(No Model.)

# F. VAN BENTHUYSEN.

## FRICTION CLUTCH.

No. 457,446. Patented Aug. 11, 1891.

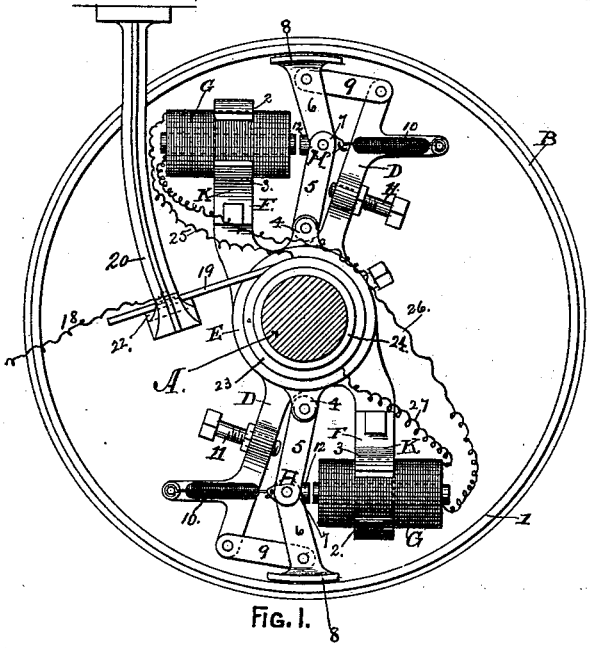

Fig. 1.

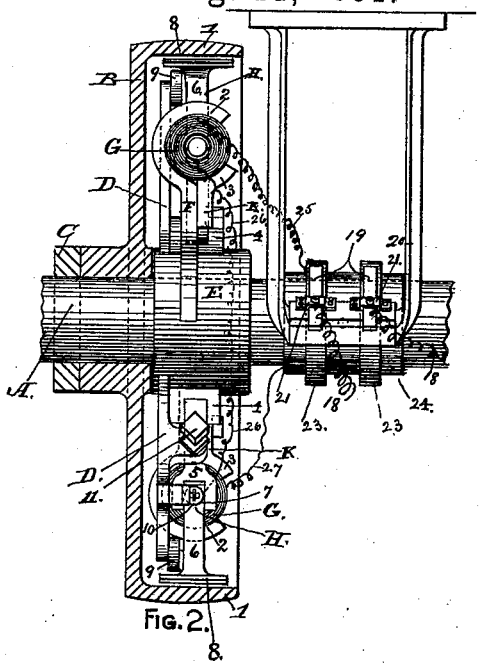

Fig. 2.

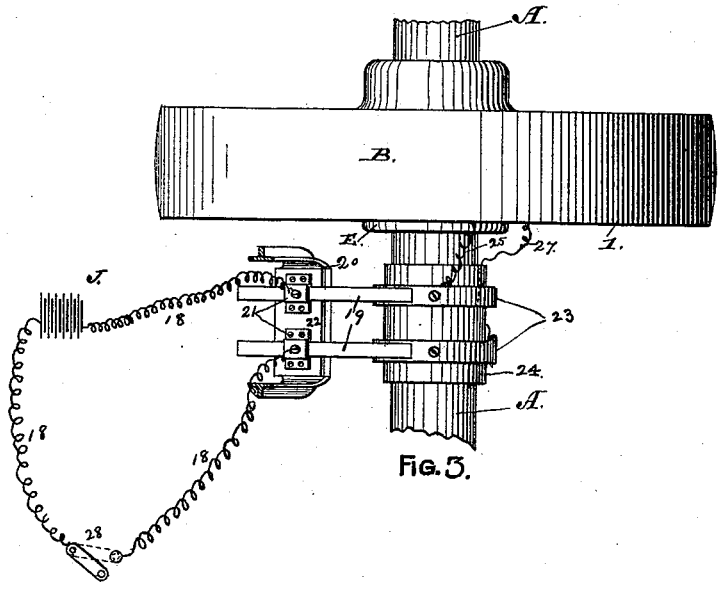

Fig. 3.

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# UNITED STATES PATENT OFFICE.

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## FRICTION-CLUTCH.

SPECIFICATION forming part of Letters Patent No. 457,446, dated August 11, 1891.

Application filed March 30, 1891. Serial No. 386,968. (No model.)

*To all whom it may concern:*

Be it known that I, FRANK VAN BENTHUYSEN, of the city and county of Albany, in the State of New York, have invented a new and useful Improvement in Friction-Clutches, of which the following is a specification.

My invention relates to friction-clutches for connecting and disconnecting pulleys, gearing, and wheels to revolving shafts; and it consists in providing the clutch mechanism with means for electrically controlling its connecting and disconnecting movements in such manner that either of said movements can be made instantaneously.

The object of my invention is to provide means for effecting an instantaneous stopping and starting of machinery whose rotative motion is dependent upon a motive power that is independent of the driven machinery. This object I attain by the means illustrated in the accompanying drawings, which are herein referred to and form part of this specification, and in which—

Figure 1 is a side elevation of my electrically-controlled friction-clutch as applied to a pulley. Fig. 2 is a vertical section of the pulley of said clutch, showing the clutch mechanism, electrical connections, and the shaft in elevation; and Fig. 3 is a plan view of Fig. 1.

As represented in the drawings, A designates a revoluble shaft, which may be either a "driver" or a driven shaft, according to the purpose for which it is required.

B is a pulley, which is loosely fitted on the shaft A and retained in place on the latter by means of a collar C. In the form shown in Figs. 1, 2, and 3 the inner side of the rim 1 of said pulley is bored concentrically with the center of the shaft A.

D are radial arms formed on a sleeve E, which is secured to said shaft; F, tangential arms extending from opposite sides of the periphery of the sleeve E and provided with a concave seat 2 at the outer end of each, for the purpose of holding an electro-magnet G on each of said arms. A binder K is secured to each of said arms and is provided with a concave 3, which forms a complement to the seat 2. The sleeve E is also provided with lugs 4, to which are pivoted the inner ends of the joint-pieces 5 or inner parts of toggle-joints H. The outer parts or joint-pieces 6 of said toggle-joints are articulated, as at 7, to the outer ends of the parts 5, and the outer end of each part 6 is provided with a head 8, which is fitted to bear in frictional contact with the inner side of the rim of the pulley B. Each outer part 6 of the toggle-joints H is flexibly connected by a link 9 to the outer end of the adjacent arm D in such manner that, while the outer end of each toggle-joint will have a free movement toward and from the rim of the pulley E, said toggle-joints will be retained in position relatively to the arms D. To each articulation 7 of said toggle-joints a spiral spring 10 is connected in such manner that the joint will be normally drawn toward the adjacent arm D, and the outer end of each of said springs is connected to a branch of said arm. Each of the arms D is provided with a check 11, by which the flexure of the adjacent toggle-joint H can be restricted, as occasion may require. To each articulation 7 an armature 12 is attached, so that its outer face will extend toward the core of the adjacent electro-magnet G, and said armatures are constructed of material that will be attracted toward the electro-magnets whenever the latter are charged with electricity. The attraction of said electro-magnets tends to draw the toggle-joints toward them, so that the latter will assume an approximately direct line in opposition to the strain of the springs 10. By this movement of the toggle-joints the head 8 of each of said toggle-joints will be forced into frictional contact with the rim of the pulley B with such tenacity that said pulley, shaft A, and sleeve E will be connected to operate as one piece.

The electro-magnets G are made in the usual manner, and both have a like polarity. By means of the sleeve E said magnets are secured to the shaft A in such manner that they will partake of the status of the latter—that is to say, they will be in motion while said shaft is revolving, and remain stationary while the latter is at a state of rest.

J designates a generator of electricity which is used for my invention, and said generator may be of any style suitable for such purpose. Connected to said generator are conducting-

wires 18, one of said wires being the positive and the other the negative one. Each of said wires is electrically connected to its appropriate brush 19, which is carried by a stationary bracket 20 or other suitable fixture. Said brushes are held in place by clips 21, and are insulated from each other and from the bracket 20 by a layer 22 of india-rubber or other non-conductor of electricity. The inner end of each brush 19 bears against an annular conductor 23, of which there are two, so that each brush will have its own annular conductor independently of the other, and said annular conductors are properly insulated from each other and from the shaft by means of a sleeve 24 of any material that is a proper non-conductor of electricity. In the drawings said sleeve is interposed directly between the annular conductors 23 and the periphery of the shaft A; but in Figs. 4, 5, and 6 said sleeve is interposed between the annular conductors 23 and the hub of the disk I. Either construction is efficient and may be used in either form of my invention. The annular conductor 23 nearest the electro-magnets is connected with the outside coil of one of said magnets by means of a conducting-wire 25. The inner coil of the same magnet is connected to the inner coil of the other magnet by means of a conducting-wire 26, and the outer coil of the second magnet is connected by a conducting-wire 27 to the annular conductor 23, which is located most distantly from the electro-magnets G. The conducting-wire 27 is embedded in the sleeve 24, beneath the annular conductor 23, that is nearest the electro-magnets, and thereby said conducting-wire is properly insulated from the last-named annular conductor. The conducting-wire 18 is provided with a switch 28 or other suitable appliance, whereby the circuit of electricity from the generator J can be instantly broken or completed, as occasion may require.

The operation of my invention is as follows: When the toggle-joints H are drawn by the springs 10 into an angular line, as shown in Fig. 1, whereby the frictional contact of the heads 8 with the rim of the pulley B will be broken upon the completion of the electric circuit by means of the switch 28 or other appliance, the electro-magnets G will instantly become magnetized, so as to attract the armatures 12 toward said magnets, and thereby causing the parts of the toggle-joints H to assume a straight line with each other. By this movement the heads 8 will be forced outwardly into frictional contact with the rim of the pulley B, whereby said pulley will be given a rotary motion, which may be continued while the current of electricity continues to pass through the electro-magnets G; but said rotatory motion may be instantly terminated by breaking the circuit through the conducting-wires 18, whereupon the springs 10 will flex the toggle-joints H, so as to retract the heads 8 from the rim of the pulley B and break the frictional contact between them.

When preferred, the toggle-joints H may be arranged in such manner in relation to the electro-magnets G and springs 10 that the latter will normally keep the heads 8 in frictional contact with the rim of the pulley B during the time the electric circuit is broken, and in such a modification the electro-magnets G will be employed to flex said toggle-joints to retract the heads 8 from contact with said pulley.

What I claim as my invention, and desire to secure by Letters Patent, is—

The combination of a revoluble shaft, a pulley on said shaft, a sleeve on said shaft provided with means for holding electro-magnets and having toggle-joints pivoted thereto, the outer end of said toggle-joints being fitted to frictionally engage with said pulley and each of said toggle-joints having an armature at its middle joint, annular electrical conductors carried on said shaft, an insulating-sleeve interposed between said shaft and annular conductors, a generator of electricty having its opposite poles connected separately to said annular conductors, the latter being electrically connected to said electro-magnets, and means for opening and closing the electric circuit between said generator and electro-magnets, substantially as specified.

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