

June 16, 1936.

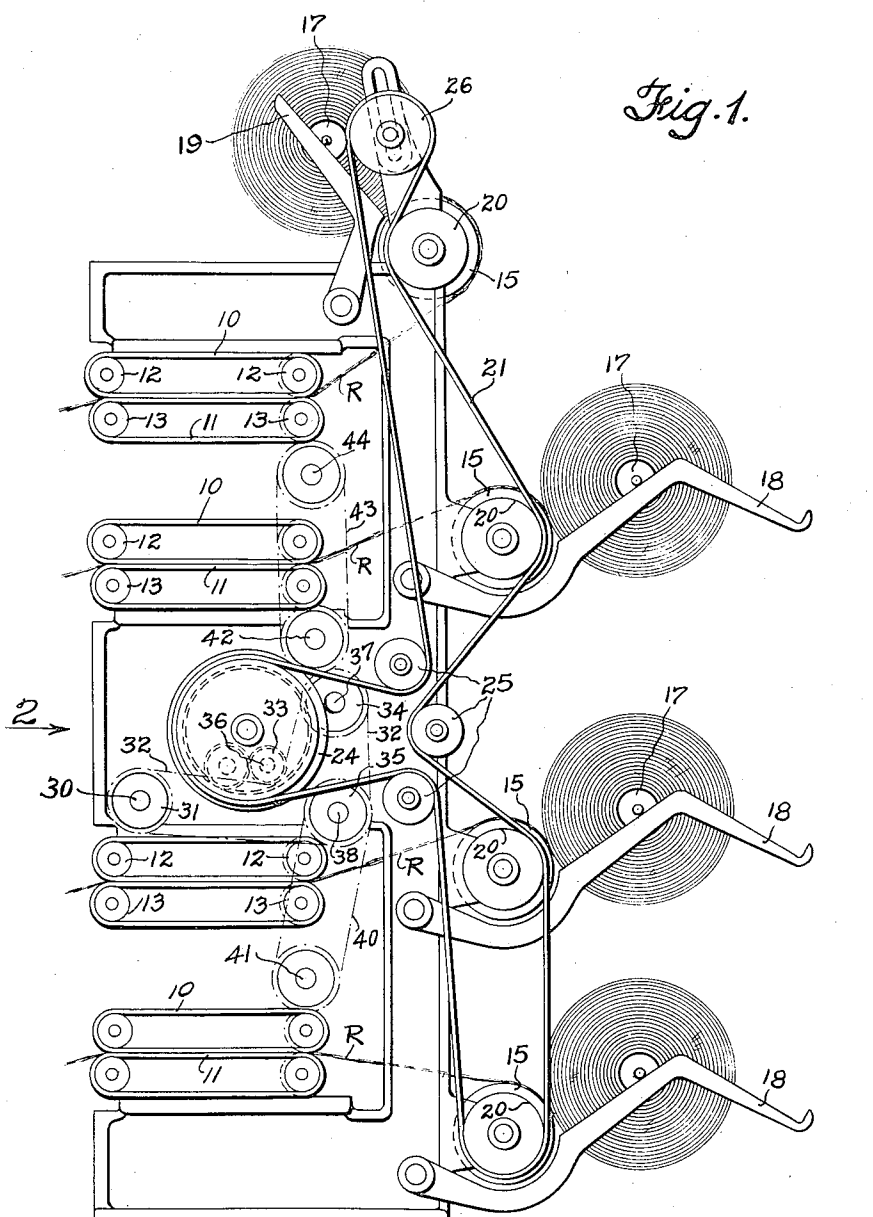
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2,044,217

TAPE CONDENSER

Filed July 30, 1934

3 Sheets-Sheet 1



INVENTOR.

BY

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June 16, 1936.

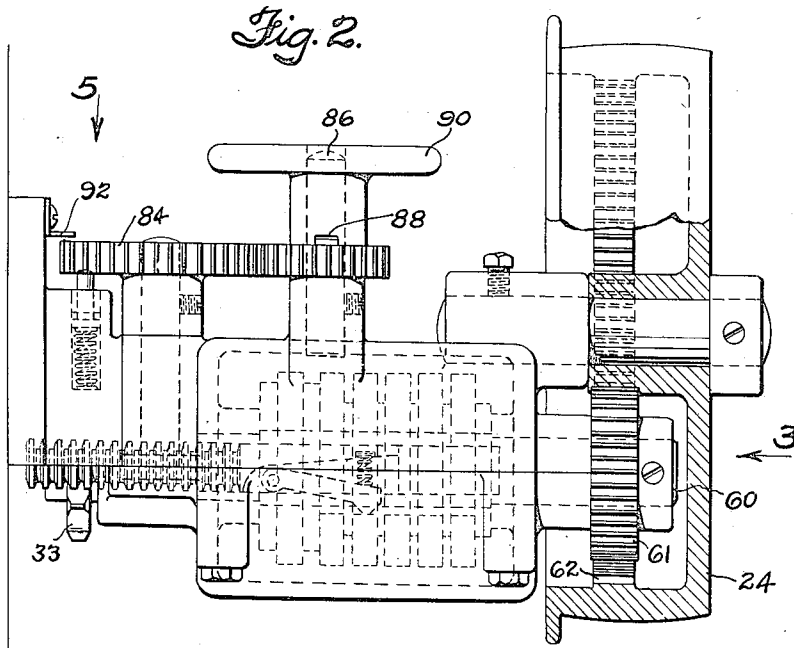
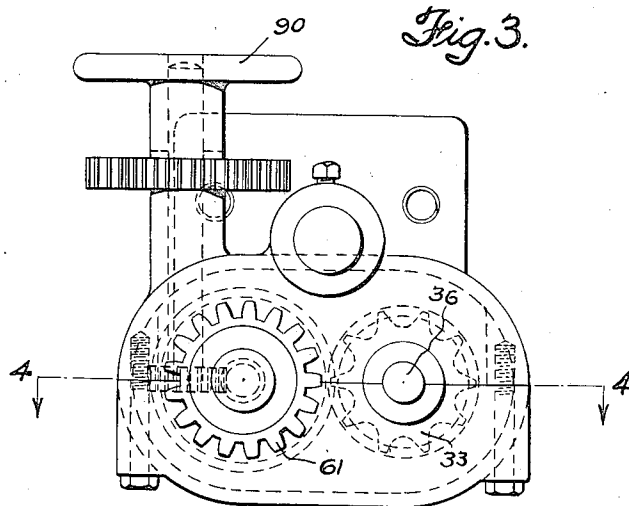
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TAPE CONDENSER

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3 Sheets-Sheet 2



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TAPE CONDENSER

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3 Sheets-Sheet 3

Fig. 4.

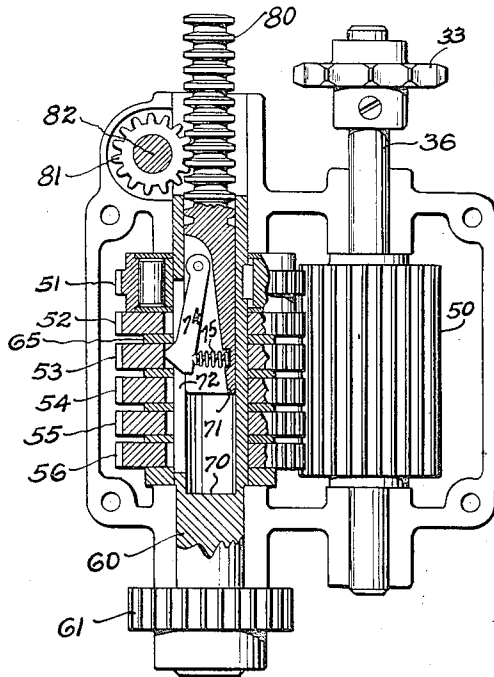


Fig. 7.

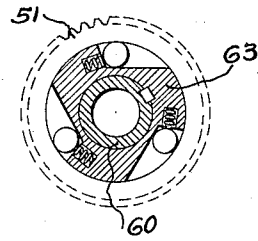


Fig. 8.

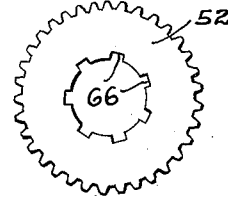


Fig. 9.

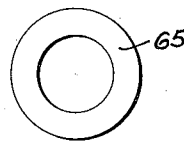


Fig. 6.

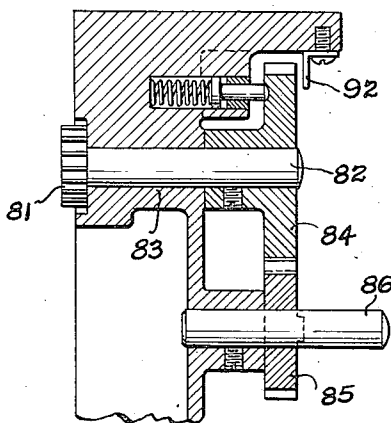
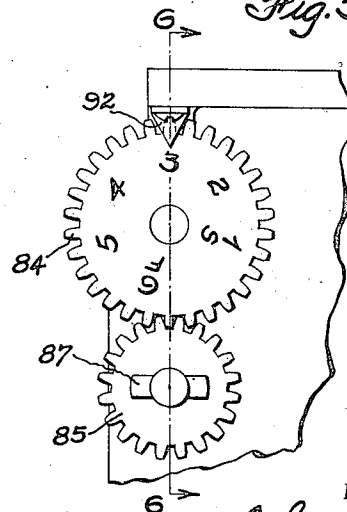


Fig. 5.



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UNITED STATES PATENT OFFICE

2,044,217

TAPE CONDENSER

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Application July 30, 1934, Serial No. 737,504

1 Claim. (Cl. 19—151)

This invention relates to tape condensers in which the wool fibre stripped from a carding cylinder is worked into separate and continuous strands or rovings, preparatory to spinning and twisting operations. These rovings are then wound on spools by surface engagement with winding drums which are driven in definite and predetermined speed relation to the condensing aprons between which the strands or rovings are formed.

As the wool fibres in the rovings are merely rubbed together and as the rovings thus contain no twist, great care is necessary in handling the rovings and particularly in controlling the relative speeds of the aprons and the winding drums.

It is found that a slight change in temperature or humidity will often cause a noticeable difference in the rate of delivery of the rovings from the aprons to the winding drums, thus causing an undesirable increase or decrease in the roving tension, accompanied by roving breakage.

It is the general object of my present invention to provide improved means for changing the speed relation of the winding drums and aprons, to the intent that substantially uniform roving tension may be maintained.

A further object of the invention is to provide means by which such relative speed adjustment may be conveniently made while the condenser is in operation.

I also provide speed changing mechanism in a tape condenser so designed and constructed that the speed may be changed in definite and predetermined amounts and that the previous setting may be readily restored.

My invention further relates to arrangements and combinations of parts which will be hereinafter described and more particularly pointed out in the appended claim.

A preferred form of the invention is shown in the drawings, in which

Fig. 1 is a side elevation of a tape condenser embodying my improvements;

Fig. 2 is a partial side elevation, partly in section and looking in the direction of the arrow 2 in Fig. 1;

Fig. 3 is an end elevation, looking in the direction of the arrow 3 in Fig. 2;

Fig. 4 is a plan view, partly in section, taken along the line 4—4 in Fig. 3;

Fig. 5 is a detail plan view, looking in the direction of the arrow 5 in Fig. 2;

Fig. 6 is a sectional elevation, taken along the line 6—6 in Fig. 5;

Fig. 7 is a sectional view of a clutch to be described;

Fig. 8 is a side elevation of a change gear, and Fig. 9 is a side elevation of a spacing collar.

Referring to Fig. 1, I have shown a tape condenser which is in general of a usual commercial form and comprises a series of upper aprons 10 and lower aprons 11, assembled in pairs between which the fibres are rubbed into strands or rovings by axial oscillation of the apron driving rolls 12 and 13. The rovings R delivered by the aprons are guided into surface engagement with winding drums 15 and are wound on spools or rolls 17 supported on inclined brackets 18 or 19. Each spool or roll is directly rotated by frictional contact with its winding drum.

The winding drums are each provided with pulleys 20 and are driven by a single driving belt 21 which successively engages the pulleys 20 on all of the winding drums. The belt 21 is driven by a pulley 24 (Figs. 1 and 2) and is provided with suitable guide-rolls 25 and with an adjustable take-up roll 26. The drive for the pulley 24 will be hereinafter described.

The drive for the condenser aprons is taken from a main driving shaft 30 (Fig. 1) having a sprocket 31 which drives a chain 32. This chain engages sprockets 33, 34 and 35 and thus drives shafts 36, 37 and 38 (Figs. 1 and 4).

The shaft 38 is connected by a chain 40 to drive a shaft 41 and the shaft 37 is gear-connected to a shaft 42, which in turn is connected by a chain 43 to an additional shaft 44. The shafts 38, 41, 42 and 44 are thus all continuously driven from the main shaft 30 and they are gear-connected to drive one roll 12 or 13 for each apron 10 or 11.

I will now describe the speed changing connections between the shaft 36 (Fig. 4) driven through the sprocket 33 by the chain 32, and the pulley 24 by which the belt 21 and winding drums 20 are driven.

The shaft 36 (Fig. 4) is provided with an elongated gear 50 with which mesh a series of change gears 51, 52, 53, 54, 55 and 56. These gears are all of the same pitch diameter but the number of teeth decreases progressively from the gear 51 to the gear 56, preferably by a reduction of one tooth for each successive gear. The gear 51 which has the most teeth rotates the slowest, while the gear 56 which has the least number of teeth rotates the fastest.

All of the gears 51 to 56 are mounted on a shaft 60 (Fig. 4) rotatable in fixed bearings and having a pinion 61 engaging an internal gear 62

(Fig. 2) formed within the pulley 24 and preferably integral therewith.

The gear 51 which has the largest number of teeth and rotates the slowest is connected to the shaft 60 by an overrunning ball or roller clutch 63, as shown in Fig. 7. Consequently the shaft 60 and pinion 61 will always be rotated at least as fast as the gear 51, and may be rotated faster by reason of the clutch 63.

The gears 52 to 56 inclusive are loose on the shaft 60 and are separated from each other by spacing collars 65 (Fig. 9). Each gear is provided with a plurality of keyways or slots 66 (Fig. 8).

The shaft 60 has an axial recess 70 (Fig. 4) in which a plunger 71 is slidable. The shaft 60 is also slotted at one side of the recess 70, as indicated at 72, and the plunger 71 is slotted to receive a pivoted key 74 yieldingly pressed outward by a spring 75. The key 74 is provided with an end portion or tooth adapted to project outward between adjacent spacing collars 65 and to enter one of the slots or keyways 66, thus connecting the corresponding change gear with the shaft 60.

The spacing collars prevent any possibility of engagement of two gears by the key 74 at any one time.

For the purpose of moving the plunger 71 axially, I provide the plunger with circular rack teeth 80 (Fig. 4) engaged by a pinion 81 on an upright shaft 82 (Fig. 6). The shaft 82 is mounted in a fixed bearing 83 and is provided with a gear 84 at its upper end, engaged by a pinion 85 rotatable on a fixed stud 86.

The pinion 85 is provided with bosses 87 adapted to be received in a slot or recess 88 (Fig. 2) in the hub of a handle 90 which may be placed on the stud when speed adjustment is desired. At other times the handle is preferably removed to prevent unauthorized speed variation.

The gear 84 (Fig. 5) may be numbered or graduated to cooperate with a fixed index 92. By turning the pinion 85 and gear 84, the key 74 may be shifted axially in the shaft 60 from one gear to another as indicated by said figures or graduations, and the speed of the winding drums may thus be conveniently adjusted relative to the speed of the condenser aprons.

Usually the machine will be started in operation with the key 74 engaging one of the intermediate change gears, such as the gear 53 shown in Fig. 4, this setting providing for adjustment to either higher or lower speed to meet changes in operating conditions.

A particular advantage of my invention lies in the fact that the speed may be varied by definite amounts which are clearly indicated by the figures on the gear 84. Also, a previous speed may be at any time restored by resetting to a figure previously in use. The operator is thus able to very easily adjust the speed in a tape condenser to meet changes in temperature or humidity or in other conditions, and is also able to return to a desired speed which has been previously found satisfactory under given conditions.

While I have described a belt and pulley drive for the drums 15, it will be understood that a chain and sprockets may be substituted therefor, and that the terms "belt" and "pulley", as used in the claim, includes also the chain and sprocket as equivalents.

Having thus described my invention and the advantages thereof, I do not wish to be limited to the details herein disclosed, otherwise than as set forth in the claim, but what I claim is:—

In a condenser having a set of condensing aprons and a plurality of winding drums, in combination, means to drive said aprons and drums in a definite speed relation to each other, said means comprising a chain and gear drive for said aprons, a belt drive for said drums, a driving pulley for said belt, a shaft positively rotated by said apron drive, a second shaft gear-connected to drive said pulley, an elongated gear on one of said shafts, a series of change gears loose on the other shaft and having different numbers of teeth but the same pitch diameter, all of said change gears meshing continuously with said elongated gear, an over-running clutch to connect the change gear having the largest number of teeth to said shaft, a sliding key by which the remaining change gears may be selectively connected with said shaft, and manual means by which said key may be adjusted axially of said shaft while the machine is in operation.

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