No. 835,373. PATENTED NOV. 6, 1906.

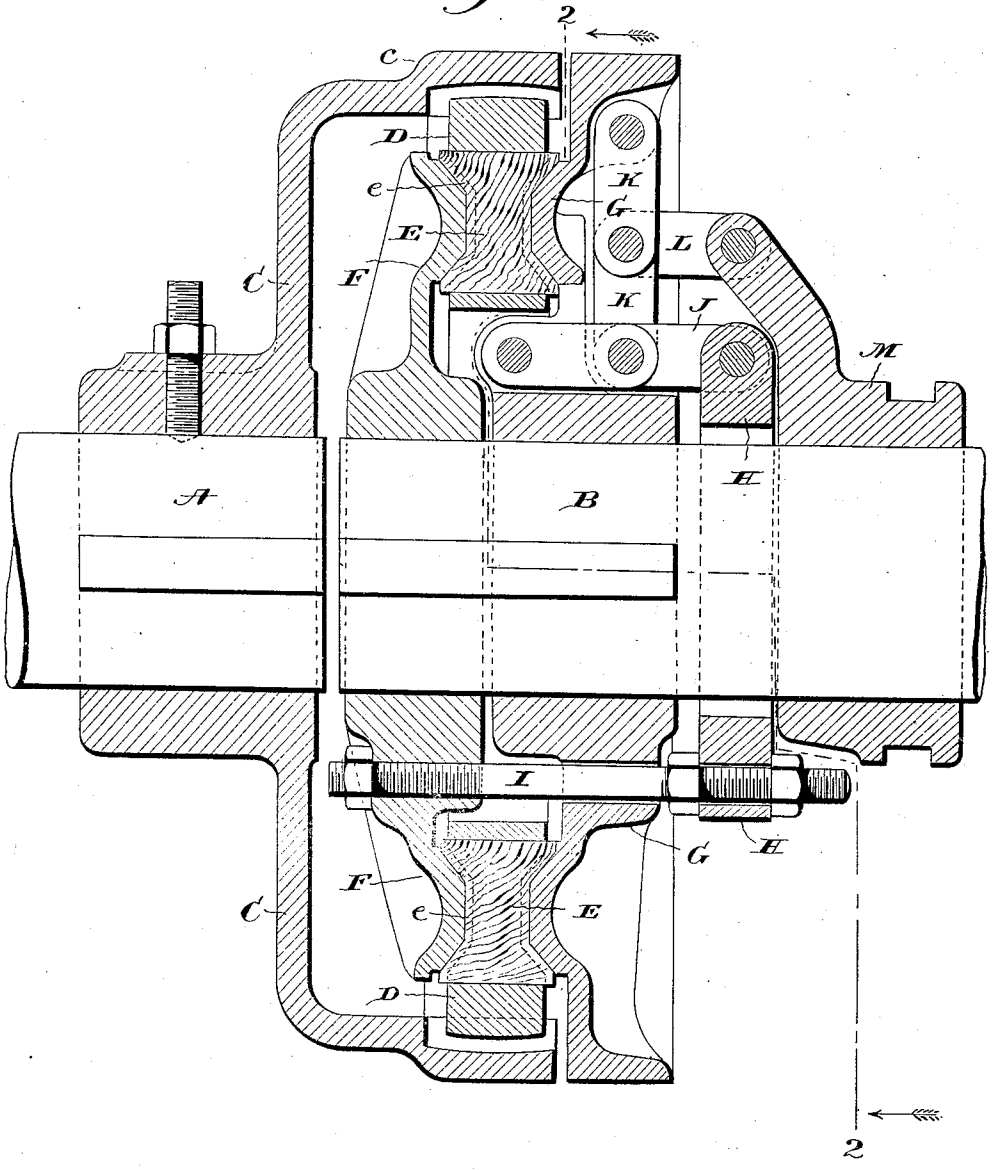
H. R. STACKS.

FRICTION CLUTCH.

APPLICATION FILED JULY 28, 1905.

4 SHEETS—SHEET 1.

Fig. 1.



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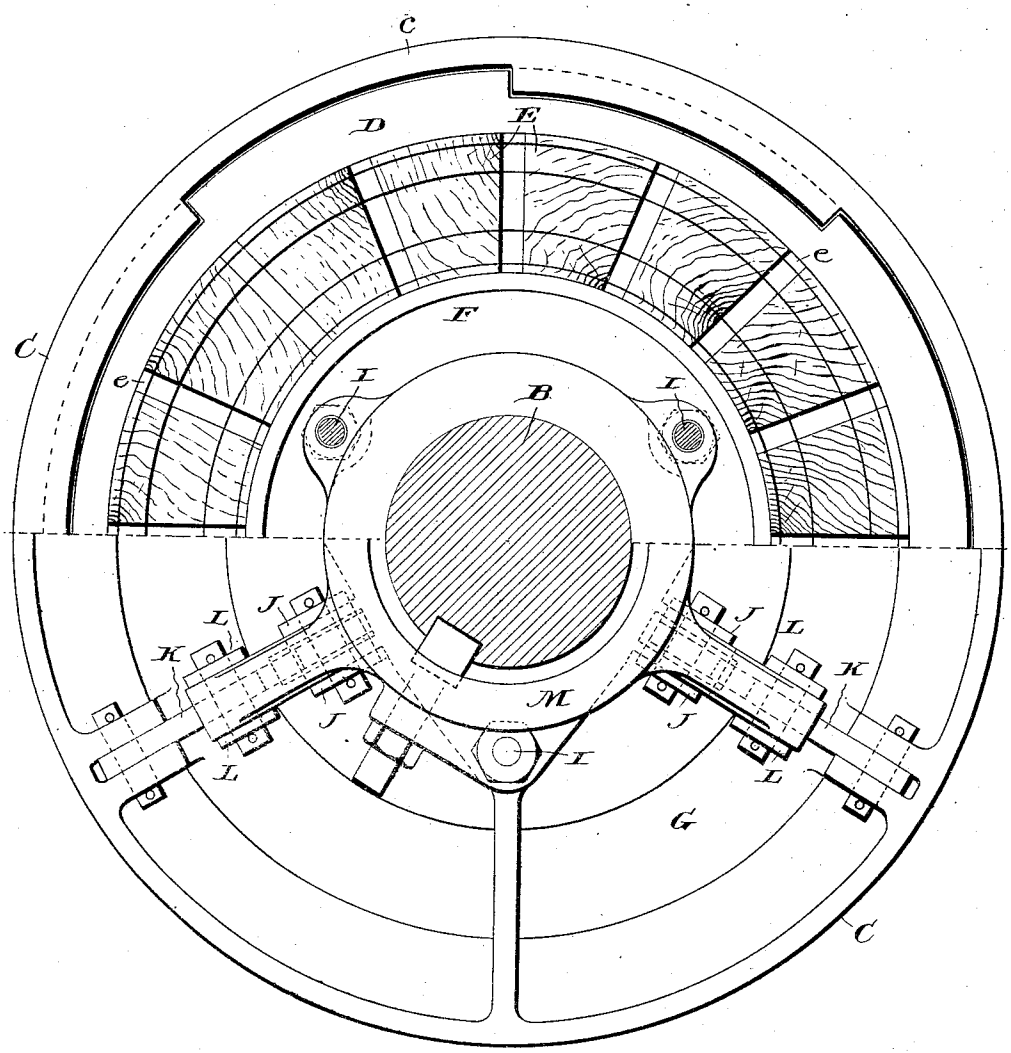
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4 SHEETS—SHEET 2.

Fig. 2.



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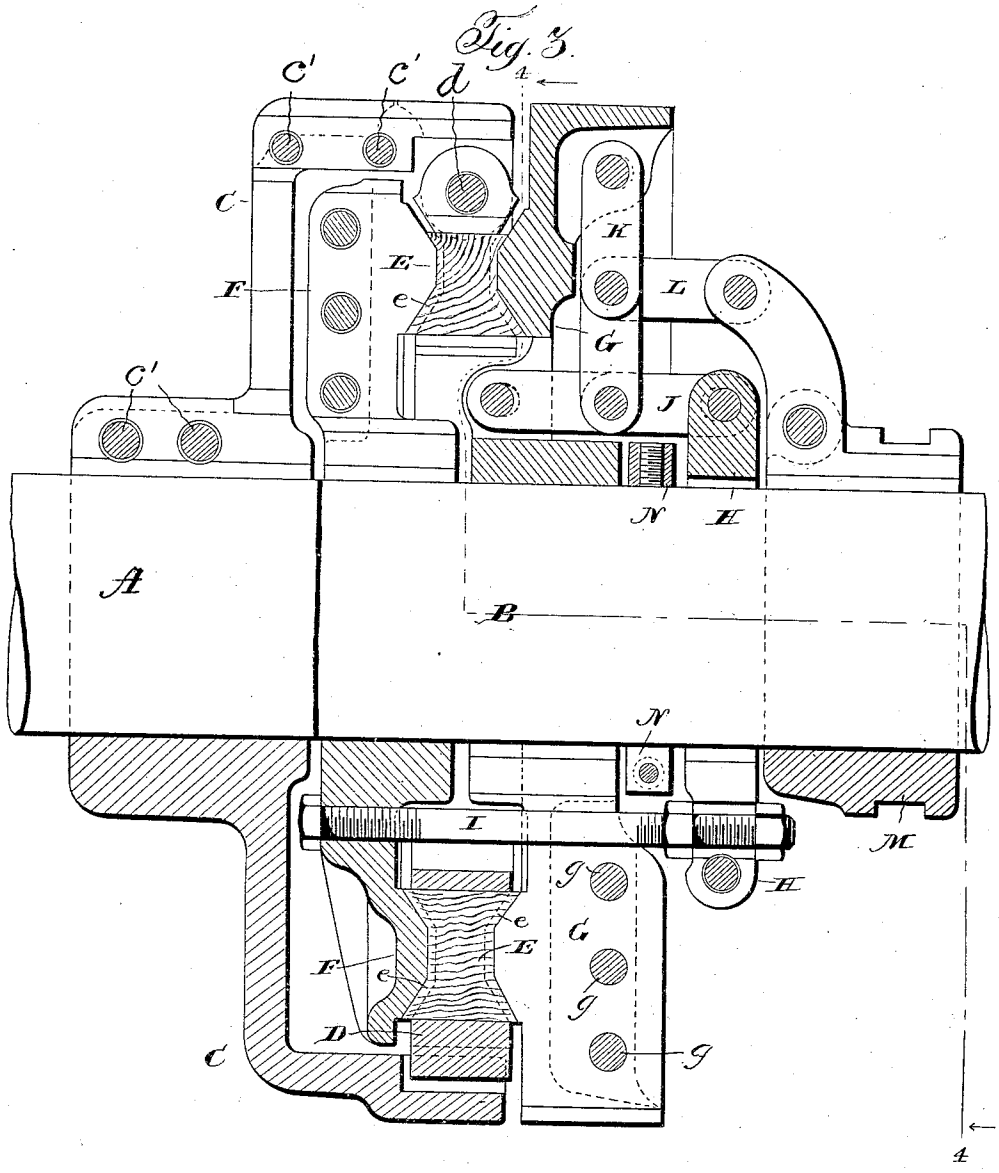
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4 SHEETS—SHEET 3.

Fig. 3.



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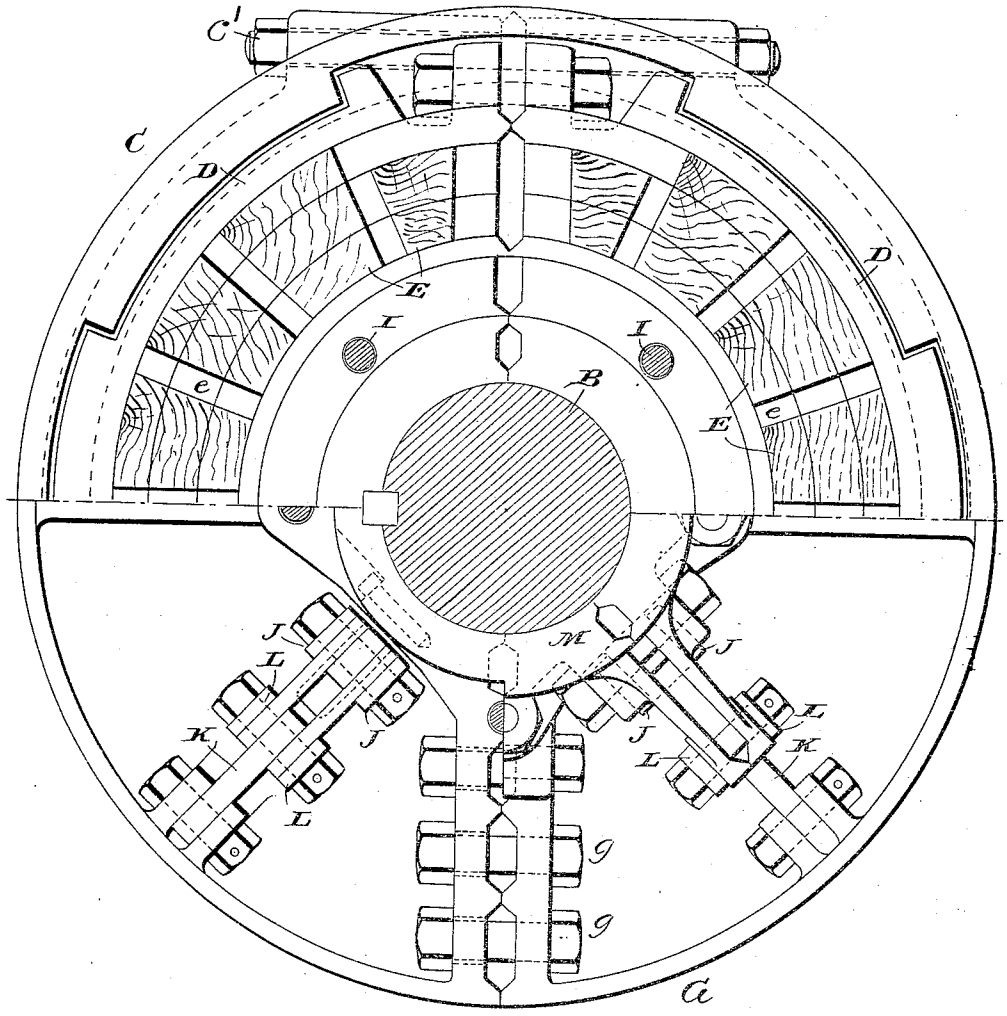
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4 SHEETS—SHEET 4.

Fig. 4.



Witnesses

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UNITED STATES PATENT OFFICE.

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FRICTION-CLUTCH.

No. 835,373. Specification of Letters Patent. Patented Nov. 6, 1906.

Application filed July 28, 1905. Serial No. 271,607.

To all whom it may concern:

Be it known that I, HOWARD ROY STACKS, of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a certain new and useful Improvement in Friction-Clutches; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, in which—

Figure 1 is a longitudinal section of a friction-clutch embodying my invention; Fig. 2, a section on the line 2 2 of Fig. 1. Fig. 3 is a longitudinal section of a clutch embodying my invention, which is a parting or split clutch; and Fig. 4 is a section on the line 4 4 of Fig. 3.

The object of my invention has been to produce a friction-clutch possessing the desirable qualities of simplicity and cheapness of construction, strength, and ease of operation; and to these ends my invention consists in the friction-clutch constructed substantially as hereinafter specified and claimed.

In the embodiment of my invention illustrated in Figs. 1 and 2 the clutch shown is applied to two shaft-sections A and B, one of which is to receive motion from the other. Fixedly mounted on the shaft-section A is a cup-form shell C, the flange *c* of which overhangs the other shaft-section B. Within the shell C is a ring D, that is connected with the shell-flange, so that the two will rotate together, but the connection between them being of such form that there may be independent movement of the ring laterally in a radial direction, the connection as shown being a well-known one, consisting of sector-shape notches in one part and sector-shape projections or lugs on the other part, the notches and lugs of the respective parts interlocking. In assembling the ring and the shell the ring is merely slipped endwise or axially into the shell from its open end, with the notches and recesses coinciding. The ring D carries an annular series of wooden friction-blocks E, inserted in openings or holes that pass through the ring from side to side, and the blocks on both sides are provided with recesses or depressions *e*, with which correspondingly-shaped annular ribs or projections of clamping rings or jaws F and G on opposite sides of the friction-ring coact. The object of the cavities or depressions in the opposite ends of the friction-blocks and the annular ribs of the clamping-jaws that coact with said cavities or depressions is to give an extended bearing-surface and also to effect the centering of the friction-ring D concentric with the shaft B should it at the time of the clutching operation not be concentric with said shaft-section. The clamping rings or jaws F and G are both directly mounted upon the shaft-section B to which they are keyed, and both may be slidably mounted upon their shaft-section for movement to and from the friction-ring D, or, if preferred, only the jaw F may be slidable on the shaft, the other jaw being stationary and of course the friction-ring D being moved in contact with it by the action of the jaw F. Encircling the shaft-section B, adjacent the hub of the clamping-jaw G, is a ring or collar H, which is connected to each of the clamping-jaws F and G. Its connection with the clamping-jaw F consists of one or more rods or bolts I, that lie parallel with the clutch-axis, which pass loosely through holes in the clamping-jaw G and at one end are screwed into threaded openings in the clamping-jaw F and at the other end being passed loosely through openings in the ring or collar H and provided with nuts that engage said ring or collar on opposite sides, and thus firmly connect them together, so that movement of the collar or ring will be transmitted, through the medium of the bolts, to the clamping-jaw F, and such movement of the clamping-jaw will be positively produced in either direction, according to the direction of the movement of the collar or ring. The connection between the collar or ring H and the clamping-jaw G consists of one or more toggles, each formed of two links J, that are respectively pivotally connected to the ring or collar H and the clamping-jaw G and of course are pivotally connected to each other, and their connections are such that when the toggle is in a straight line and its centers aline it is parallel or substantially parallel with the axis of the clutch. For each toggle consisting of links J there is a second toggle consisting of links K, one of which is pivotally connected to the joint or knuckle of the links J and the other pivoted to the clamping-jaw G, and the links K of course are pivoted to each other, and the position of said second toggle

and its centers is such that when said second toggle is in a straight line it extends at a right angle to the first toggle. Pivoted to the joint or knuckle of the second toggle is one end of a link L, whose other end is pivoted to an arm on a sliding collar M, adapted, as usual, to be reciprocated to clutch and unclutch by a suitable hand-lever.

It will be seen that movement of the clamping-jaw F is produced by the action of the toggles on the ring or collar H, and, as will be evident, by my system of double toggles I get a most powerful gripping action, and I get it by a minimum amount of movement of the clutch-operating lever, both considerations, of course, being of great practical importance, the first because of its assuring a grip or hold of the clutch members which will not slip, and the second because the fulcrum of the operating-lever being usually near the ceiling such lever must be of considerable length to be within reach of a man on the floor, and, of course, by reason of its length, a short movement of the clutch-operating collar means a short movement of the handle end of the lever.

Clearance is preferably left between the ring or collar H and the shaft-section it encircles, so that should the adjustment of the connections between said collar and the friction-jaws be not accurate uniformity of pressure of the jaws on the friction-ring D may, nevertheless, be had by the shifting or adaptation of the position of the ring or collar H to the conditions of imperfect adjustment which may exist.

By reason of the loose connection between the friction-ring D and the shell-flange *c* the clutch will operate satisfactorily even though the two shaft-sections A and B may not be in alinement, though parallel, and such loose connection also permits of the adaptation of the clutch-ring D and the shell to each other should the shaft-sections be at an angle to each other, and to facilitate such adaptation and increase the range of it the periphery of the friction-ring D and the adjacent surface of the shell-flange are spherically curved on a center that is coincident with the center of the friction-ring.

Inasmuch as the assemblage of the friction-ring D and the shell involves merely the endwise movement of these parts into engagement, no bolts or other attaching means being necessary, it will be seen that all the members of the clutch which go on each shaft-section can be applied thereto before the shaft is placed in position and then the completion of the assemblage of the clutch effected when the shaft-sections are mounted in their bearings, and for the same reason the taking down of the clutch is facilitated.

As shown in Figs. 3 and 4, my clutch has a parting or divided form, which, of course, is desirable under some conditions. In this form those members or parts of the clutch which consist of rings are made in halves and the halves united by bolts and nuts. Thus the shell C is composed of halves united by bolts *c'*, the ring D of halves united by bolts *d*, and the ring G of halves united by bolts *g*. When both the clamping-jaws F and G are axially slidable on the shaft, it may be desirable, as is shown in Fig. 3, to place upon the shaft, between the ring or collar H and the hub of the jaw G, a stop-ring N, against which the hub of the jaw G and the ring or collar H will strike in unclutching when the jaws F and G have moved the desired distance from the friction-ring D.

Clutches made in accordance with my invention possess in addition to the advantages which have been mentioned others that are of practical value and importance. They are cheap to manufacture, because the only finished surfaces are the shaft-engaging surfaces, the friction-surfaces, and the drill-work, all of which is turret-lathe and jig work. The size of the clutches, compared with their horse-power, is extremely small—a thing that is of importance, both because there is a saving in manufacture, as less material is required, and because of the amount of space or room required, the crowded conditions of some shafting and the location thereof making even a difference of an inch in diameter or length of a clutch of consequence. By reason of my arrangement of toggles centrifugal force is without effect when the clutch is locked when the clutch is revolving at the highest rates of speed, and when unlocked the effect of centrifugal force is to keep the clutch unlocked, thus insuring against automatic or accidental locking of the clutch. There are no flying arms, levers, set-screws, or other parts apt to become loose and thrown off, the outside of the clutch being perfectly smooth and free from projections, and yet such parts as require adjustment are so exposed as to be easily accessible. All the parts are interchangeable, so that the cost of repair from wear or other causes is not great, and there are no springs.

I do not show in the drawings a clutch-pulley embodying my invention; but it will be understood without illustration that my invention may be embodied in a clutch-pulley.

From what has been said in the specification it will be seen that my invention is susceptible of different embodiments, and it is therefore to be understood that the scope of my invention is not restricted to clutches embodying the particulars of construction which are shown in the drawings and are described in detail herein.

Having thus described my invention, what I claim is—

1. In a clutch, the combination of a shell, a friction-ring connected therewith by interlocking lugs and notches, the adjacent pe-

ripheral surfaces of the shell and ring being spherically curved, and jaws to engage said ring.

2. In a clutch, the combination of a shell, a friction-ring connected therewith to rotate with it, but free to move laterally in a radial direction independently of the shell, and a ring-engaging jaw, the engaging surfaces of the ring and jaw being complementary cavities or depressions and projections with inclined surfaces, whereby the application of the jaws to the ring may act to shift the ring in a radial direction.

3. In a clutch, the combination of a shell, a friction-ring connected therewith to rotate with it, but free to move laterally in a radial direction independently of the shell, said ring having, in opposite sides, cavities or depressions with inclined sides, and jaws on both sides of the ring to engage the same, having surfaces corresponding to said cavities or recesses, to enter therein.

4. In a clutch, the combination of coöperating friction members, and operating mechanism comprising two toggles, each consisting of a pair of links, the link of one of the toggles being directly connected with the knuckle of and transmitting motion to the other.

5. In a clutch, the combination of coöperating friction members, comprising two oppositely-acting jaws, a toggle, whose respective links are connected with both jaws, a second toggle, composed of two links, one of whose links is connected to the knuckle of the first-mentioned toggle, and means for operating said second toggle connected to the knuckle thereof.

6. In a clutch, the combination of coöperating friction members comprising a ring and a jaw, operating mechanism comprising two toggles, each consisting of a pair of links, a link of each pair being connected to the jaw member, a bearing for the other link of one of the pairs, a connection between the two toggles at the knuckle of one of the same, and means for applying power to the knuckle of the other toggle.

7. In a clutch, the combination of coöperating friction members, a shaft-encircling ring or collar loose on the shaft, adjustable connections between said ring or collar and one of the friction members, clearance existing between the collar and shaft to permit movement of the collar for adaptation to the conditions due to adjustment and means for applying power to said ring or collar to move the same.

8. In a clutch, the combination of friction members, comprising two oppositely-acting jaws, both of which are movable, connections between the jaws, by which they are movable in opposite directions, and a stop to limit the movements of the jaws in unclutching.

In testimony that I claim the foregoing I have hereunto set my hand.

HOWARD ROY STACKS.

Witnesses:
JOSEPH M. HEWLETT,
E. E. HELLER.