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PATENTED JULY 31, 1906.

G. E. FRANQUIST.
FRICTION CLUTCH.

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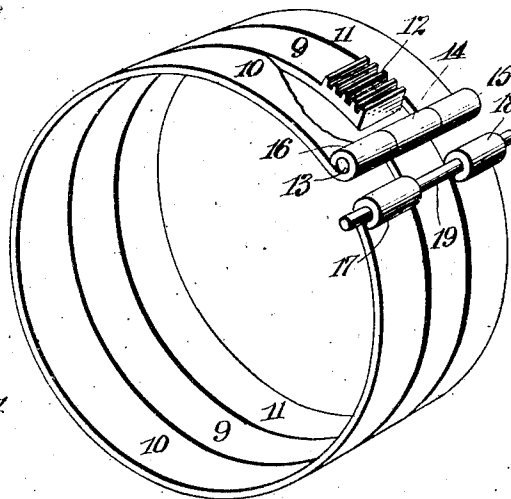
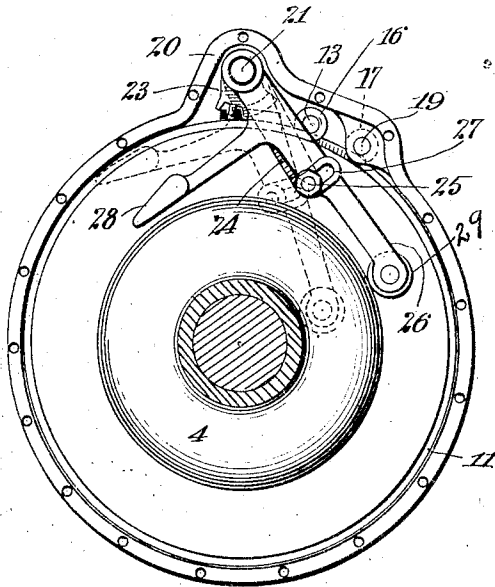
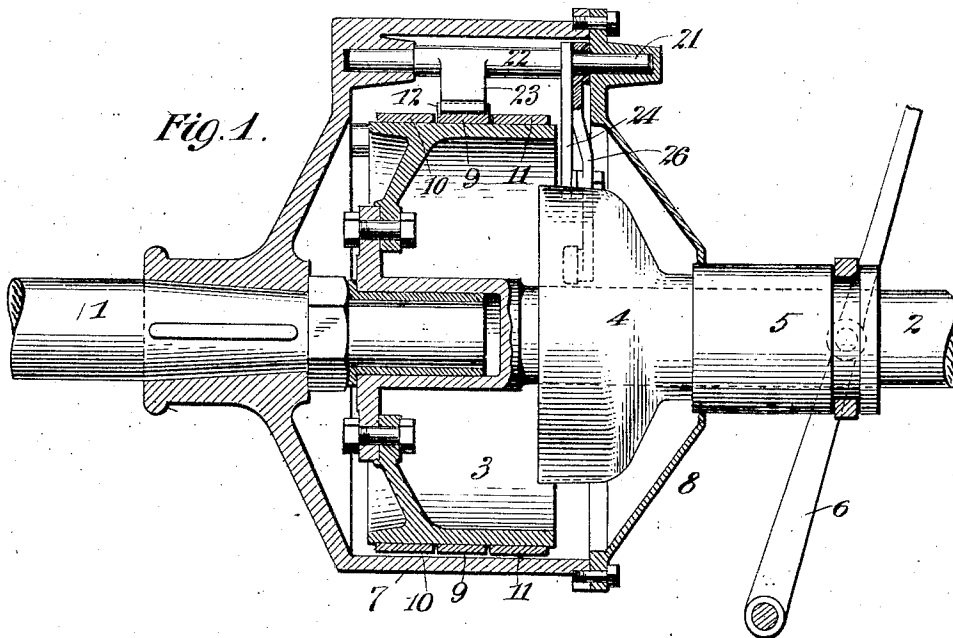


Fig. 2.

Fig. 3.

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FRICTION-CLUTCH.

No. 827,091.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, GUSTAVE E. FRANQUIST, a citizen of the United States, residing at the city of New York, in the borough of Manhattan and State of New York, have invented certain new and useful Improvements in Friction-Clutches, of which the following is a full, clear, and exact description.

This invention relates to friction clutches and brakes, and has special reference to that type of device wherein a flexible strap coöperates with the exterior surface of a drum to connect and disconnect two shafts. One form in which this type of clutch has been heretofore used embodies a drum in combination with a continuous strap making a number of spiral convolutions around the drum and so disposed that when the strap is tightened its inner face throughout its entire length will be drawn into engagement with the surface of the drum. In the tightening of the strap in such a brake or clutch it is evident that owing to the spirality of the turns the friction along one edge of the turns will be greater than along the other, thus causing not only the band to wear away unevenly, but to cut grooves in the surface of the drum and produce unequal and unreliable frictional engagement. Another defect of such a construction is the fact that unequal pressure is brought upon the journal-boxes of the shafts. At the same time this style of brake has a number of advantages which it is desirable to obtain, among which may be mentioned the fact that it affords a long frictional surface, which can be brought into engagement with the drum as a whole in a comparatively short interval, but which nevertheless engages gradually from one end to the other to avoid abrupt picking up of a stationary shaft or the sudden stopping of the moving shaft.

The object of the present invention is to retain the advantages of the spiral-strap arrangement while eliminating its disadvantages. This object is accomplished by using instead of a single spirally-wound strap or band a number of straps each in a plane at right angles to the axis of the drum and with their ends so connected to each other that the strain applied to one end of one of the straps in setting the brake or closing the clutch is gradually transmitted throughout the length of the first strap and is then communicated to the second, through which it

gradually spreads, as before, to the point of anchorage.

The peculiar feature of construction whereby the strain is thus transmitted from one strap to another constitutes one of the features of my invention, the details of which will be more fully described hereinafter.

In the drawings accompanying and forming a part of this specification, Figure 1 illustrates a longitudinal section of a practical embodiment of the present improvement, certain parts being shown in elevation for greater convenience of illustration. Fig. 2 is an end view from the right-hand end of Fig. 1, the end of the housing or casing being removed and the shaft and actuating-cam shown in cross-section; and Fig. 3 is a perspective view of the bands removed from the other parts.

The two parts of the shaft to be connected and disconnected are indicated by 1 and 2, and in the present description it will be assumed that the motor or other source of power is connected with the shaft 1 and the load with shaft 2. On the end of shaft 2 is an ordinary friction-drum 3, having a wide face, the hub of such drum receiving and forming a bearing for the end of the shaft 1. On shaft 2 there is also a slidable bell-shaped cam 4, carried by a sleeve 5, which by means of a lever 6 can be moved in either direction along the shaft. Fixed upon shaft 1 is a box, frame, or casing comprised of the cylindrical portion 7, having a hub or cover 8. This casing surrounds the drum and the cam 4 and rotates with the shaft 1. Surrounding the external face of the drum are three straps or bands, (indicated, respectively, by 9, 10, and 11.) The strap 9 has a free end provided with a segment of gearing 12. From this free end the strap leads around the drum in a plane at right angles to the axis thereof and to a point a little short of its free end, where it is connected to the middle of a cross-pin 13 by simply bending around the same at 14. The projecting extremities of this pin 13 are respectively engaged by the looped ends 15 and 16 of the two straps 10 and 11. These straps lead in the same direction around the drum as the strap 9 and occupy positions parallel to, but slightly separated from, the said strap 9. Straps 10 and 11 lead around the drum and are connected by means of the looped ends 17 and 18 with another pin 19, which stands slightly above or

outside of the strap 9 and which is fixed in the outer casing 7 to furnish an anchorage or fixed point for the ends of the straps 10 and 11.

5 Opposite the location of the gear-segment 12 the casing 7 is provided with an offset portion 20, in which a shaft 21 is mounted parallel to the axis of the drum. On this shaft is a sleeve 22, carrying a gear-sector 23, engaging with the gear-segment 12. This sleeve also has attached to it a crank-arm 24, which is provided with a pin and clamping-nut 25. Parallel to the crank is an arm 26, pivotally mounted upon shaft 21, being somewhat longer than the crank and provided with a concentric slot 27, through which the pin 25 projects and in which the same may be adjusted to alter the relative angular positions of the crank and arm with respect to each other. At the free end of arm 26 is a roller 29, that bears upon the outer surface of the bell-shaped cam 4. Said arm 26 is also provided with an angular extension 28, weighted at its outer end for a purpose that will hereinafter appear. When the two shafts are disconnected, the roller 29 on the end of arm 26 bears against the portion of the bell-shaped cam of smallest diameter, the roller being thereby nearer the axis of the system than it is when resting against the greater diameter of the cam. In this position it will be seen that through the sleeve 22, the gear-sector, and gear-segment the end of strap 9 has been moved in a direction to free the strap from the drum. If the motor is running under these conditions, the entire system of straps, with the casing 7, being also rotated, the centrifugal force acting upon the weighted arm 28, which is then at a greater distance from the center than the roller 26, tends to hold the roller in this position, and consequently to maintain the straps free and permitting the drum to rotate without appreciable friction with the straps. In order to couple the two shaft-sections together, the cam 4 is thrown into the position shown in Figs. 1 and 2 by means of the lever 6. This causes the roller on arm 26 to travel up the incline of the cam until it rests upon its portion of greater diameter, in making which movement shaft 21 is rocked, causing the sector 23 to act upon the segment 12 and move the free end of strap 9 toward its end 14, thus causing said strap 9 to gradually clamp throughout its length that portion of the drum opposed to it. In the same movement the strain upon the free end of strap 9 is eventually communicated to the pin 13, and this pin being free to move is thrown in the same direction as the segment. In this way the two straps 10 and 11 are simultaneously and gradually thrown against the surface of the drum until finally all of the free movement in all of the straps has been taken up, the final portion of the movement re-

sulting in a positive clamping of the surface of the drum, which furnishes the necessary friction to cause the rotated straps to pick up and to carry along with them the rotated end or section of the shaft. In releasing the clutch the same operation takes place, but in the reverse direction. The gear-segment 12 being moved backward, the strap 9 is first gradually freed, and then the straps 10 and 11 are eased up until all of the straps are substantially free of the drum, this being accomplished by moving the cam 4 to the position described, when centrifugal force and spring action of the straps will move them from the drum-face. It is therefore apparent that by this construction I am able to obtain a length of strap or band equivalent to three turns of an ordinary spiral band, and at the same time I am able to graduate the application or release of the frictional engagement, first through one of those turns and then through the other two together. In respect to the graduation of the friction my improved construction is the equivalent of only two turns of a spiral strap, because two of the three straps used move simultaneously. It will be seen that this brake or clutch affords a square frictional engagement between the straps and the drum, thus preventing unequal wearing of either the straps or the drum and furnishing uniform friction for given movements of the cam.

It is pointed out that the portion of the cam of larger diameter may be slightly flaring to the end, so that in case of wear of the friction-surfaces or lost motion at any point in the system the cam can always be moved far enough to create the full braking force of which the apparatus is capable. By adjusting the pin 25 in the slot 27 the proper relation between the gear-sector and gear-segment and their actuator can be secured.

Having described my invention, I claim—

1. A friction clutch or brake comprising a drum of uniform peripheral diameter and a plurality of straps surrounding the same, the said straps occupying planes at right angles to the axis of the drum and connected together at their ends whereby strain applied to the end of one strap will be successively transmitted to the others so as to clamp the periphery of the drum.

2. A friction clutch or brake comprising a drum of uniform peripheral diameter, a plurality of straps surrounding the same and occupying planes parallel to each other and at right angles to the axis of the drum, the end of one strap being connected to the end of another strap, while the opposite end of said other strap is anchored, substantially as described.

3. In a friction clutch or brake, the combination of a drum and three straps surrounding the same and occupying planes parallel to each other and at right angles to the axis of

the drum, the middle strap being free at one end and connected at its other end with one end of the other two straps, the opposite end of said other two straps being anchored.

5 4. In a friction clutch or brake, the combination of a drum and three straps surrounding the same, said straps occupying planes parallel to each other and at right angles to the axis of the drum, a tightening and loosening device engaging the free end of the middle strap, a cross-bar having the opposite end of said middle strap engaging the middle thereof, the extremities of which cross-bar are engaged by ends of the other two straps, 15 while the opposite ends of said two straps are anchored.

5 5. In a friction clutch or brake, the combination of a drum, a strap surrounding the same, a rock-shaft and connections between 20 the rock-shaft and one end of the strap, whereby the motions of the shaft are communicated to the strap, a crank-arm on said

rock-shaft, a bell-shaped cam concentric with said drum and adapted to be moved along the axis thereof, against which cam the end 25 of said crank-arm rests and a centrifugal device connected with said crank-arm, for the purpose set forth.

6. In a friction clutch or brake, a drum, a pair of straps surrounding the same, and a 30 central strap connected to their extremities.

7. A friction clutch or brake comprising a drum having a pair of straps thereon, and a central strap secured to the extremities of both, and means for initially tightening the 35 central strap upon the drum and subsequently applying tightening force to the two side straps.

In witness whereof I subscribe my signature in the presence of two witnesses.

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Witnesses:

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