June 22, 1948. E. T. BIRSCH 2,443,593

CLUTCH FOR SPINNING BUCKETS

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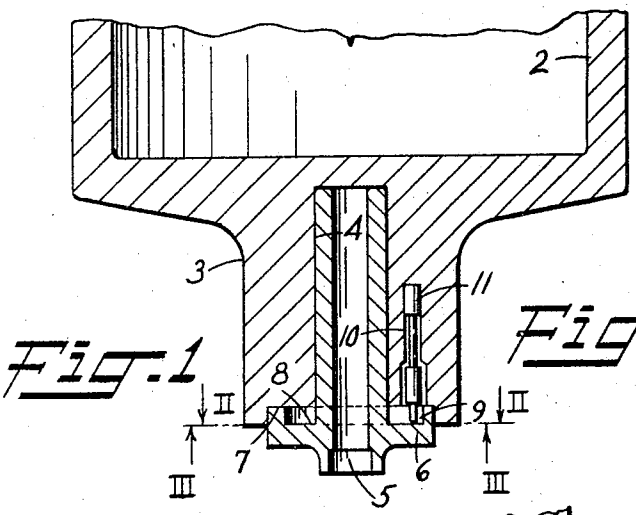

Fig. 1

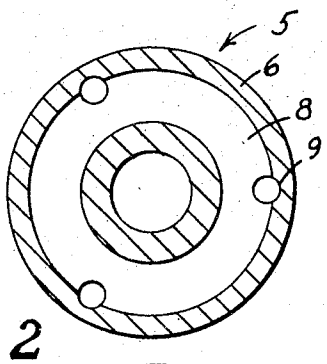

Fig. 2

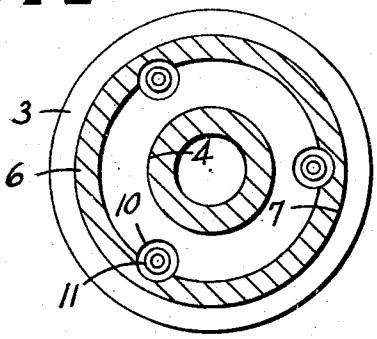

Fig. 3

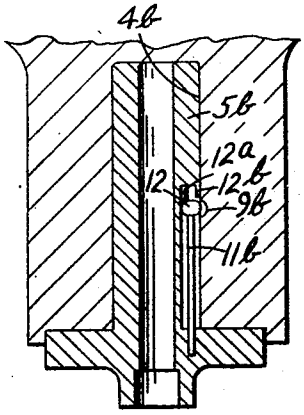

Fig. 5

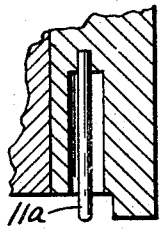

Fig. 4

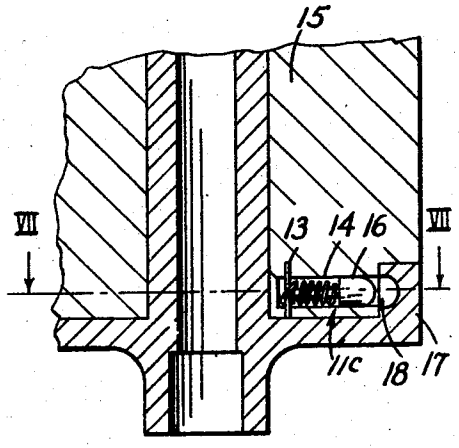

Fig. 6

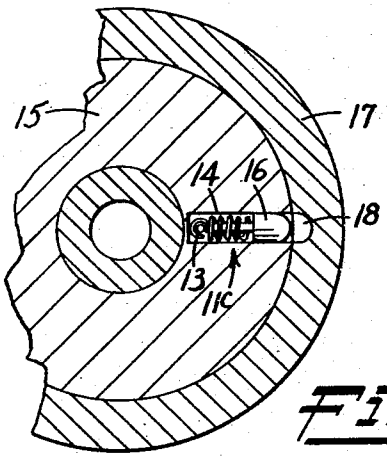

Fig. 7

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CLUTCH FOR SPINNING BUCKETS

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13 Claims. (Cl. 57—77)

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This invention relates to centrifugal couplings which are of general utility for coupling a driving element with an element to be driven, such as two shafts, in accordance with which a direct positive coupling is obtained at a predetermined minimum speed and the maximum power transmission obtained at any speed during which coupling is positive is predetermined by the characteristics of the coupling so that when the maximum load is exceeded, the coupling slips without damage thereto and without overloading the driving mechanism. The invention is hereinafter described in connection with rayon spinning buckets to which it is particularly applicable.

In the manufacture of rayon and the like, the thread or yarn is collected in a spinning bucket that is rotated at high speed by a drive shaft or motor spindle. It is the customary practice to place the buckets upon, and sometimes to remove the buckets from, their drive spindles while the drive spindles are rotating at high speed. It is, therefore, necessary that the spinning buckets be readily removable from the drive spindles. It is also necessary that the spinning bucket does not slip on its drive spindle during the spinning operation.

This invention has for its principal object to provide improvements in means for coupling a spinning bucket to a drive spindle which will permit the spinning bucket to be readily applied thereto and also to be readily removed therefrom during rotation of the spindle and which assures substantially uniform speed of the spinning box during normal operation thereof for collecting yarns. Other objects and advantages of the invention will be apparent from the following description and the accompanying drawings.

In the drawings—

Figure 1 is a sectional view of a spining bucket embodying the invention;

Figure 2 is a sectional view taken on line II—II of Figure 1;

Figure 3 is a sectional view taken on line III—III of Figure 1;

Figure 4 is a partial view in section of a modification;

Figure 5 is a partial view in section of another modification;

Figure 6 is a partial view in section of a fourth modification; and

Figure 7 is a section on line VII—VII of Figure 6.

Referring to Figures 1 to 3 of the drawing, reference character 2 indicates generally a spinning bucket having a hub portion 3 provided with a central bore 4. The spinning bucket, when in operative position, is mounted on the adapter bushing 5 which is rigidly attached to a motor spindle, not shown. While the bushing closely

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fits the central bore, sufficient clearance is provided to enable the spinning bucket to be readily removed and replaced on the adapter bushing.

As shown, the adapter 5 has a flange 6 which fits within a recess 7 of the hub of the spinning bucket. The flange 6 of the adapter has an annular groove 8 in its upper face and has one or more recesses such as in the form of notches 9 (three being shown) in its outer wall. One or more bores 10 (three being shown) extend into the hub and a corresponding resilient member 11 is secured therein. Securement may be by forcible fitting of an enlarged portion into the bore, as shown, or by any other suitable means. Each resilient member has a portion which is movable under the action of centrifugal force, such as the free end which extends into the groove 8 of the adapter, and there is a clearance between the wall of the bore 10 and the surface of the free end. As shown, the free end comprises a slender resilient neck and an enlarged portion adjacent the tip. This shape is not critical, however, as in its simplest form the member 11 may consist of a resilient pin or rod secured at one end in the hub as shown at 11*a* in Figure 4.

The resilient members 11 may be made of stiff spring steel or any other resilient material, and they may be designed to flex outwardly so that their tips engage the notches 9 at any predetermined speed. This may be accomplished in the embodiment of Figures 1 to 3 by selection of the diameter of the slender neck portion and of the enlarged portion. The larger the diameter of the neck portion and the smaller the diameter of the enlarged portion, the higher the speed at which the members are brought into engagement with the notches 9 of the adapter. As shown, the members 11 do not project beyond the recess 7 of the bucket hub so that the bucket may be set with its hub on a flat surface without damaging the pins.

Figure 5 shows a modification in which the resilient members 11*b* are anchored in the adapter 5*b* and their knobs 12 (which may be spherical) on flexing of the members engage notches 9*b* in the bore 4*b* of the bucket hub. If desired the notch-engaging knob 12 may be an anti-friction roller rotatably mounted upon the member 11*b* as a shaft. A projection 12*a* extending from the knob 12 prevents excessive outward motion of the resilient member by striking against the wall 12*b*.

While the resilient members 11 are disposed parallel to the bucket axis, they may be inclined at a large angle thereto. In Figures 6 and 7, there is shown a modification in which each of the resilient members 11*c*, comprising a helical spring secured at one end by a pin 13 within a

radial slot 14 in the hub 15 of the bucket, is fastened to a movable pin carrying a slide-block 16 at the outer end, and an upwardly extending annular rim 17 of the adapter is provided with the notches 18. Normally the spring retains the block 16 within the bucket hub but centrifugal force moves it into engagement with the notches 18 of the adapter.

Preferably, as shown, the notches 9 have gradually sloped or curved bottoms and the tips of the resilient members may have a corresponding curve so that when the bucket is accelerating from a stationary condition under the influence of the conventional frictional drive, the members may ride in and out of the notches relatively freely until the speed of the bucket is sufficient to hold the members in the notches under the action of centrifugal force. In this manner there is substantially no shock when the coupling becomes positive, thus reducing wear to a minimum. Also, the curved form of the notches and resilient members makes it possible to apply a brake to slow down the bucket for doffing without damaging the coupling. The coupling is composed of extremely few moving parts of the simplest character and consequently there is little opportunity for wear or failure resulting from clogging.

While preferred embodiments have been shown, it is to be understood that changes and variations may be made without departing from the spirit and scope of the invention as defined in the appended claims.

I claim:

1. In combination, a rotatable driving element, a rotatable driven element, means for coupling said driven element to the driving element comprising an inwardly facing generally annular wall within a portion of one of the elements adjacent their juncture, at least one resilient member secured to the other of the elements, and at least one recess formed in the annular wall of the first-mentioned element, each of said resilient members having a portion movable in response to centrifugal force to engage a corresponding recess from a position of rest out of engagement with said recess, each of the recesses having a bottom surface gradually sloped in the direction of rotation between the opposite lines of juncture thereof with the annular wall to permit the engaging portion of the corresponding resilient member to ride smoothly in and out of the recess during acceleration and deceleration of the driven element when the relative speeds of the elements are not substantially the same.

2. In combination, a rotatable driving element, a rotatable driven element, means for coupling said driven element to the driving element comprising an inwardly facing generally annular wall within a portion of one of the elements adjacent their juncture, at least one pin secured to the other of the elements so that it extends generally axially with respect thereto and at least one recess formed in the annular wall of the first-mentioned element, each pin having a free end comprising a resilient portion and a tip-adjoining portion movable in response to centrifugal force to engage a corresponding recess from a position of rest out of engagement with said recess.

3. In combination, a rotatable driving element, a rotatable driven element, means for coupling said driven element to the driving element comprising an inwardly facing generally annular wall within a portion of one of the elements adjacent their juncture, at least one pin secured to the other of the elements and at least one recess formed in the annular wall of the first-mentioned element, each pin having a free end comprising a resilient portion and a tip-adjoining portion movable in response to centrifugal force to engage a corresponding recess from a position of rest out of engagement with said recess, each of the recesses having a bottom surface gradually sloped in the direction of rotation between the opposite lines of juncture thereof with the annular wall to permit the tip of the corresponding pin to ride smoothly in and out of the recess during acceleration and deceleration of the driven element when the relative speeds of the elements are not substantially the same.

4. In combination, a rotatable driving element, a rotatable driven element having a hub adapted to receive the driving element, means for coupling said driven element to the driving element comprising a plurality of bores extending generally axially in the hub, a plurality of resilient pins secured at one end in the bores, clearances being provided between the bores and the free ends of the pins therein to permit outward flexing thereof, and notches in the driving element arranged to be engaged by the ends of the pins upon outward movement thereof.

5. In combination, a rotatable driving element, a spinning bucket driven element, means for coupling said bucket element to the driving element comprising an inwardly facing generally annular wall within a portion of one of the elements adjacent their juncture, at least one resilient member secured to the other of the elements, and at least one recess formed in the annular wall of the first-mentioned element, each of said resilient members having a portion movable in response to centrifugal force to engage a corresponding recess from a position of rest out of engagement with said recess, each of the recesses having a bottom surface gradually sloped in the direction of rotation between the opposite lines of juncture thereof with the annular wall to permit the engaging portion of the corresponding resilient member to ride smoothly in and out of the recess during acceleration and deceleration of the bucket element when the relative speeds of the elements are not substantially the same.

6. In combination, a rotatable driving element, a spinning bucket driven element, means for coupling said bucket element to the driving element comprising an inwardly facing generally annular wall within a portion of one of the elements adjacent their juncture, at least one member secured to the other of the elements and at least one recess formed in the annular wall of the first-mentioned element, each of said members having a portion movable in response to centrifugal force to engage a corresponding recess from a position of rest out of engagement with said recess, each of the recesses having a bottom surface gradually sloped in the direction of rotation between the opposite lines of juncture thereof with the annular wall to permit the engaging portion of the corresponding member to ride smoothly in and out of the recess during acceleration and deceleration of the bucket element when the relative speeds of the elements are not substantially the same.

7. In combination, a rotating driving element, a spinning bucket driven element, means for coupling said bucket element to the driving element comprising an inwardly facing generally annular

wall within a portion of one of the elements adjacent their juncture, at least one pin secured to the other of the elements so that it extends generally axially with respect thereto and at least one recess formed in the annular wall of the first-mentioned element, each of said pins comprising a resilient portion and a tip-adjoining portion movable in response to centrifugal force to engage a corresponding recess from a position of rest out of engagement with said recess.

8. In combination, a rotatable driving element, a spinning bucket driven element, means for coupling said bucket element to the driving element comprising an inwardly facing generally annular wall within a portion of one of the elements adjacent their juncture, at least one pin secured to the other of the elements and at least one recess formed in the annular wall of the first-mentioned element, each of said pins comprising a resilient portion and a tip-adjoining portion movable in response to centrifugal force to engage a corresponding recess from a position of rest out of engagement with said recess.

9. In combination, a rotatable driving element, a spinning bucket having a hub adapted to receive the driving element, means for coupling said bucket to the driving element comprising a plurality of bores extending generally axially in the hub, a plurality of resilient pins secured at one end in the bores, clearances being provided between the bores and the free ends of the pins therein to permit outward flexing thereof under the influence of centrifugal force, and notches in an internal surface of the driving element arranged to be engaged by the ends of the pins upon outward movement thereof, each of the notches having a bottom surface gradually sloped in the direction of rotation between the opposite lines of juncture thereof with the internal surface of the driving element to permit the ends of the pins to ride smoothly in and out of the notches during acceleration and deceleration of the bucket element when the relative speeds of the elements are not substantially the same.

10. In combination, a rotatable driving element, a spinning bucket having a hub adapted to receive the driving element, means for coupling said bucket to the driving element comprising a plurality of bores extending generally axially in the driving element, a plurality of resilient pins secured at one end in the bores, clearances being provided between the bores and the free ends of the pins therein to permit outward flexing thereof under the influence of centrifugal force, and notches in an internal surface of the hub arranged to be engaged by the ends of the pins upon outward movement thereof, each of the notches having a bottom surface gradually sloped in the direction of rotation between the opposite lines of juncture thereof with the internal surface of the driving element to permit the ends of the pins to ride smoothly in and out of the notches during acceleration and deceleration of the bucket element when the relative speeds of the elements are not substantially the same.

11. In combination, a rotatable driving element, a spinning bucket having a hub adapted to receive the driving element, means for coupling said bucket to the driving element comprising a plurality of bores extending generally radially in the hub, a plurality of pins resiliently secured in the bores and adapted to move outwardly in response to centrifugal force, and

notches in an internal surface of the driving element arranged to be engaged by the ends of the pins upon outward movement thereof, each of the notches having a bottom surface gradually sloped in the direction of rotation between the opposite lines of juncture thereof with the internal surface of the driving element to permit the ends of the pins to ride smoothly in and out of the notches during acceleration and deceleration of the bucket element when the relative speeds of the elements are not substantially the same.

12. In combination a rotatable driving element, a rotatable driven element, means for coupling said driven element to the driving element comprising an inwardly facing generally annular wall within a portion of one of the elements adjacent their juncture, at least one pin secured to the other of the elements so that it extends generally axially with respect thereto and at least one recess formed in the annular wall of the first-mentioned element, each pin having a free end comprising a resilient portion and a tip-adjoining portion from a position of rest out of engagement with said recess, a corresponding recess movable in response to centrifugal force to engage, each of the recesses having a bottom surface gradually sloped in the direction of rotation between the opposite lines of juncture thereof with the annular wall to permit the tip of the corresponding pin to ride smoothly in and out of the recess during acceleration and deceleration of the driven element when the relative speeds of the elements are not substantially the same.

13. In combination, a rotatable driving element, a rotatable driven element having a hub adapted to receive the driving element, means for coupling said driven element to the driving element comprising a plurality of bores extending generally axially in the hub, a plurality of resilient pins secured at one end in the bores, clearances being provided between the bores and the free ends of the pins therein to permit outward flexing thereof, and notches in an internal surface of the driving element arranged to be engaged by the ends of the pins upon outward movement thereof, each of the notches having a bottom surface gradually sloped in the direction of rotation between the opposite lines of juncture thereof with the internal surface of the driving element to permit the ends of the pins to ride smoothly in and out of the notches during acceleration and deceleration of the driven element when the relative speeds of the elements are not substantially the same.

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