means.

The spring means preferably comprises a multiplicity of springs spaced circumferentially about the axis of rotation of the pressure plate. There may be between four and ten springs, for example seven.

10 The gear wheel may be driven by a worm gear.

The invention further provides a mechanism according to the invention for opening and closing gates and a motor for driving the mechanism.

15 The motor may drive a worm wheel which drives a worm gear which in turn drives said gear wheel.

By way of example, one embodiment of a mechanism according to the invention will now be described with reference to the accompanying drawings, in which:-

20 Figure 1 is a cut-away view of a mechanism according to the invention; and

Figure 2 is an exploded view illustrating all the parts which make up the mechanism of Figure 1 and the motor drive therefor.

As shown in Figures 1 and 2, a drive mechanism 25 generally indicated at 10 has a main body portion 11 which includes a plate 12 to fit at ground level, for example set in concrete, the plate having four holes 13 formed therein.

30 Beneath the plate 12 extends a housing part 14 for housing a gear mechanism and clutch assembly.

The description of the mechanism and its operation will start from the motor drive end and finish with the output from the mechanism.

35 Drive to the mechanism and through the mechanism to a gate is provided by a motor 15, conveniently an

electric motor. The motor drives

5 a worm gear within a motor casing 16 and the worm gear drives a ring gear 17 fixed for rotation with an input shaft 18 carrying a worm gear 19. Bolts 20 secure together the housing 16 and a motor flange 21 and bolts 22 secure together the motor flange 21 and an end cap 23, which end cap 23 in the completed assembly is threadedly engaged with the housing part 14. An oil 10 seal 24 fits over the shaft 18 and a bearing 25, in this case a ball bearing, supports the shaft 18.

The ring gear 17 is fixed for rotation with the shaft 18 by a key 26.

15 The end of the shaft 18 remote from the ring gear 17 is supported in a second bearing 27 which in turn is supported by an end cap 28 threadedly engaged with the housing part 14.

20 The worm gear 19 is meshed with a worm wheel 30 rotatably mounted on a hub 31. The hub 31 is in turn mounted on an output shaft 32, the hub 31 being fixed for rotation with the output shaft 32 by a key 33.

25 The output shaft 32 is mounted for rotation within the housing part 14 by upper and lower bearings 34 and 35 respectively, in this case ball bearings. The lower bearing 35 is supported in a housing cover 36.

Beneath the worm wheel 30, a clutch pressure plate 40 is fixed for rotation with the hub 31 by a key 41.

30 Beneath the pressure plate 40, a spring base 42 is secured to the hub 31 by a ring nut 43 threadedly mounted on the lower end of the hub 31. A set of coil springs 44 are engaged in recesses 45 in the pressure plate 40, the springs 44 acting on the spring base 42 and the pressure plate 40 to urge the worm wheel 30 into frictional engagement with the hub 31. 35 The spring base 42 also has recesses formed therein and engaged by the springs 44 to prevent shifting and slipping of the springs.

Two oil seals 50 and 51 seal a chamber surrounding

the clutch and worm wheel mechanisms, a cap 52 providing access to the chamber to fill the chamber with a lubricant such as lubricating oil.

The upper end of the shaft 32 carries an output arm 5 60 fixed for rotation with the shaft 32 by a key 61. A bolt 62 serves to secure the output arm 60 to the shaft 32 and a cap 63 fits over the free end of the shaft 32.

The output arm 60 is secured to a gate in use.

Finally, a lower cover 70 is secured to the plate 10 12 by bolts 71.

In operation, the motor 15 drives the shaft 18 and the worm gear 19 on the shaft 18 drives the worm wheel 30 to rotate the output shaft 32 and hence open or close the associated gate. In the event that manual opening 15 or closing of the associated gate is required, the clutch assembly permits such manual operation once a predetermined moment is exerted about the axis of rotation of the gate, by the hub 31 and clutch pressure plate 40 slipping against the worm wheel 30. The 20 strength of the springs 44 determine the moment required to cause slipping of the clutch assembly and the advantage of this assembly is that reliable and trouble free manual operation of an associated gate is allowed. The presence of lubricating oil in the clutch and worm gear 25 housing reduces friction and noise.

CLAIMS

1. A mechanism for opening and closing gates, which mechanism comprises input means adapted to be driven by a motor, output means from the mechanism for moving
5 a gate, which output means is movable about an axis of rotation, and means for transmitting movement from the input means to the output means, which transmission means comprises clutch means for allowing manual operation of a gate and a gear mechanism, which clutch means comprise
10 a clutch pressure plate, a friction plate and spring means for urging the pressure plate against the friction plate with a predetermined force to allow manual operation of a gate by slipping of the clutch means when a predetermined moment is applied about the axis
15 of rotation of the output means, the friction plate being a gear wheel of the gear mechanism.
2. A mechanism as claimed in Claim 1 wherein the clutch means are enclosed within a clutch housing.
3. A mechanism as claimed in Claim 2 wherein the hous-
20 ing is filled with lubricating fluid.
4. A mechanism as claimed in any preceding Claim wherein the output means, the gear wheel and the clutch pressure plate are mounted for rotation about a common axis.
5. A mechanism as claimed in Claim 4 wherein the output
25 means and the clutch pressure plate are fixed for rotation on a common shaft and the gear wheel is mounted on the shaft to allow relative rotational movement between the gear wheel and the shaft.
6. A mechanism as claimed in Claim 5 wherein the gear
30 wheel is rotatably mounted on a mounting element fixed for rotation with the shaft, the mounting element having abutment means for providing an axial stop against axial movement of the gear wheel under bias of said spring means.



18

6

7. A mechanism as claimed in any preceding Claim wherein the gear wheel is driven by a worm gear.
 8. A mechanism as claimed in any preceding Claim wherein the spring means comprises a multiplicity of
 - 5 springs spaced circumferentially about the axis of rotation of the pressure plate.
 9. A mechanism as claimed in Claim 8 wherein there are between four and ten springs.
 10. A mechanism for opening and closing gates
 - 10 substantially as herebefore described with reference to and as shown in the accompanying drawings.
 11. A mechanism as claimed in any preceding Claim for opening and closing gates in combination with a motor for driving the mechanism.
-