July 11, 1933. E. PFLÜGER 1,917,775

COUPLING

Filed Aug. 28, 1930

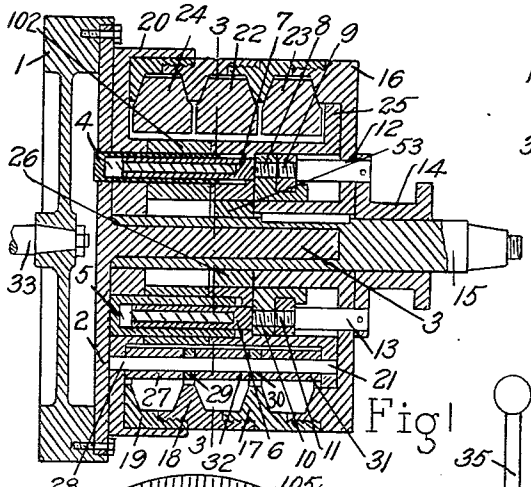


Fig 1

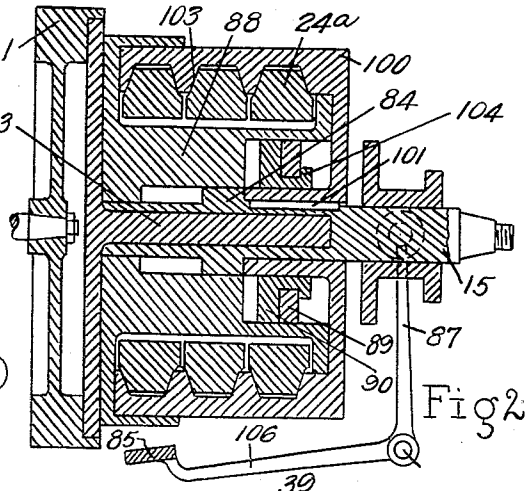


Fig 2

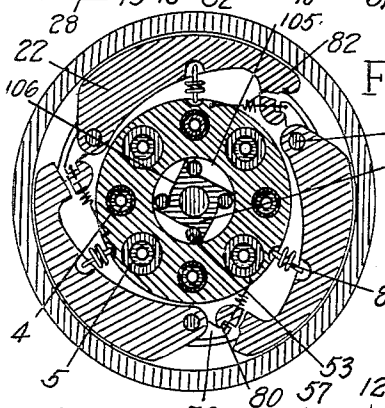


Fig 3

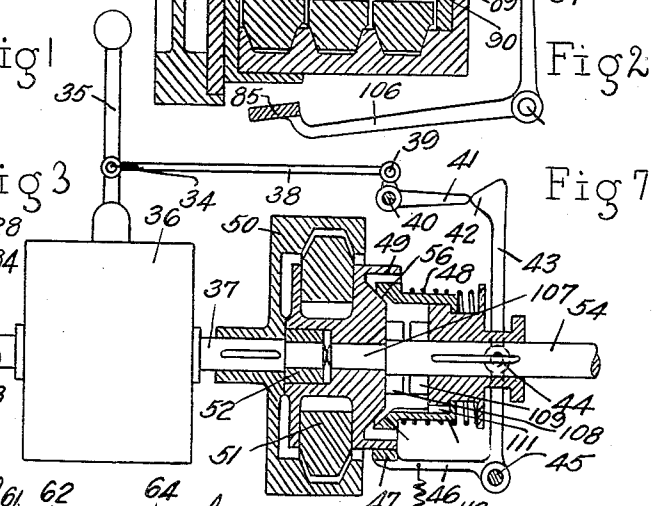


Fig 7

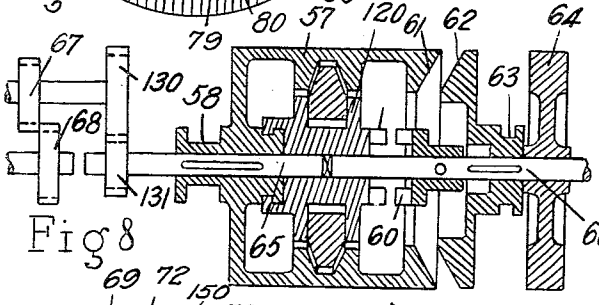


Fig 8

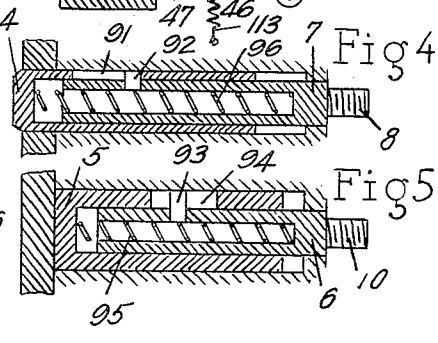


Fig 4



Fig 5

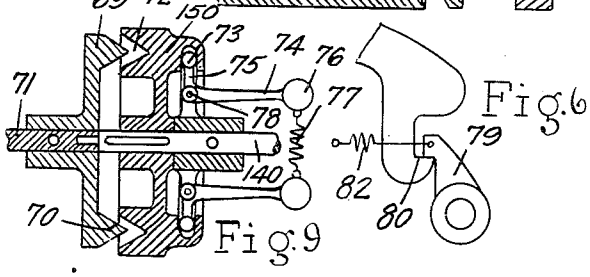


Fig 9



Fig 6

WITNESSES

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# UNITED STATES PATENT OFFICE

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## COUPLING

Application filed August 28, 1930. Serial No. 478,502.

My invention relates to a coupling for autos and has for its object the automatic action of coupling.

Reference is to be had to the accompanying drawing in which

Figure 1 shows a section of the coupling.

Figure 2 shows a similar section like shown in Figure 1 but this section makes it possible to understand the construction better.

Figure 3 shows a section according to the line 3—3 of Figure 1.

Figures 4, 5 and 6 show details on a larger scale.

Figures 7 and 8 show special constructions of the coupling.

Figure 9 shows a coupling, where a leverage increases the effect of the centrifugal force.

According to Figures 1, 2 and 3 a plate 2 with the axle 3 is fixed to the flywheel 1. The flywheel 1 is fastened to the motorshaft 33. The whole coupling rests on the axle or shaft 3. The hollow shaft 15 is fastened to the gears for the different speeds. The shaft 15 rests loosely on the shaft 3. For a better understanding it may be stated according to the Figure 2, that the principal parts of the coupling are the following—. The case 100 is entirely hollow and shows the grooves for the tapered levers 24*a*. The case 100 is fixed to the shaft 15 by the key 101. Therefore the case 100 is connected to the not shown changeable speedgears. Inside of the case 100 the case 88 is placed loosely. The latter carries the pivots 28 according to Figures 1 and 3 and the levers 24*a* according to Figure 2. The case 88 can be connected to the plate 2 by movable pins 4 according to Figures 1 and 3. Therefore the case 88 can be connected to the motor by a special pin coupling. As the Figure 2 is shown for the purpose of an easier understanding it may be stated, that the case 88 of Figure 2 consists of the following parts according to Figure 1. The both outside parts 20 and 25 are placed against the middle part 102, but all three parts belong together and form one piece. The levers 24*a* of Figure 2 which are built with a tapered conical surface, are the same as the levers 22, 23, 24 of Figure 1. The levers are pivoted at 28 and are held in place by the levers 79 according to Figures 3 and 6. In this position the levers cannot come in contact with the surface of the grooves 103 of the case 100. But as soon as the levers 79 disengage the levers 22, 23, 24 and the case 100 rotates with a certain speed, the centrifugal force drives the levers against the wall of the grooves like it is shown in Figure 3.

Figure 3 shows two positions of the lever 22. Therefore the section of the lever is broken and the larger part of the lever shows the lever, pressed against the tapered surface of the outside case by high revolutions. In this case the small end part of the lever 22 is free and not caught by the lever 79. At the same time Figure 3 shows the small end part of the lever 22 in a position caught by the lever 79 at low speed like the Figure 6 shows. In this case the large part of the lever 22 is out of connection with the tapered surface of the outside case. The construction of Figures 1, 2, 3 shows nine levers. The spring 83 acts against the centrifugal force. As the levers 22, 23, 24 have the hubs 27, 32, 31, the levers 79 are fixed to the hubs 29, 30. The levers 79 are bent a little sidewise for reaching the nose of the levers 22. The case 88 shows eight holes for pins 4 and 5 according to Figures 1 and 3. The latter are shown in Figures 4 and 5. While the pins 4 couple the case 88 to the plate 2 by entering into the four holes of the plate 2, the pins 5 touch the plate 2 only by friction. The pin 4 slides on the pin 7 and is held in place by the pin 92, while the pin 7 is fitted with the slot 91. A spring 96 tries to keep the pins 4 and 7 apart. The pin 5 slides on the pin 6 and is held in place by the pin 93, while the pin 6 is fitted with the slot 94. The pins 6 and 7 are fixed to the ring 90 by the threads 8 and 10. The ring 89 is held in place by the offset 104. A spring 95 tries to keep the pins 5 and 6 apart. Both rings 89 and 90 can turn in any direction but both rings can move only together in the direction of the axle. The pins 12 and 13 are fixed to the ring 89 and to the sliding hub 14. The shaft 15 is fitted with noses 84 according to Figures 2 and 3. Rollers 53 are

placed between the noses 84 and the bore 105 of the case 88. The sliding lever 87 with the pivot 86 shows an arm 106 with the shoe 85.

The operation of the coupling is as follows: The flywheel 1 of the motor rotates and the sliding hub 14 is brought into the position of the Figure 1. In this case the pins 4 and 5 are pressed against the plate 2 by the springs 95, 96 and the friction between plate and pins make the case 88 rotate slowly. As the holes in the plate 2 are too small for the pins 5, only the pins 4 can enter into the holes. After a certain movement of the case 88, the pins 4 find their holes and the case 88 is fixed to the plate 2 and rotates together with the fly-wheel of the motor. The weight of the small lever 79 is very little but it is sufficient for effecting a certain centrifugal force, which works against the spring 82 (Figure 6) and which disengages the levers 22, 23, 24. The latter effect such a high centrifugal force at a certain speed that the levers couple the case 88 to case 100. In this moment the variable speed gears are coupled to the motor by the shaft 15. As it is necessary that the case 88 stands still as quick as possible as soon as the pins 4 are coupled out by removing the sliding hub 14, the brakeshoe 85 is pressed against the case 88 at the same time. In case that the auto runs downward from a hill it may happen that the motorshaft and the shaft 15 are disconnected from each other and the shaft 15 could reach a very high dangerous speed. For preventing a dangerous speed of the disconnected shaft 15 the roller coupling 53, 104 is applied. In case of a high speed the rollers 53 travel along the line 106 of the nose 84 and as the rollers 53 are pressed between the nose 84 and the wall of the bore 105 the case 88 is coupled to the shaft 15 and it must follow the speed of the flywheel 1.

Figure 7 shows the construction of a coupling connected to the motorshaft 54 and shaft 37 of the gearcase 36. The case 50 is fixed to the shaft 37 and case 49 with the levers 51 is resting on roller coupling 52 and the pin 107 of the motorshaft 54. A clutch coupling 108, 109 connects the case 49 to the motorshaft 54. The coupling part 110 can slide on the coupling part 109 in direction of the axle but cannot rotate on the part 109 on account of the key 111. The parts 110 and 109 are held apart by the spring 48. The case 49 and the coupling part 110 carry the tapered surfaces 45, 56. As soon as the coupling part 109 is moved against the case 49 by the lever 43 and roller 44, the surfaces 55 and 56 come in contact and the case 49 is coupled to shaft 54 by friction. If the spring 48 is pressed together more, the claws of the coupling parts 108 and 109 come in contact and the case 49 is fixed to motorshaft rigidly. If a certain speed is desired, the lever 35 of the gearcase 36 is brought into the corresponding position for connecting the corresponding gears. The rod 38 is connected to the lever 35 by the pin 34 and the rod 38 connects the levers 35 and 39. The lever 39, 41 has the pivot 40. The arm 41 knocks against the cam 42 of the lever 43. A strong spring 113 presses the lever 43 against the arm 41. In the position shown in the Figure 7 the coupling is disconnected and the case 49 is held in place by the brakeshoe 47 of lever 46 with the pivot 45. The brakeshoe moves away from the case 49 as soon as the lever 35 shows an oblique position and changes the speed-gears inside of the gearcase. In this case the arm 41 moves upward or downward and the lever 43 can move to the left side. The brakeshoe 47 gives the case 49 free.

The Figure 8 shows the gearshaft 65 and motorshaft 66 with the flywheel 64. The case 57 with the hub 58 and surface 61 is fixed slidably to the shaft 65, while the case 120 with the claws 59 is fixed loosely to the shafts 65, 66. The clutch coupling part 60 is fixed to the shaft 66. The coupling 62, 63 is fixed slidably to the shaft 66. If the motor is started, it can happen that the gears 67, 68 cannot be brought into connection, as the teeth don't meet. In this case the gears must be brought into rotation by the gears 130, 131, shaft 65, case 57. For this purpose the coupling 62 is pressed against the surface 61 and as the coupling 62 is connected to the motorshaft 66, the case 57 rotates and the gears 67, 68 can be brought into connection. The friction part of coupling 60 is left out and can be used in the same way as shown in Figure 7.

Figure 9 shows a coupling with tapered grooves 72 of disc 150 and tapered surfaces 70 of the disc 69, fixed to the shaft 71. For coupling the shaft 140 to shaft 71, the centrifugal force of the weights 76, working against the force of the spring 77 drives the balls 76 apart and presses the disc 150 against the disc 69. Both get coupled and the shafts 71 and 140 are connected. The pressure, which presses the surface 70 into the groove 72 is increased according to the leverage of arms 74 and 75 with the head 73.

I claim:

1. In a coupling the combination of a case with tapered grooves, fixed to the shaft of the variable speed gears, a case with swinging levers with corresponding tapered surface for the purpose of catching the case with tapered grooves by centrifugal force and a coupling with two parts, one part for the purpose of connecting the case with the levers to the motorshaft by friction at first, the other part, connecting the case with levers rigidly to the motorshaft afterwards.

2. In a coupling the combination of a case with tapered groves, fixed to the shaft of the variable speed gears, a case with swinging levers with corresponding tapered sur-

face for the purpose of catching the case with tapered grooves by centrifugal force and a coupling with two parts, one part for the purpose of connecting the case with the levers to the motorshaft by friction at first, the other part, connecting the case with levers rigidly to the motorshaft afterwards, an arrangement for driving the case with the tapered grooves directly from the motorshaft.

3. In a coupling the combination of a case with tapered grooves, fixed to the shaft of the variable speed gears, a case with swinging levers with corresponding tapered surface for the purpose of catching the case with tapered grooves by centrifugal force, which levers are caught by other levers at low speed, acting also by centrifugal force, a coupling with two parts, one part for the purpose of connecting the case with the levers to the motorshaft by friction at first, the other part, connecting the case with levers rigidly to the motorshaft afterwards, an arrangement for driving the case with the tapered grooves directly from the motorshaft.

4. In a coupling the combination of a case with tapered grooves, fixed to the shaft of the variable speed gears, a case with swinging levers, having a weight on a long arm and the contact surface on a short arm, the weight acting by centrifugal force, a coupling with two parts, one part for the purpose of connecting the case with the levers to the motorshaft by friction at first, the other part, connecting the case with levers rigidly to the motorshaft afterwards.

5. In a coupling the combination of a case with tapered grooves, fixed to the shaft of the variable speed gears, a case with swinging levers, having a weight on a long arm and the contact surface on a short arm, the weight acting by centrifugal force, a coupling with two parts, one part for the purpose of connecting the case with the levers to the motorshaft by friction at first, the other part, connecting the case with levers rigidly to the motorshaft afterwards, a coupling with rollers for connecting the motorshaft with the shaft of the variable speed gears, as soon as the latter reaches a higher speed than the motorshaft.

In testimony whereof I affix my signature.

ERNST PFLÜGER.