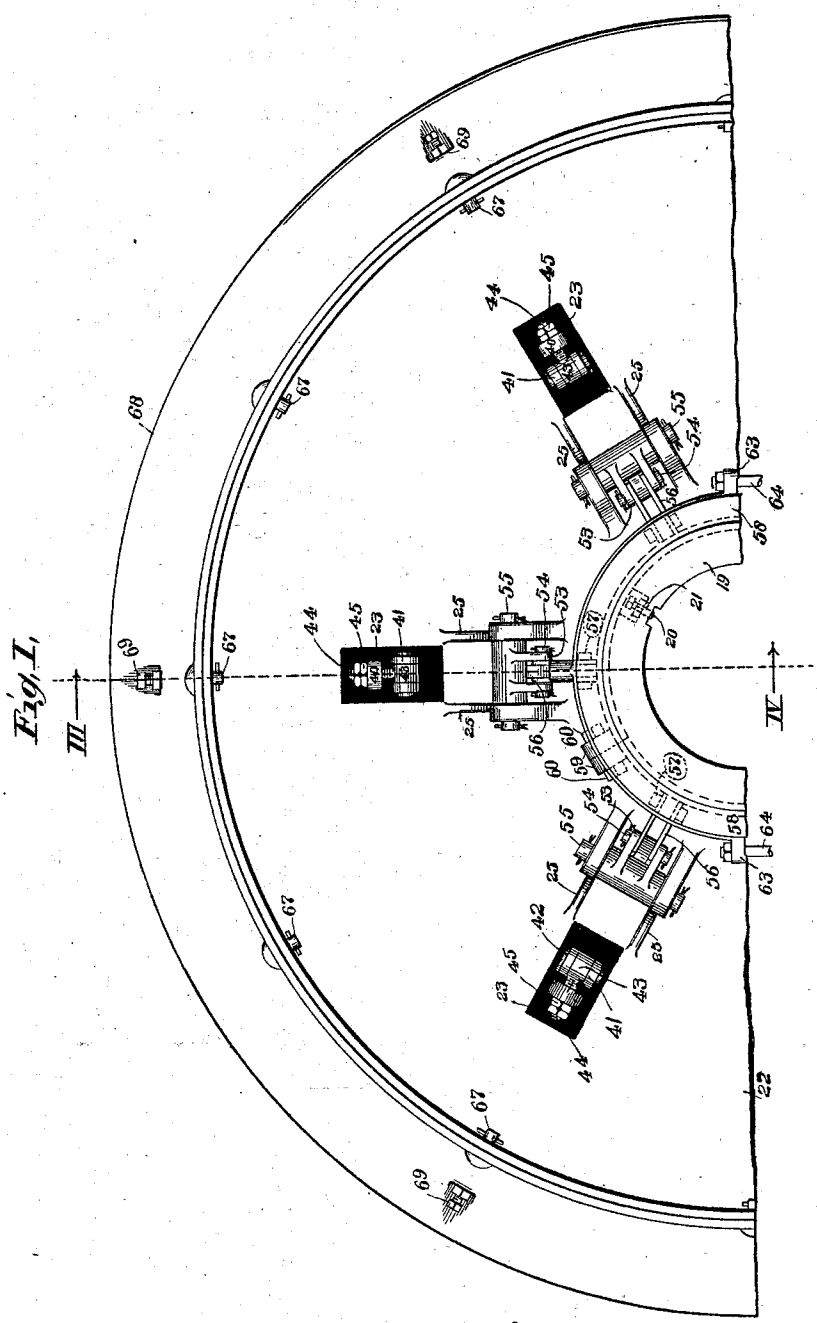
(No Model.) 4 Sheets—Sheet 1.

G. N. HINCHMAN.

FRICTION CLUTCH.

No. 560,714. Patented May 26, 1896.

Fig. 1.



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W. C. Alexander.

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By Attorneys Fowler & Fowler

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(No Model.) 4 Sheets—Sheet 2.

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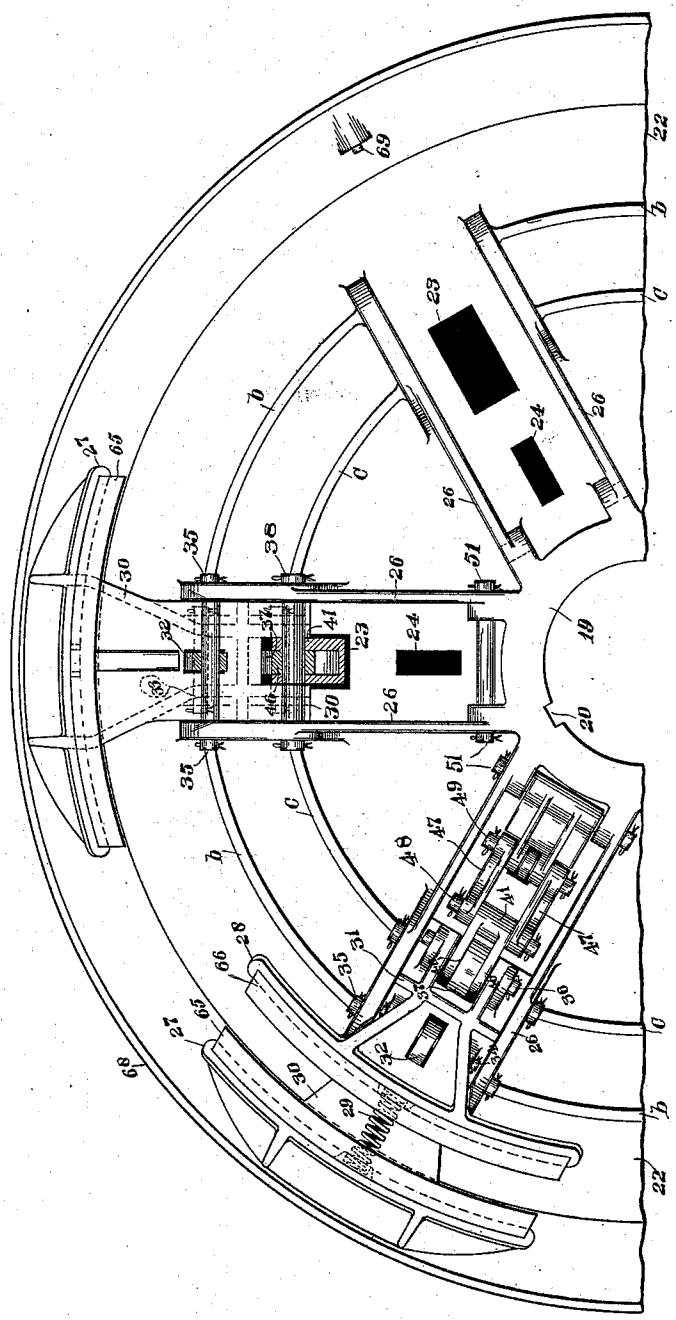
Fig. II.



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(No Model.) 4 Sheets—Sheet 3.

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Fig. III.

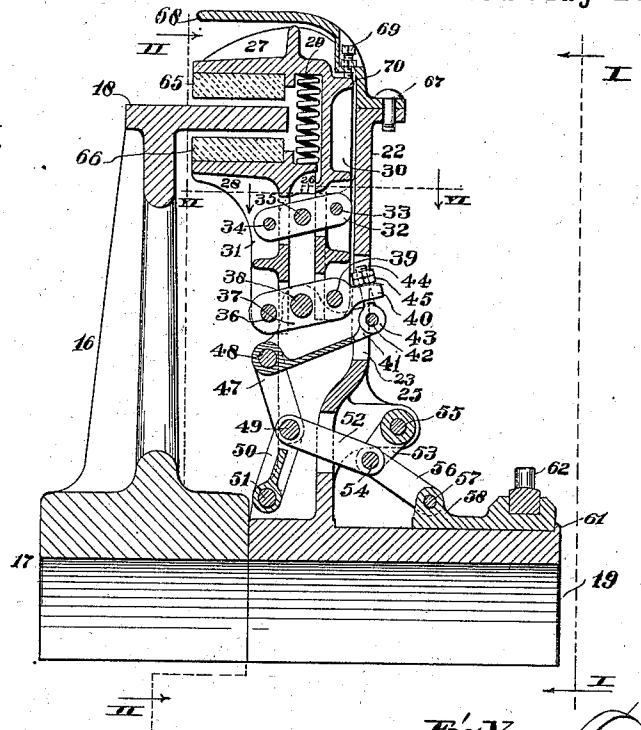


Fig. IV.

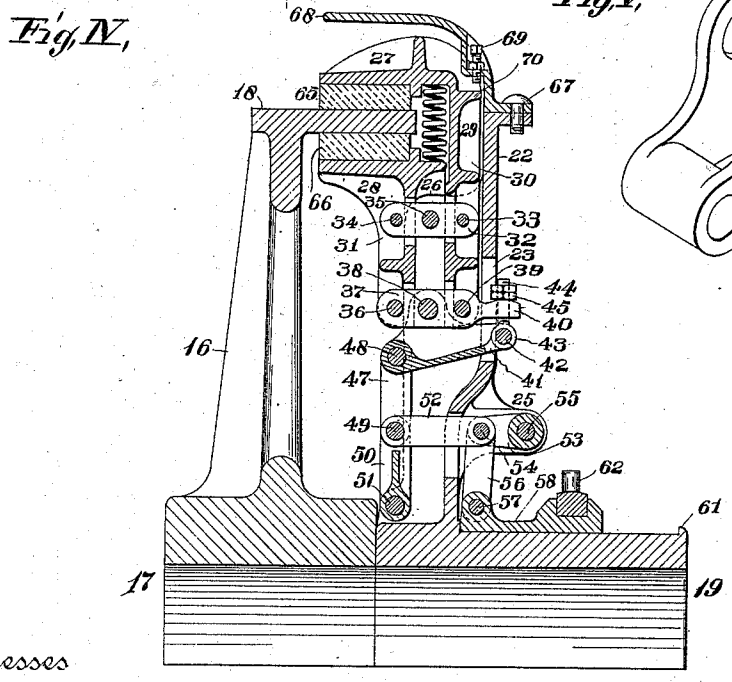
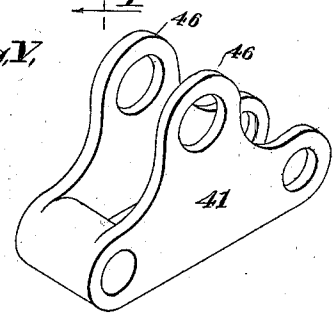


Fig. V.



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(No Model.) 4 Sheets—Sheet 4.

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Fig. VI.

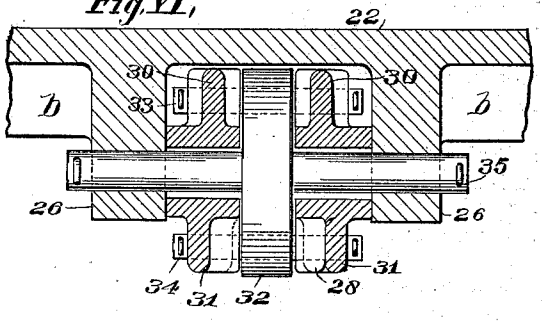


Fig. VIII.

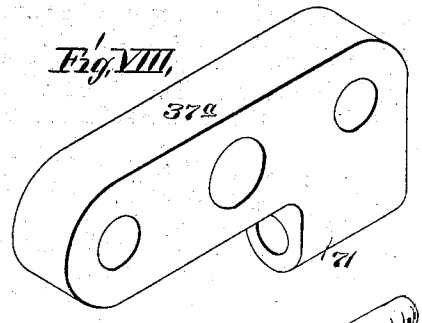


Fig. IX.

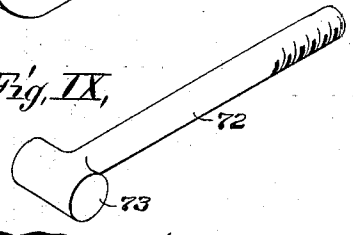


Fig. VII.

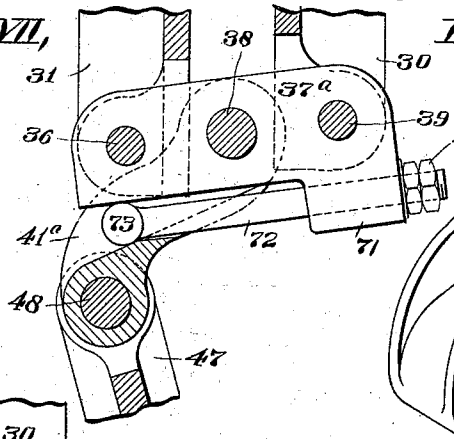


Fig. X.

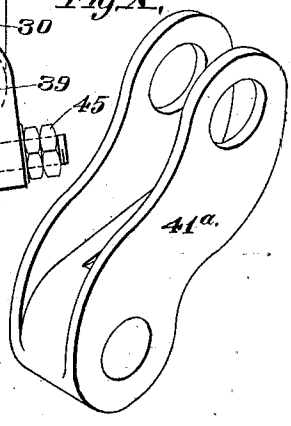


Fig. XI.

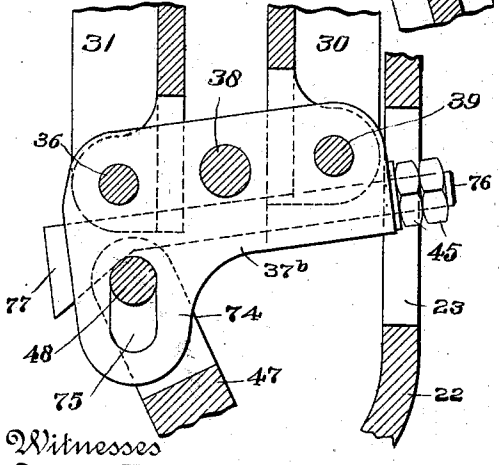
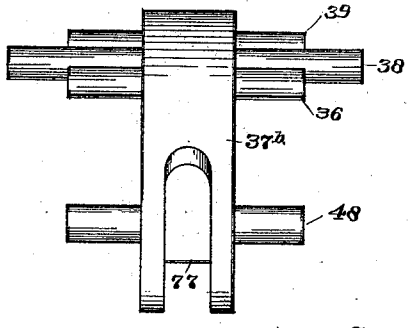


Fig. XII.



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UNITED STATES PATENT OFFICE.

GEORGE N. HINCHMAN, OF CUYAHOGA FALLS, OHIO.

FRICTION-CLUTCH.

SPECIFICATION forming part of Letters Patent No. 560,714, dated May 26, 1896.

Application filed November 27, 1894. Serial No. 530,112. (No model.)

To all whom it may concern:

Be it known that I, GEORGE N. HINCHMAN, a citizen of the United States, residing at Cuyahoga Falls, county of Summit, and State of Ohio, have invented a certain new and useful Friction-Clutch, of which the following is such a full, clear, and exact description as will enable any one skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification.

The object of my invention is to construct a friction-clutch which will require the least possible amount of finished work in the way of milling and planing and which will take up the least possible space and shall at the same time be a very effective apparatus.

The invention also has for its object the construction of a friction-clutch which will be cheap and will not cause noticeable currents or drafts of air.

It is also the object of my invention to produce a friction-clutch in which there is no danger of the operator falling between the parts thereof and being injured.

The invention will be best understood by referring to the accompanying drawings, in which—

Figure I is a front elevation on the plane of the line I I of Fig. III of one form of my invention, representing but a portion of the friction-clutch; and Fig. II is a sectional elevation thereof on the line II II of Fig. III, some parts of the apparatus having been omitted from the part of this figure to more clearly illustrate the invention. Fig. III is a cross-section on the line III III of Fig. I, the clutch being seen. Fig. IV is a similar view as the last, the clutch being closed. Fig. V is an isometric view of a detail. Fig. VI is a detail sectional view on the line VI VI of Fig. III. Fig. VII is a sectional side elevation of a modification of part of the apparatus shown in Figs. III and IV for adjusting the parts of the clutch. Figs. VIII, IX, and X are detail isometric views, respectively, of three of the parts illustrated in the modification shown in Fig. VII. Fig. XI is still another modification, corresponding to the parts illustrated in Fig. VII, for adjusting the clutch. Fig. XII is a detail elevation of some of the parts shown in Fig. XI.

The same marks of reference indicate the same parts throughout the different figures of the drawings.

16 represents one semicircular half of a pulley mounted loosely by a hub 17 upon a suitable shaft. (Not shown.) This pulley is provided with a friction-ring 18 at its periphery, which extends parallel with the hub of the pulley. Adjacent to the hub 17, carrying the loose pulley, is a hub 19, which is mounted upon the shaft. (Not shown.) The hub 19 is furnished with a feathered way 20, into which may take a spline or feather (not shown) secured in the said shaft. By this means the hub 19 is made to revolve with the shaft. To prevent the hub 19 from moving longitudinally on the shaft, the hub is provided with a pointed set-screw 21, which takes against the said spline or feather.

Extending from the hub 19 is a circular web portion 22, which may be cast integral with said hub. This circular part 22 has a series of apertures 23 and 24, respectively, therein at regular intervals around it, and is made of the configuration shown to better afford room for the parts of the clutch. Adjacent to each aperture 24 and extending outwardly from the circular web portion 22 are two parallel brackets 25, which may also be cast integral with the said circular portion 22. From the other side of the circular part 22 and adjacent to each of the apertures 23 and 24 are two parallel brackets 26, extending inwardly, which reach from the hub 19 radially to not far from the outer edge of the circular part 22. Each parallel bracket 26 is connected to its neighboring bracket 26 by circular ribs *b* and *c*, Fig. II, on the web portion 22, which ribs strengthen the web portion and brace the brackets. These latter-mentioned brackets and circular ribs may also be cast integral with the hub and circular web portion 22.

27 and 28, Figs. II, III, and IV, are two jaws, which are adapted to grasp and make frictional contact with the friction-ring 18. These jaws are arranged in sets of two at regular intervals around the said ring. They are all similar in construction and operated in the same manner, so that I shall proceed to set forth a description of one set of these jaws only. Between the two jaws is interposed a spring 29, which tends to force them

apart and out of contact with the friction-ring 18. The upper jaw 27 is provided with a downward extension 30, which is at right angles to its main part. The jaw 28 is also provided with a downward extension 31. These two jaws are connected together by a link 32, which is pivotally connected to their downward extensions by pins 33 and 34, respectively, and pivotally supported upon a pin 35, supported by the upper part of the brackets 26. The downward extensions 30 and 31 of the jaws are suitably slotted to permit the link 32 to pass through them. A space is also left between the said downward extensions for the said jaws to move freely up and down without being interfered with by the pin 35. To the lower end of the downward extension 31 is pivotally connected by a pin 36 a link 37, swung upon a pin 38, which is supported by the brackets 26 about midway of their length. This link 37 is also pivotally connected by a pin 39 to the downward extension 30 of the jaw 27. The lower ends of the extensions 30 and 31 are also slotted to permit the link 37 to play up and down in. The links 32 and 37, by the construction set forth, impart a parallel movement to the extensions 30 and 31, the brackets serving to guide the extensions 30 and 31 in their movements, Figs. II and VI. As the downward extension 30 moves toward the center of the clutch the downward extension 31 moves from the center of the clutch, and vice versa, thereby bringing the jaws toward or causing them to recede from each other.

The link 37 is provided with an extension 40, to which is attached a bifurcated link 41 by means of a pin 42 passing through the said bifurcated link and through a short sleeve 43, Fig. I, from which extends a screw-threaded pin 44, projecting through the extension 40 of the link 37, and being adjustably attached thereto by nuts 45. The construction of this bifurcated or double link 41 is shown clearly in Fig. V. It has a bifurcated upward extension 46, which is swung upon the pin 38, the two extensions 46 being at each side of the link 37. By this means the bifurcated link 41 is pivotally supported by the brackets 26. The other end of the bifurcated link 41 has an articulate connection with two parallel arms 47 of a toggle-joint, the said articulate connection being made by means of a pin 48, Figs. II, III, and IV. The two arms 47 of the toggle-joint are connected by means of a pin 49 to a single toggle-arm 50, attached by a pin 51 to the lower part of the brackets 26, or to a lug upon the hub 19. To the pin 49 of the toggle is attached a single arm 52 of a second toggle, the other two parallel arms 53, Figs. I, III, and IV, of which are secured to said single arm 52 by a pin 54. The other ends of the two parallel arms 53 of the second toggle swing about a pin 55, carried by the brackets 25, extending from the outside of the circular disk or web part 22. To actuate these different toggles and the jaws of the friction-clutch, there are provided two parallel links 56, the ends of which are swung upon the pin 54 of the second-mentioned toggle and the other ends of which are articulated by a pin 57 to a sleeve 58, Figs. I. III, and IV, adapted to slide upon the hub 19, previously referred to. This sleeve 58 is preferably a divided one, consisting of two semicircular parts having lugs 59, Fig. I, extending therefrom, which may be joined together by bolts 60. The sleeve 58 is adapted to slide between the circular web part or disk 22 and a circular shoulder 61 on the hub 19. The sleeve 58, as a matter of fact, in practice will preferably be located upon a reduced or turned-off portion of the hub 19. About the sleeve 58 is a yoke 62, which is preferably divided or split, so that it may be placed about the sleeve 58. The divided parts are provided with flanges 63, by which they may be united by bolts 64. The yoke is the part adapted to slide the sleeve 58 backward and forward on the hub 19, so as to put on or take off the clutch.

The jaws 27 and 28 are provided with wooden shoes 65 and 66, respectively, which in fact make contact with the friction-ring 18 instead of the jaws themselves. To the periphery of the circular flanged part 22 is secured by bolts 67 a circular cap-piece 68, which overhangs the upper jaw 27 of the clutch, and with the circular web part 22 and pulley 16 forms a complete housing for the parts of the clutch, preventing the operator from becoming entangled in the parts of the clutch and injured, and preventing also the clutch from causing noticeable and objectionable currents of air. It will be seen that the main supporting-web 22 of the clutch serves also as a housing for the clutch.

The amount of clearance between the friction-ring 18 of the clutch and the jaws or woods thereof is regulated by set-screws 69, carried by the circular cap-piece 68. The ends of these set-screws are adapted to come against shoulders 70 on the upper jaws 27, and thereby regulate the distance of the jaws from the friction-ring 18.

The operation of the apparatus is as follows: To apply the clutch, the handle (not shown) connected to the yoke 62 is grasped by the operator, and the sleeve 58, which is revolving with the clutch, is thereby thrown from the position shown in Fig. III to the position shown in Fig. IV. It will be understood, of course, that the hub 19 and all the parts carried by the circular web portion and housing 22 are constantly revolving, whereas the yoke 62 remains stationary, but permits the sleeve 58 to rotate freely. The movement of the sleeve 58 to the position shown in Fig. IV causes the parallel links 56 to push outwardly in a radial direction the toggle formed by the arms 52 and 53, bringing the arms of this toggle and the various pins thereof nearly in a straight line. This causes the arm 52 of this toggle to operate on the toggle formed by the arm 47 and 50, inasmuch as the outer

end of the first-mentioned toggle is journaled upon the fixed pin 55. The thrust exerted by the link 52 of this toggle causes the second toggle to straighten, as illustrated in Fig. IV, and thereby exerts an upward thrust against the pin 48 and bifurcated link 41, causing the inner or left-hand end of this link to be thrown upward and the outer or right-hand end thereof downward, the bifurcated link swinging about the pin 38 as a center. The pulling downward of the link 42 as a consequence pulls downward the extension 40 of the link 37 and swings the link 37 on its pin 38, thereby drawing downward the upper jaw 27 and throwing upward the lower jaw 28 and compressing the spring 27 between these two jaws. This causes the wooden pieces carried by the jaws to come against the friction-ring 18, and thereby couples the clutch to the friction-ring to drive the pulley 16. A reverse movement of sleeve 58 causes the parts to operate in the reverse direction and takes off the clutch from the friction-ring 18, as shown in Fig. III, the spring 29 between the jaws assisting in the reverse movement of the parts.

The upper link 32, between the extensions 30 and 31 of the jaws, is provided to steady and guide the movement of the jaws, giving the said extensions of the jaws a parallel movement.

Should the wooden shoes of the jaws become worn, the jaws may be set up toward the friction-ring 18 by manipulating the set-screws 69, and to compensate for such wear and the setting up of the woods the adjustment between the extension 40 of the link 37 and the bifurcated link 41 is provided. This insures a given uniform movement of the sleeve 58, moving the toggles and jaws 27 and 28 through a given distance. This latter adjustment is effected by manipulating the nuts 45 and causing them to be screwed up or down upon the screw-pin 44, as the case may be, to thereby cause the extension 40 of the link 37 to be drawn nearer to or removed farther from the bifurcated link 41.

It will be understood, of course, in the devices previously described that the outer or right-hand end only of the bifurcated link operates the link 37, and that the inner or left-hand end of such bifurcated link does not operate directly upon the end of the link 37, as might be supposed from the drawings, these parts being arranged near each other in the present instance to secure compactness in structure.

Should any part of the apparatus get out of order, it is only necessary to remove the circular cap-piece 68 and slide the clutch and hub 19 along the shaft (not shown) until the clutch is sufficiently separated from the pulley 16. All of the parts of the clutch may then be gotten at with ease and any part thereof removed. Before sliding the hub on the shaft it would of course be necessary to loosen the grip of the set-screw 21 upon the spline in the shaft. In putting the clutch together the upper and lower jaws can be pivoted together before being attached to the circular housing or web part 22, to which they are secured by means of the pins 35 and 38, passing through the links 32 and 37 and resting in the brackets 26.

It will be obvious that the jaws may be operated by other mechanisms than the toggle devices herein set forth. I do not wish, therefore, to limit my invention to such toggle mechanism being used, except when the same is specified in the claims attached hereto. So, too, it will be obvious that the toggle mechanism herein set forth may be employed to operate other forms of gripping-jaws, so that I do not wish to be understood as confining my invention to the particular form of jaws herein set forth, unless the same are specifically designated in my claims.

In Figs. VII, VIII, IX, and X is illustrated a modified way of adjusting the parts to accommodate the jaw-operating connections to the wear of the wooden shoes. Here the link 37^a is provided with a downward perforated extension 71, through which passes a screw-threaded rod 72, having a T-head 73. The bifurcated link 41^a is also of peculiar form and is shaped as illustrated in Fig. X. It swings about the pins 38 and 48 only, the pin connection 42, previously described, being dispensed with. The T-head 73 is interposed between the bifurcated link 41^a and the link 37^a. In this instance an upward movement of the toggle-arm 47 pushes directly upward the extension 31 of the lower jaw 28 through the instrumentality of the left-hand end of the link 37^a, and this causes the other end of the link 37^a to be swung downwardly and thereby draws downward the extension 30 of the upper jaw 27. By manipulating the nuts 45 on the end of the screw-threaded rod 72 the T-head 73 may be drawn inward or allowed to move outward to adjust the parts, so as to compensate for the wear of the wooden shoes applied to the gripping-jaws.

In Figs. XI and XII is illustrated still another modification of this adjustment. Here the action of the apparatus is quite similar to that last described. In the present instance the bifurcated link 41 is dispensed with and the link 37^b, provided with a downward extension 74, having a slot 75 therein, in which slot works the pin 48 of the toggle-arm 47. The link 37^b has a channel-passage through it, in which is placed a bar 76, having a screw-threaded end and nuts the same as the rod 72 last described, but provided with an inclined extension 77, against which the pin 48 is adapted to come. By drawing the bar 76 inward, which is effected by screwing the nuts farther on the end of the said bar, the inclined plane of the extension 77 is to a greater extent drawn within the upward path of the pin 48, and by unscrewing said nut 45 from said bar the incline of the end 77 is to a less extent interposed in the travel of the pin 48. When the toggle-arm 47 is thrust up-

ward, the pin 48 passes through the slot 75, strikes sooner or later upon the incline of the bar 77 and thereby throws upward the left-hand end of the link 37 and downward the right-hand end of said link, causing the extension 31 of the lower jaw 28 to be moved upward and the extension 30 of the upper jaw 27 to be moved downward.

My friction-clutch may be used as cut-off coupling instead of clutch-pulley, as described, in which case, as is well known, the hubs 17 and 19 would be located on a divided shaft—that is, would really be on separate shafts—and the hub 17 of the friction-ring would be coupled by a feather or otherwise to its shaft. The clutch would then be used to couple and uncouple the two shafts.

Modifications may be made in the apparatus without departing from the spirit of my invention, and I do not wish, therefore, to limit my invention to the details set forth; but

What I desire to claim and secure by Letters Patent of the United States as my invention is—

1. A friction-clutch comprising a suitable rotary member having a peripheral friction-ring, a series of gripping-jaws at each side of said ring, adjusting means for determining the amount of clearance between the jaws and friction-ring, connections for operating said jaws, and adjusting devices for accommodating the operating connections to the wear of the said jaws.

2. The combination to form a friction-clutch, of a rotary member having a peripheral friction-ring, jaws gripping said ring between them and carried by a second rotary member adjacent to said first rotary member, two links pivoting said jaws together and maintaining parallelism between them, pins pivoting said links to said second rotary member, a bifurcated link swung upon one of said pins for imparting power to said jaws and links, and connections actuating said bifurcated link.

In testimony whereof I have hereunto set my hand and affixed my seal, this 17th day of November, 1894, in the presence of the two subscribing witnesses.

GEORGE N. HINCHMAN. [L. S.]

Witnesses:

LIZZIE HINCHMAN,

C. N. RUSSELL.