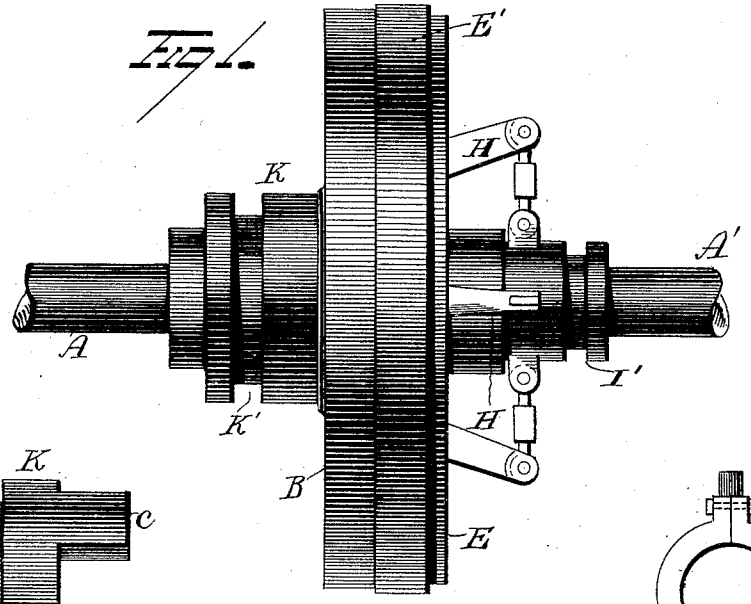
(No Model.) 4 Sheets—Sheet 1.

L. J. WING.

CLUTCH.

No. 475,838. Patented May 31, 1892.

Fig. 1.



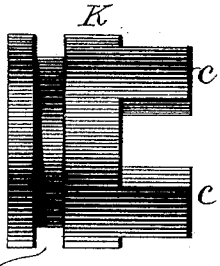


Fig. 2.

Fig. 4.

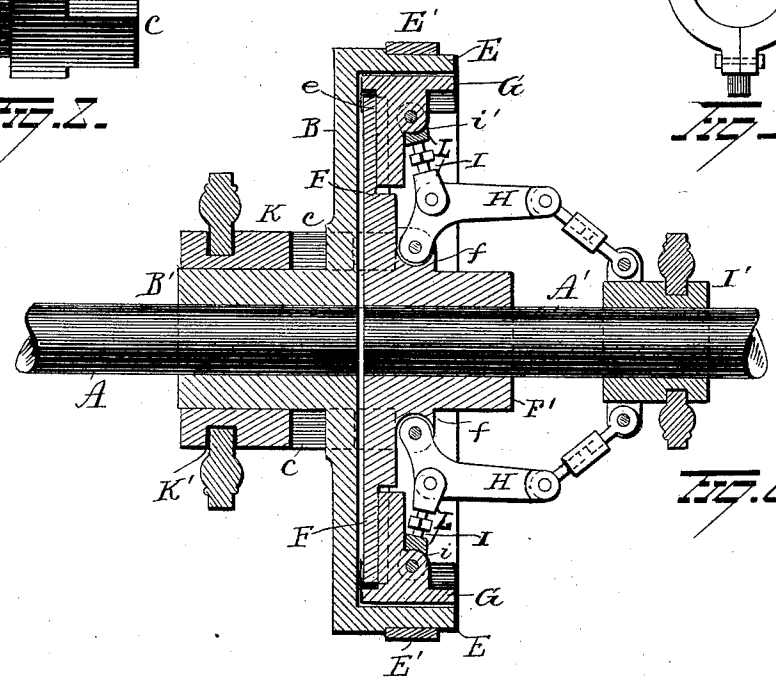


Fig. 2.

Witnesses
E. J. Nottingham
S. G. Nottingham

Inventor
L. J. Wing.
By H. A. Seymour
Attorney

(No Model.) 4 Sheets—Sheet 2.

L. J. WING.

CLUTCH.

No. 475,838. Patented May 31, 1892.

Fig. 3.

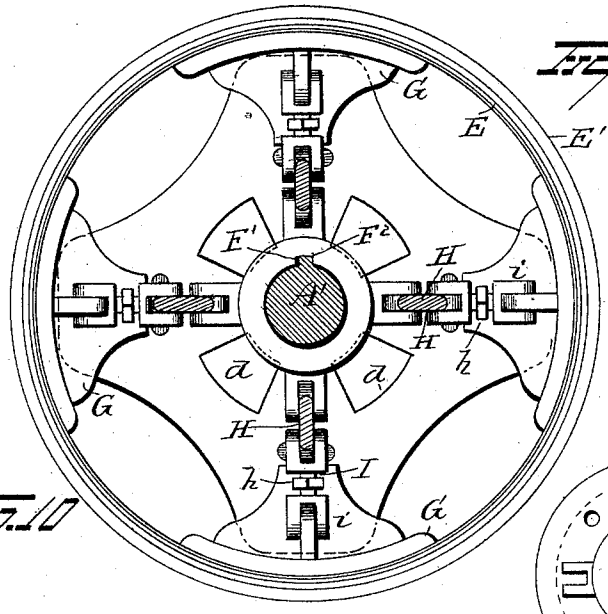


Fig. 10.

Fig. 13.

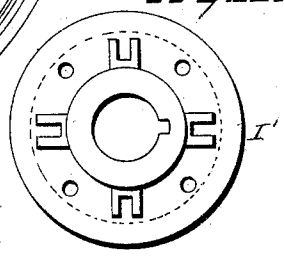


Fig. 4.

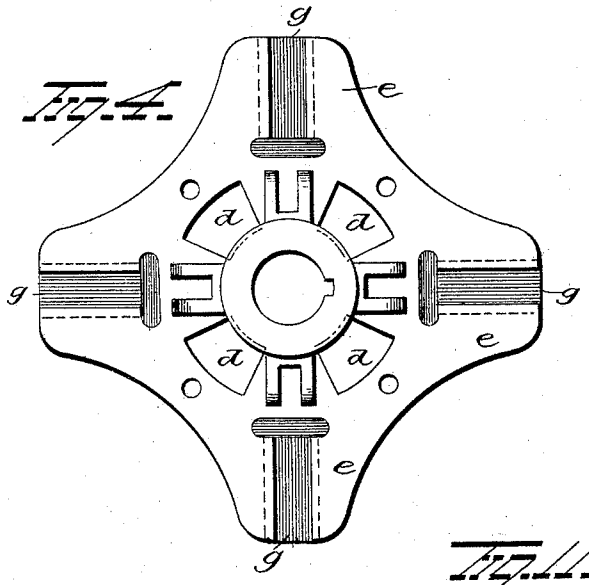


Fig. 5.

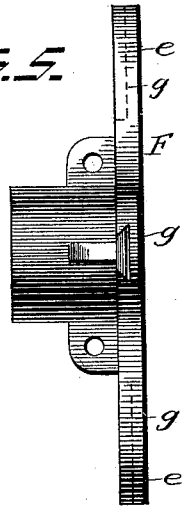
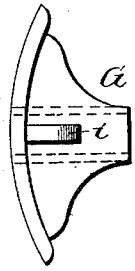


Fig. 11.



Witnesses

E. J. Nottingham

S. G. Nottingham

Inventor

L. J. Wing.

By H. A. Seymour.

Attorney

(No Model.) 4 Sheets—Sheet 3.

L. J. WING.

CLUTCH.

No. 475,838. Patented May 31, 1892.

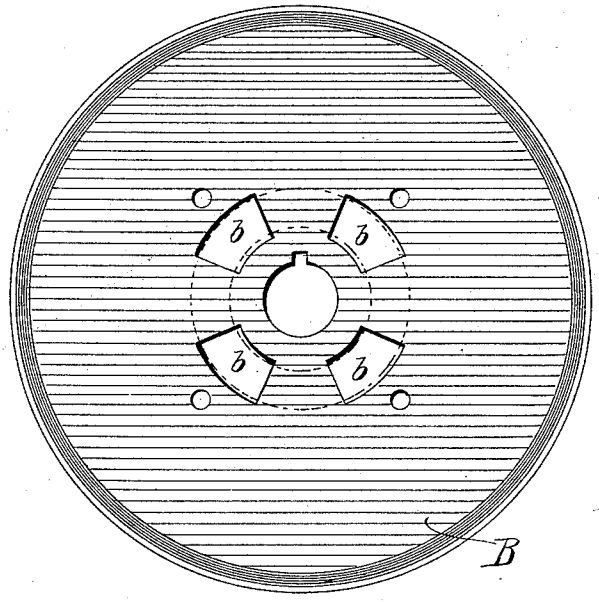


FIG. 6.

FIG. 7.

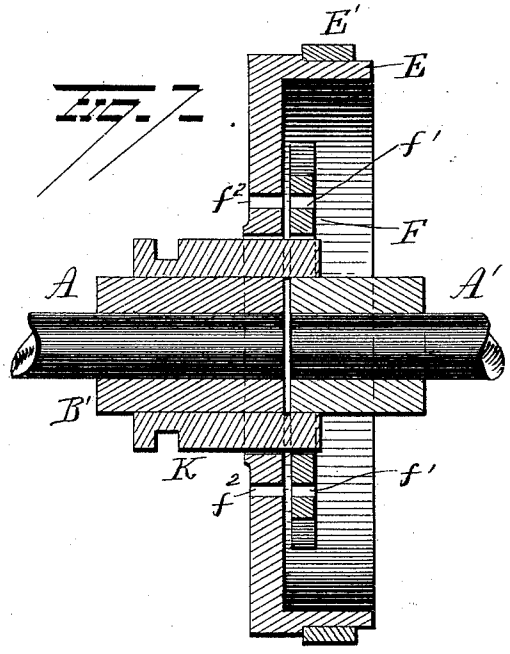
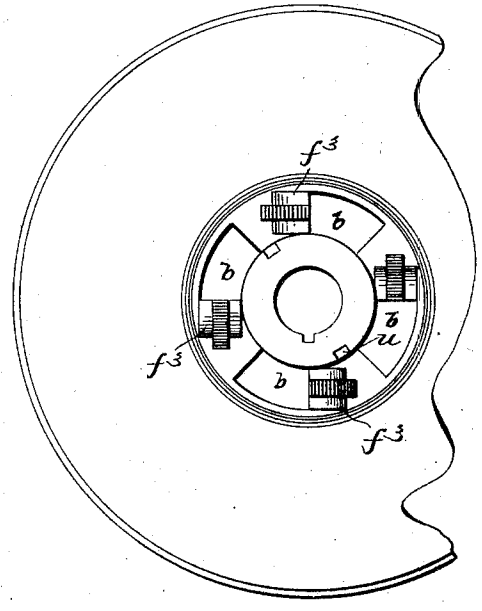


FIG. 5.



Witnesses
S. G. Nottingham
S. G. Nottingham

Inventor
L. J. Wing.
By A. Sugmore
Attorney

(No Model.) 4 Sheets—Sheet 4.

L. J. WING.

CLUTCH.

No. 475,838. Patented May 31, 1892.

Fig. 12.

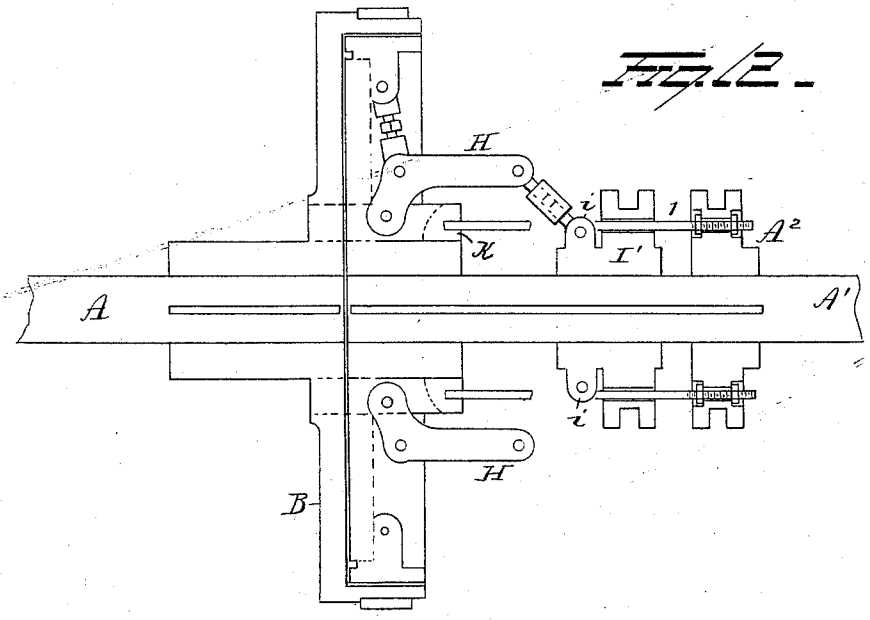


Fig. 14.

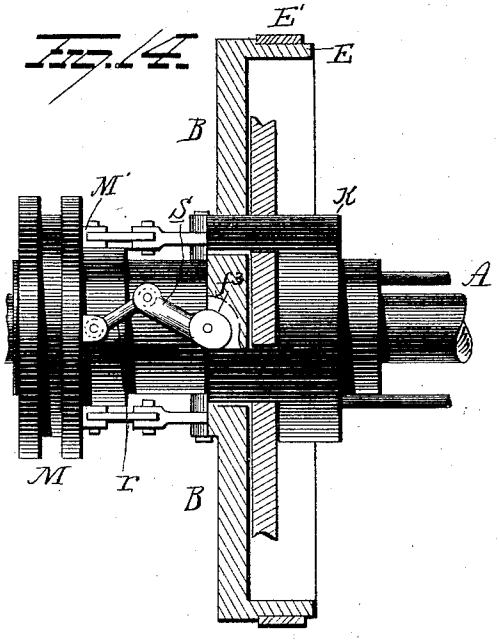
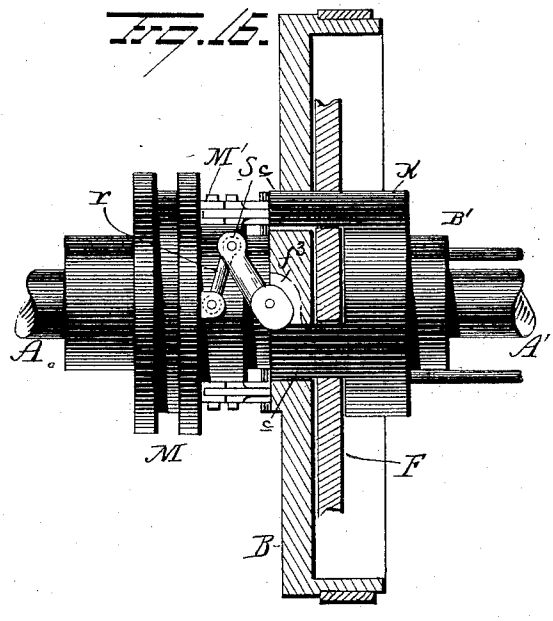


Fig. 15.



Witnesses
C. J. Nottingham
Sly Nottingham

Inventor
L. J. Wing.
By H. A. Seymour.
Attorney

UNITED STATES PATENT OFFICE.

LEANDER J. WING, OF LEXINGTON, MASSACHUSETTS.

CLUTCH.

SPECIFICATION forming part of Letters Patent No. 475,838, dated May 31, 1892.

Application filed July 15, 1891. Serial No. 399,649. (No model.)

To all whom it may concern:

Be it known that I, LEANDER J. WING, a citizen of the United States, residing at Lexington, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Clutches; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The introduction of electrical machinery for lighting and power purposes has rendered it necessary to employ devices for throwing on and off at will to and from the main power-shaft the dynamos and generators used in generating the electric current without interrupting the motion or speed of such power-shaft. For this purpose, among other appliances, friction-clutches have been very largely used and with fairly satisfactory results when substantially built and properly cared for; but it has been found in actual practice that the best of them will sometimes fail to work satisfactorily, showing a tendency to slip when worn, which naturally annoys and frightens the user, creating anxiety and fear that they may some time fail all together.

It is the object of my invention to obviate these deficiencies and drawbacks and to produce a compound positive and friction clutch which shall be effectual in the performance of its function and serve to start or stop the machinery without unnecessary jerking.

With this object in view the invention consists in certain novel features of construction and combination and arrangement of parts, as hereinafter set forth, and pointed out in the claims.

Figure 1 is a view in side elevation of my invention with the friction and jaw clutch both in position for service. Fig. 2 is a view in cross-section, showing the two parts of the clutch disconnected. Fig. 3 is an end view from the clutch end with the jaw removed. Fig. 4 is a detached plan view of the friction-spider with the shoes, adjusting-yokes, and lever removed. Fig. 5 is a side elevation of the same. Fig. 6 is a detached plan view of the front face of the flanged disk. Fig. 7 is a view in cross-section, showing the jaw-clutch in position for service, with shoes, adjusting-yokes, and lever removed from the friction-spider. Fig. 8 is a detached view, in side elevation, of the jaw-clutch. Fig. 9 is a side view of the bisected shipping-ring. Fig. 10 is an outside view of the flanged shoe with the flange broken away to show inside construction. Fig. 11 is a plan view of the same. Fig. 12 is a view in outline of the jaw K, located upon the hub of the friction-spider F. Fig. 13 is a view in outline of the sliding head I′, partly shown in Fig. 12. Fig. 14 is a view in side elevation and cross-section of the releasing device. Fig. 15 is a rear view of the disk B, showing ears and cavities for the application of the releasing device thereto. Fig. 16 is a modification of Fig. 14, showing the cam-lever S in position to hold apart the adjacent surfaces of the jaw K and the disk B.

A and A′ represent the two shafts to be connected or coupled together. A flanged disk B is secured to the shaft A by means of a key-seat in the hub B′, which fits over the feather located in the shaft A near its adjacent end. The key which holds the hub B′ is of sufficient length and size to hold said hub B′ rigidly in its place. The flanged disk B is provided with segmental openings *b b b b*, extending through the web of the disk B just outside and around the line where the hub-section joins the disk-section. The purpose of these openings *b b b b* is to allow the passage through the disk B of the teeth or projections of the jaw K. The segmental openings *b b b b* of the disk B should be enough longer rotatively than the teeth or projections of the jaw K as to allow of a backward movement of the jaw K and its teeth for the purpose of easily releasing them from their mutual contact. Upon the periphery of the disk B is formed the flange E, to the outside of which is fitted by shrinking thereon a wrought-iron or steel tire E′ for the purposes of strength. The under finished side of the flange E is adapted to have fitted to it the outside surface of the flanged shoe G. The jaw K is nicely fitted to slide back and forth easily on the hub B′, and its teeth or projections *c c c c* are sufficiently long to allow them to pass through the web of the friction-spider

F when the jaw K is in position for service. When the jaw K is not in position for service, its teeth or projections *c c c c* enter the segmental openings *b b b b* only as far as the inner face of the flanged disk B. Near the outer end the jaw K is provided with a slot K′, into which is fitted the device used for shifting back and forth the jaw, as required. It will be seen that the teeth or projections *c c c c* of the jaw K are so fitted between the web of the disk B and the friction-spider F that the strain upon it is a shearing strain and allows the jaw K to be made light, except in that portion occupied by the teeth or projections *c c c c*, and because of this a series of steel or iron pins fitted into a suitable sliding head adapted to slide easily upon the hub of the flanged disk B may be used instead of the jaw K in case it should be found that it can be more economically made, in which case the openings through the disks may be bored enough larger than the pins or studs to allow of the application of the releasing device. The friction-spider F is provided with a hub F′, which is secured to the shaft A′ by means of a key F^2, fitted to the shaft A′, and a keyway in the hub F′, securely fitted together. The friction-spider F is also provided with segmental openings *d d d d*, identical in form and position with the segmental openings *b b b b* in the flanged disk B. The friction-spider F is further provided with projections *e e e e*, which are adapted to receive the flanged shoes G. Upon the outer portion of these projections or arms *e e e e* are formed elongated slots *g g g g*, with beveled sides, into which are nicely fitted the under portions of the flanged shoes G, which are adapted therefor. Between the segmental openings *d d d d* and jointed to the hub F′ are formed ears or projections *f f f f*, into which is fitted the lower end of the bent lever H. In the web of the friction-spider F and opposite the center of the segmental openings *d d d d* are made bolt-holes *f′ f′ f′ f′*, and in connection with similar holes $f^2 f^2 f^2 f^2$ on the flanged disk B may be used to securely bolt the two disks together should occasion demand. The flanged shoe G is provided on its under side with a projection having beveled sides, adapted to fit nicely into the elongated slots *g g g g* of the friction-spider F and to move freely in and out radially when the friction is thrown off or on. On the other side of the flanged shoe G is formed an ear or projection *i′*, adapted to have fitted thereto the double adjusting-yoke L, one end of which is fitted to the bent lever H at a point where its angle is most acute. The two yokes forming the double adjusting-yoke L are connected by a right and left hand threaded screw I, of suitable strength to answer the demands made upon it. The outer end of the bent lever H is adapted to receive the eye portion of one of the two right and left hand threaded eyebolts, which, with a suitable nut, forms its connection with the sliding head I′, which operates the friction-clutch. The sliding jaw K is shown in Fig. 1 located on the hub B′ of the flanged disk B; but when for any reason it is desired to locate it upon the hub F′ of the friction-spider F it can be readily done by placing a sliding head A^2 upon the shaft A′ just beyond the sliding head I′, Fig. 12, and then by connecting this outer sliding head with the sliding jaw by means of rods *l*, one end of which is secured to the inner yoke L and the other end to the outer sliding head or yoke, and, further, by enlarging the diameter of the sliding head I′ to allow such rods to pass freely through it inside of the bottom of the slot midway between the ears *i i i i* on the sliding head I′ the two sliding heads may be operated independently without detriment to each other, and thus allow the sliding jaw K to be operated on whichever hub may be most convenient for the service required. This modification is shown in Figs. 12 and 13.

To facilitate the easy withdrawal of the teeth or projections *c c c c* of the jaw K from the segmental openings *b b b b* of the disk B when there is a pressure on the jaw K by reason of the load or for other reasons, I have arranged a device by which the teeth or projections *c c c c* of the jaw K are thrown backward from the surface of the segmental openings *b b b b*, against which they press, and while in this position they are freed from contact with the sides of the segmental openings *b b b b* and are made to rest against the face of a movable cam until such time as may be required to apply the friction by which the teeth will be rigidly held away from contact with the sides of the segmental openings. Then the movable cam may be withdrawn and the jaw K, with teeth *c c c c*, may be freely withdrawn from the segmental openings and the friction may be used to control the movements of the revolving wheel entirely independent of the positive or jaw clutch, that remaining inoperative during the time of throwing off the load. This releasing device is shown in detail in Figs. 14, 15, and 16, and may be described as follows: Upon the outer face of the disk B, at one side of that portion of the segmental openings *b b b b* against which the forward faces of the teeth *c c c c* press when in active service, are formed the ears $f^3 f^3 f^3 f^3$, which are adapted to provide a firm support for the cam-lever S, which is located between the ears f^3 in a slot or cavity and fastened by the introduction through the ears and the cam-lever of a bolt of suitable size and strength to sustain the pressure to be put upon it. (See Fig. 14.) The cam-lever S is so formed at its outer end as to allow of a swinging connection with the connecting-rod *r*, by which it is connected with the sliding head M by means of ears M′

formed thereon, between which the rod *r* is pivoted. By this arrangement it will be seen that the cam-lever S is made to move on a plane at right angles with that face of the segmental openings against which the teeth of the jaws K press when it is carrying the shaft. As the pressure on the sliding head M is such as to give the head a rotary motion, I have introduced a feather *u* on two opposite sides of the hub B′ of the disk B.

It will be seen that the form of the cam of the cam-lever S is such that should the teeth of the jaw K be accidentally thrown into the segmental openings *b b b b* while the cam-lever S was in position to hold the adjacent surfaces apart the bevel on the back side of the cam would allow the teeth to enter the openings to their full length without injury to the releasing device. Should the frequent use of the cam cause it to wear, the connecting-rod *r* may be made adjustable, like those shown in connection with the sliding head I′.

By a careful consideration of appliances herein combined it will be seen that the positive or jaw clutch is at all times under the control of the party using it and may be readily thrown in or out at will, and that when it is in position for service the friction-clutch has absolutely nothing to do and may be thrown into or out of working position, as the operator may prefer to have it.

From the above description of my improved clutch it will be seen that I have so arranged and combined with a friction-clutch a positive or jaw clutch as to obviate the difficulties attending the use of the friction-clutch alone. In this arrangement the only service required of the friction-clutch is to start up the pulley at rest which is to drive the dynamo, generator, or other machine and bring it to a speed uniform with the speed of the driving-shaft, and while these two shafts are revolving at the same speed the friction is disengaged, and during that moment of time, while the newly-started pulley is being carried by its acquired momentum, the positive or jaw clutch is readily and easily thrown into place without jar or concussion and with safety to the operator, thus forming a positive, reliable, and permanent connection. After this connection has been made there is no further service required of the friction-clutch until it becomes necessary to shut down the machine, when the friction may be again put on, the positive or jaw clutch released, when the friction may be withdrawn and the pulley stopped.

The principle of combining a sliding jaw-clutch with a friction-clutch can be applied without difficulty to most of the forms of construction upon which most of the friction-clutches in use are built, and I do not wish to restrict myself to the precise details of construction herein described; but,

Having fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination, with two shafts, of a hub mounted on one of said shafts and adapted to rotate therewith, a disk carried by one of the shafts and having openings therein, a flange projecting from said disk, a jaw or sleeve mounted to slide on said hub, teeth projecting from said jaw or sleeve and through the openings in the disk, a spider carried by one shaft, having openings therein for the reception of the teeth of the jaw or sleeve, and an expansible friction-clutch carried by said spider, substantially as set forth.

2. The combination, with two shafts, of a hub carried by one of said shafts, a jaw or sleeve mounted to slide on said hub, teeth projecting from said jaw or sleeve, a disk carried by one of the shafts and having openings for the accommodation of the teeth, a flange projecting from said disk, a spider carried by the other shaft, friction-shoes carried by said spider, bent levers connecting said shoes and spider, and means for operating said levers to slide the friction-shoes, said spider being provided with openings for the reception of the said teeth, substantially as set forth.

3. The combination, with two shafts which align, of a hub carried by one of said shafts, a disk carried by said hub and having openings therein, a flange projecting from said disk, a jaw or sleeve mounted to slide on said hub, teeth projecting from said hub and through the openings in the disk, a spider carried by the other shaft, friction-shoes carried by said spider, bent levers connected at one end to said spider, an adjustable connection between said levers and the friction-shoes, a sleeve mounted on one of the shafts, and connections between said sleeve and the bent levers, whereby said levers may be operated to force the friction-shoes into contact with the flanged disk, said spider being provided with openings for the reception of the said teeth, substantially as set forth.

4. The combination, with two shafts, of a positive clutch carried by one shaft, a spider carried by the other shaft, with which the teeth are adapted to engage, a flanged disk adapted to rotate with the first-mentioned shaft, friction-shoes carried by said spider and adapted to make contact with the flanged disk, bent levers pivoted to said spider, an adjustable connection between said levers and the friction-shoes, a sleeve carried by one shaft, and adjustable connections between said sleeve and the bent levers, substantially as set forth.

5. In a clutch mechanism, the combination, with a spider carried by one shaft and a disk carried by another shaft, of a jaw or sleeve having teeth to pass through aligned openings in the spider and disk, cams adapted to engage said teeth to facilitate the releasing thereof, and means for operating said cams, substantially as set forth.

6. In a clutch mechanism, the combination,

with a spider carried by one shaft and a disk carried by another shaft, of a jaw or sleeve having teeth to pass through aligned openings in the spider and disk, cams adapted to engage said teeth to facilitate the releasing thereof, a sleeve carried by one of said shafts, and rods or links connecting said cams with the sleeve, substantially as set forth.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

LEANDER J. WING.

Witnesses:
N. S. STEARNS,
JOHN HOWE.