Oct. 26, 1965 B. BJÖRK 3,213,709

METHOD FOR CONTROLLING THE SLIPPING RELATION BETWEEN ROLLERS OR THE LIKE

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FIG. 1.

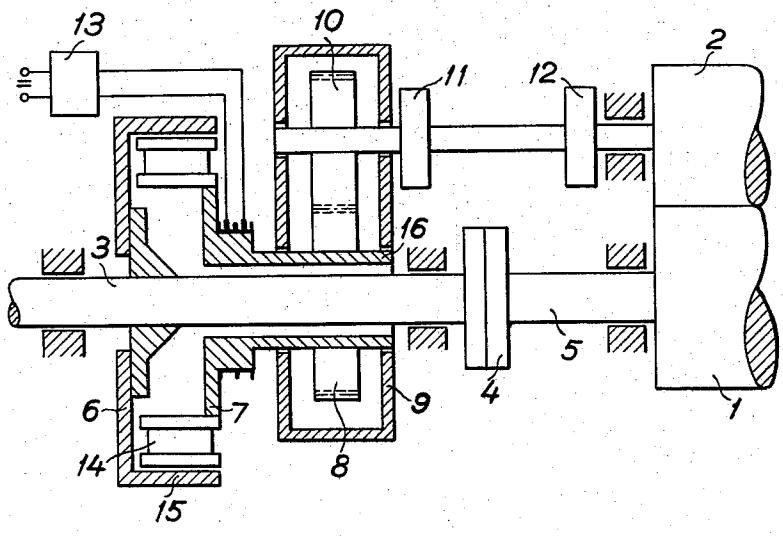

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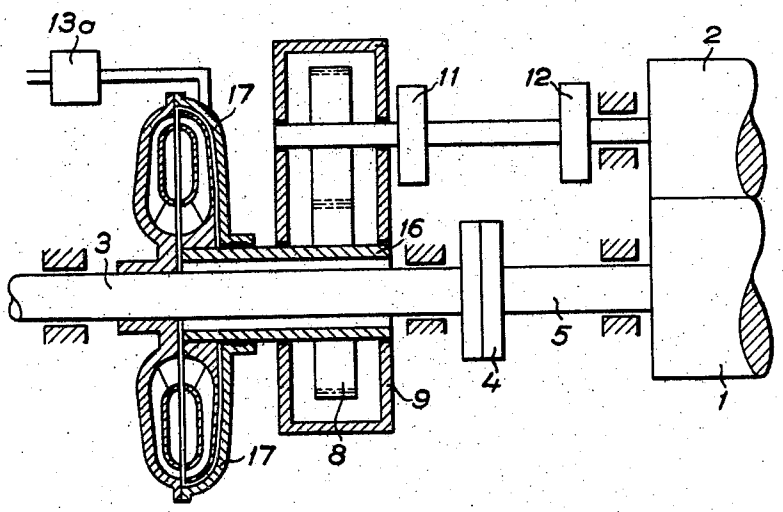
FIG. 2.



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METHOD FOR CONTROLLING THE SLIPPING RELATION BETWEEN ROLLERS OR THE LIKE

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4 Claims. (Cl. 74—665)

The present invention relates to a drive means for driving from a single input two rotating rollers or the like forming a roller pair and for regulating the slipping relation between them.

Particularly in the manufacture of paper it is in certain cases desirable that the separate rollers in a roller pair through which the paper passes rotate with a somewhat different speed, i.e. one of the rollers is slightly braked in relation to the other. When the paper passes such a roller pair a certain compression occurs in the longitudinal direction of the paper so that a tough and durable paper quality is obtained. Since thus a certain slipping occurs between the rollers, there is relatively rapid wear of one of the rollers which is usually provided with a softer wear surface and the worn roller must therefore be reground at relatively short time intervals. Of course, when the roller is reground its diameter is decreased and so that the desired slipping between the rollers may be maintained substantially constant the rotation speed of the roller must be adjusted at least after each regrinding. Further, different slipping relations are required for different qualities of paper and it is often impossible to determine in advance the correct slipping relation without a test being done. Due to limited space there are usually practical dfficulties connected with directly or via separate gears driving the separate rollers in the roller pair from individual motors, at least one of which must be provided with speed regulation. It is also expensive to arrange two separate driving and power transmission systems, particularly as great effect is usually transmitted to the rollers, often in the order of 1000 hp.

It is known per se to drive both the single rollers of a roller pair from a common input over a gear and to arrange an electrical slipping clutch on one of the roller shafts in order to obtain a certain slipping between the rollers. However in high power arrangements it may be very difficult or impossible to apply a slipping clutch on a roller shaft between the roller and the gear since a slipping clutch with a high torque transmitting capacity has a great radial extension and the available space is in radial direction limited by the shaft of the other roller.

According to the invention this problem is solved by arranging the slipping clutch, which may be of any suitable construction, such as for example an electrical slipping clutch or a hydraulic clutch, in axial direction outside the shaft end of one of the rollers, that is, outside the gear. In order to obtain this, the invention provides a drive means in which the slipping clutch is connected to the gear by means of a hollow shaft and to one of the rollers by means of a shaft running axially through said hollow shaft. Preferably the shaft passing through the hollow shaft is the input of the drive means to which a driving motor is connected.

Embodiments of the invention will in the following be more closely described with reference to the accompanying figures which show schematically the invention adapted for a driving means for paper rollers. FIGURE 1 shows an embodiment with an electrical slipping clutch and FIGURE 2 shows an embodiment with hydraulic clutch.

In FIGURE 1, 1 and 2 designate the two rollers, 1

being the main roller and 2 the braking roller. A driving motor (not shown) is connected to the shaft 3 which via a clutch 4 is connected to the shaft 5 of the main roller 1. The shaft 3 is supported by one half 6 of the member with variable transmitting moment 6, 7, in this case shown as an electrical slipping clutch. The other half 7 of the slipping clutch is supported by a hollow shaft 16 connected directly to a gear wheel 8 in a gearing 9. The braked roller 2 is connected to a second gear wheel 10 in the gearing and the two gear wheels 8 and 10 may be in engagement with each other either directly or via intermediate wheels. So that the slipping clutch may be applied outside the gearing 9 so that its size is not limited by the shaft of the roller 2, the driving shaft 3 passes through the hollow shaft 16. Between the gear wheel 10 and the roller 2 are applied two tooth clutches 11 and 12 or corresponding devices allowing small angle differences in the direction of the connected shafts. Since after regrinding because of its decreased diameter the roller 2 is displaced somewhat closer to the roller 1, the power transmission between the gearing 9 and the roller 2 must in some way allow such a movement.

The slipping moment in the electric slipping clutch 6, 7 is controlled and/or regulated by means of the control or regulating device 13 regulating the excitation current in the excitation winding 14 of the slipping clutch. The opposite pole of the electromagnets is in this case most suitably composed of a large drum 15.

The slipping between the rollers 1 and 2 is determined in the shown construction by the diameter relation of the rollers, the gear ratio and the slipping in the slipping clutch. The gear ratio is constant while the diameter relation of the rollers, i.e. the diameter of roller 2, alters somewhat. So that the slipping of the roller 2 in relation to roller 1 may be maintained at a constant value, therefore, the slipping moment of the slipping clutch must be regulated to compensate alterations in the diameter relation of the rollers. The slipping moment is regulated either antomatically or manually with the aid of the regulating device 13.

FIGURE 2 shows an arrangement similar to the one shown in FIGURE 1 in which the electrical slipping clutch is replaced by a hydraulic clutch 17. Such clutches are well known per se and their torque transmitting capacity can be regulated in several ways, for instance by regulating the amount of liquid contained in the hydraulic clutch. A control device 13*a* for hydraulic regulation of the torque transmitted by the clutch is shown in the figure and this regulating device corresponds to the device 13 in FIGURE 1.

In the embodiments according to the figures, a plurality of modifications may be made. It may, for example, be necessary to arrange the one tooth clutch 11 on the opposite side of the gearing to obtain a sufficiently long shaft part between the two tooth clutches. It will then be necessary to make a hollow shaft construction in the same way as with the connection of the slipping clutch to the driving shaft 3 and gear wheel 8. The invention is not limited to the shown field of use but may be adapted in many fields where a preferably variable slipping relation or a corresponding speed difference is required. Otherwise several variations and embodiments of the invention may be imagined within the scope of the following claims.

I claim:

1. Drive means for driving from a single input two rotating rollers forming a roller pair and for regulating the slipping relation between them, comprising a pair of meshing gears, a first of said gears being directly connected to a first of said rollers, a slipping clutch having two relatively movable clutch parts, first means con-

necting one of said clutch parts to the second of said gears, said first connecting means comprising a hollow shaft, said second gear being mounted on said shaft, and second connecting means connecting the second roller to the second clutch part, said second connecting means comprising a roller shaft connected to the second of the rollers and extending axially through said hollow shaft, said roller shaft being connected to the second clutch part, said slipping clutch being located on the opposite side of said gear from said rollers.

2. Drive means as claimed in claim 1 in which said roller shaft is the input shaft of the drive means.

3. Drive means as claimed in claim 1, in which said slipping clutch is composed of an electric slipping clutch.

4. Drive means as claimed in claim 1, in which said slipping clutch is composed of a hydraulic clutch.

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