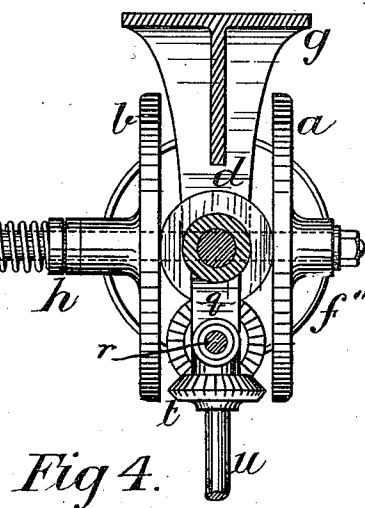
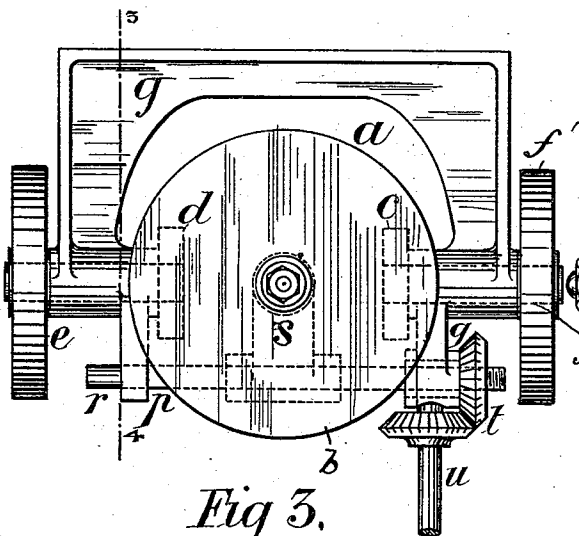
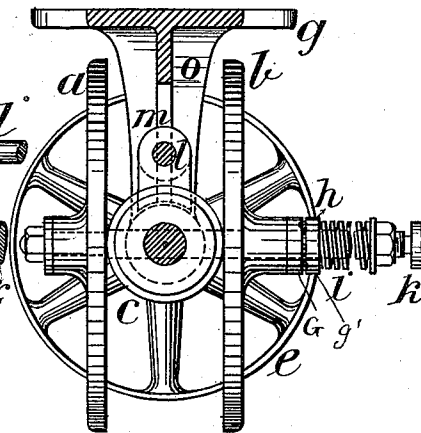
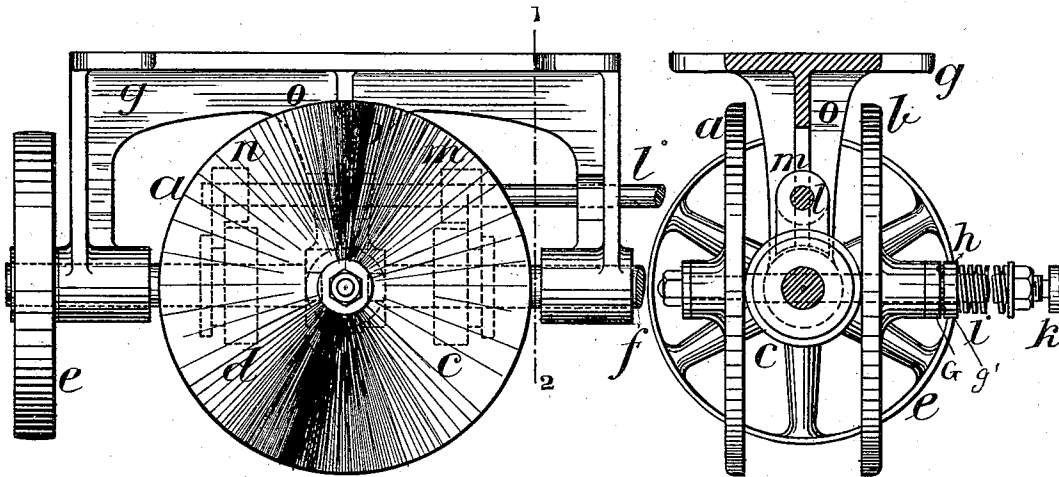


3 Sheets—Sheet 1.

No. 512,196.

Patented Jan. 2, 1894.



Witnesses:
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(No Model.)

3 Sheets—Sheet 2.

F. M. KETTON & C. W. HOLLIS.
FRICTIONAL FEED AND DRIVING MECHANISM.

No. 512,196.

Patented Jan. 2, 1894.

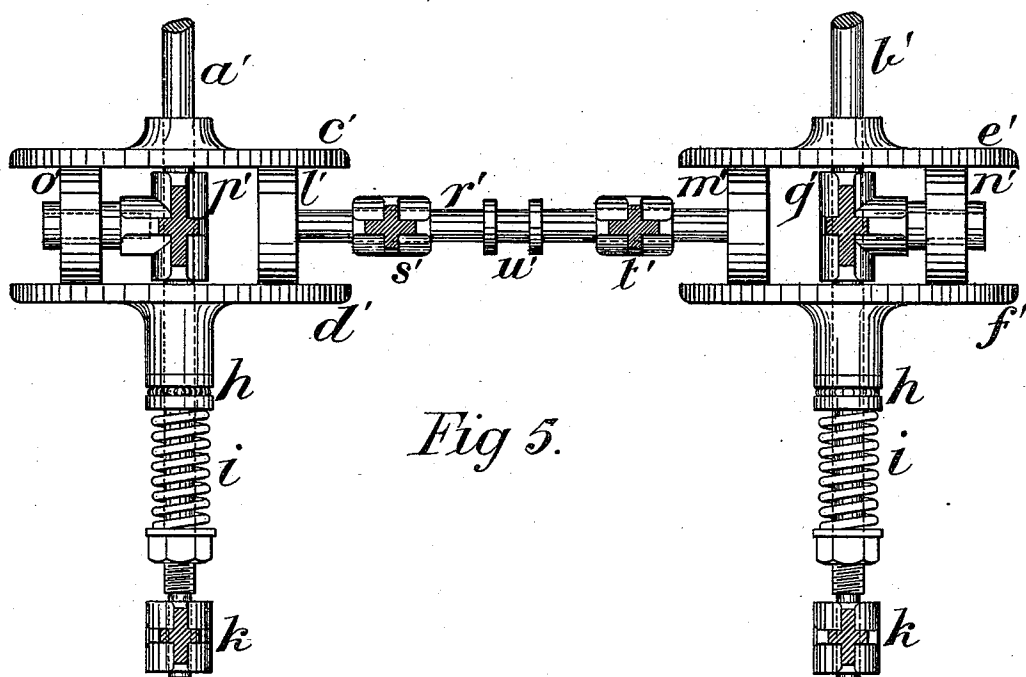


Fig 5.

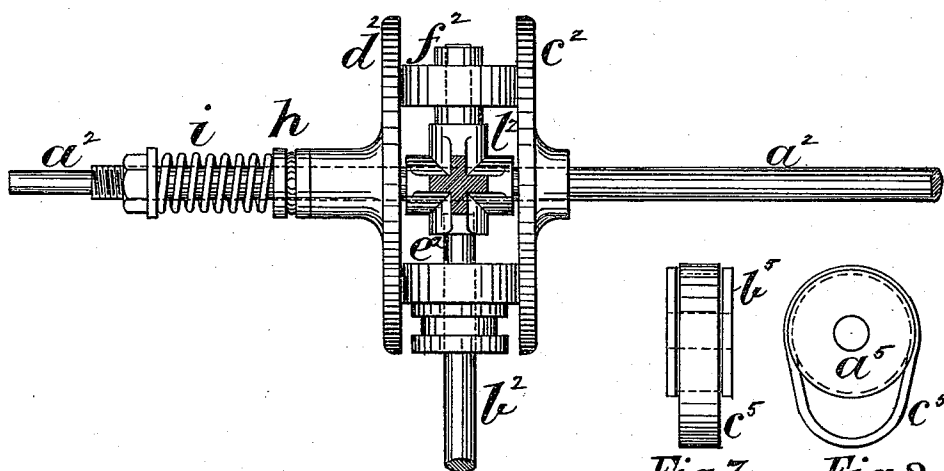


Fig 6.

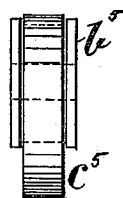


Fig 7.



Fig 8.

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3 Sheets—Sheet 3.

F. M. KETTON & C. W. HOLLIS.
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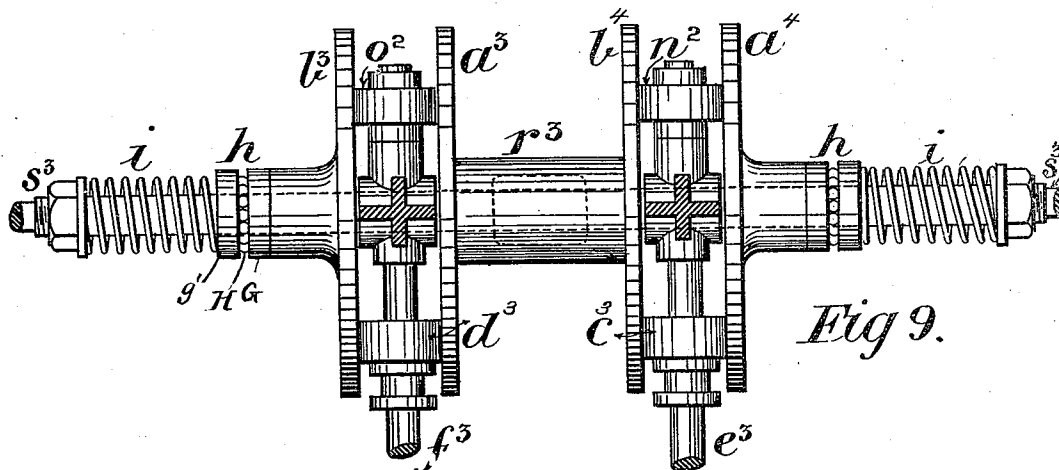


Fig 9.

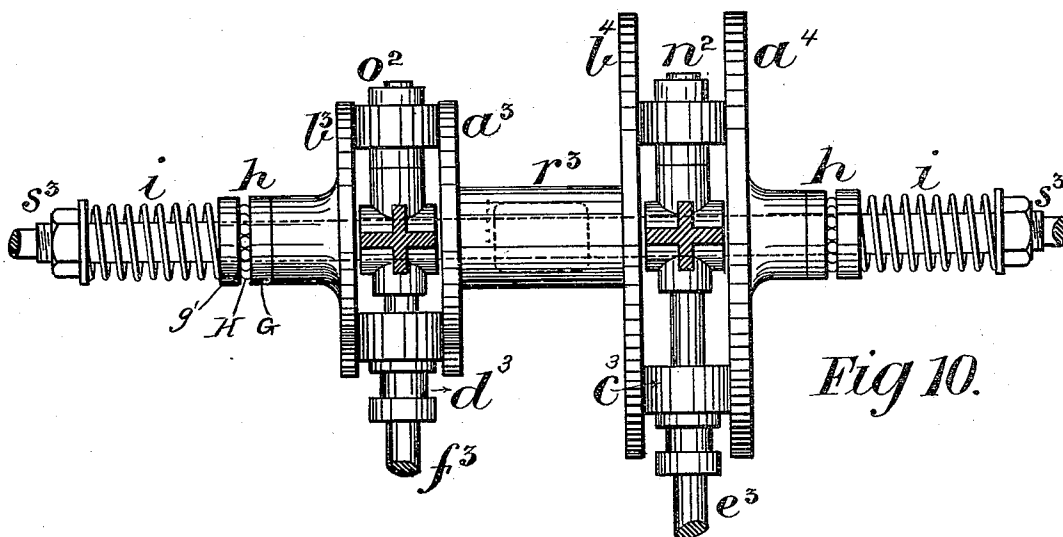


Fig 10.

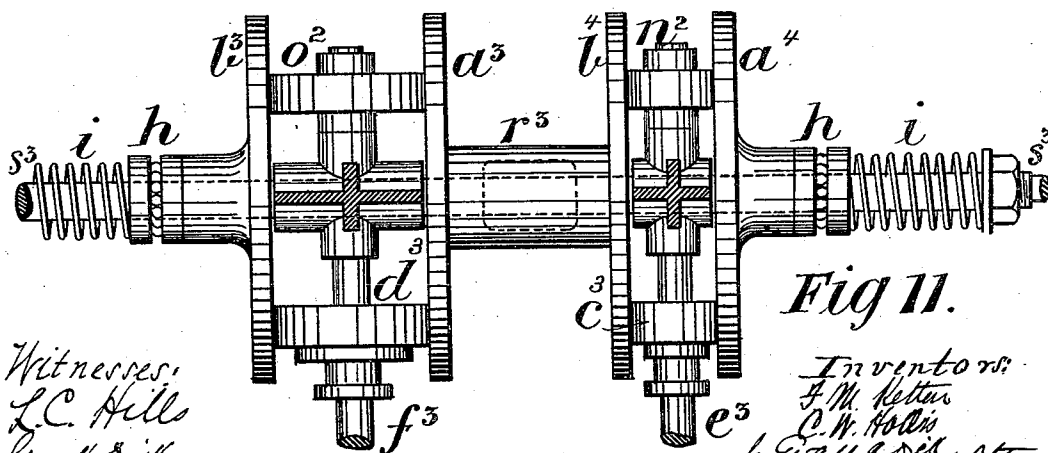


Fig 11.

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UNITED STATES PATENT OFFICE.

FRANCIS MURR KETTON AND CHARLES WILLIAM HOLLIS, OF NOTTINGHAM,
ENGLAND.

FRICITIONAL FEED AND DRIVING MECHANISM.

SPECIFICATION forming part of Letters Patent No. 512,196, dated January 2, 1894.

Application filed April 19, 1893. Serial No. 470,950. (No model.) Patented in England October 18, 1887, No. 14,115.

To all whom it may concern:

Be it known that we, FRANCIS MURR KETTON and CHARLES WILLIAM HOLLIS, subjects of the Queen of Great Britain, residing at Nottingham, in the county of Nottingham, England, have invented certain new and useful Improvements in Frictional Feed and Driving Mechanisms, (for which we have obtained a patent in Great Britain, No. 14,115, bearing date October 18, 1887,) of which the following is a description.

Our invention relates to improved arrangements of disks and rollers for transmitting motion by means of friction from one shaft to another, and our object is to obtain an arrangement by which the speed of the driven shaft may be varied at will within the range of the particular arrangement, such variation being effected without stopping either of the shafts.

Our improved arrangement may be used for driving shafting, machine tools, and other appliances requiring the speed of the same to be varied.

We can also apply our improvements to the feed motion of lathes, drilling and other similar machines.

The objects of our invention are obtained by the mechanisms illustrated in the accompanying drawings, in which—

Figure 1 is a front elevation of one method of driving a shaft from another one in a line with it. Fig. 2 is a cross sectional elevation of Fig. 1 on the line 1, 2. Fig. 3 is a front elevation of an alternative method of driving one shaft from another one in a line with it. Fig. 4 is a cross sectional elevation of Fig. 3 on the line 3, 4. Fig. 5 is a plan of an arrangement for driving one shaft from another one parallel to it, the brackets supporting the parts being shown in section. Fig. 6 is a plan of an arrangement for driving one shaft from another one placed at right angles to it, the brackets supporting the same being shown in section. Fig. 7 is a side elevation showing an alternative method of constructing the friction roller. Fig. 8 is a front elevation of Fig. 7. Figs. 9, 10, and 11 are plans of three arrangements of disks and rollers for transmitting motion from one shaft to another parallel to the first.

Referring to the arrangement shown in Figs.

1 and 2 motion imparted by a pulley *e* to the driving shaft upon which is fitted a roller *d* capable of sliding upon the said shaft but compelled to rotate with it. The driven shaft *f* is fitted with a roller *c* similarly mounted to the roller *d*, both rollers being engaged by gluts *n* and *m* on a sliding rod *l* which is free to move endwise and may be actuated either automatically or by hand or by any suitable arrangement of mechanism such as a rack and pinion, or worm gearing, motion being given to the actuating mechanism by hand or from some moving part of the appliance or machine to which our improvements are applied. Motion is communicated from the roller *d* to the roller *c* and consequently to the driven shaft *f* by disks *a* and *b* which are mounted upon a cross shaft and pressed upon the rollers by a spring *i* which acts through our improved antifriction arrangement which is shown at *h* and fully described in our British specification No. 14,116, A. D. 1887, and consists of two hardened steel plates *G g'* on the disk spindle with balls *H* working between their faces, thus allowing the disks to revolve freely in opposite directions under pressure. The disk shaft is also fitted with a nut for regulating the pressure of the spring and the end of the shaft is supported by a bearing *k*. The whole of this arrangement is carried by a bracket *g* which has a central arm *o* for supporting the ends of the driving and driven shafts, and which also forms a bearing for the disk shaft.

In the arrangement shown in Figs. 3 and 4 the driving shaft is fitted at one end with a pulley *e* and at the other end with a roller *d* which is in this arrangement fixed upon the shaft. The driven shaft is fitted with a fixed roller *c* and a pulley *f'*, or the driven shaft may be continued as required. The disks *a* and *b* which are held in frictional engagement with the rollers *c* and *d* by a spring *i*, between which and one of said disks is arranged our antifriction arrangement *h*, are mounted upon a shaft having bearings in a bracket *s*, this latter being carried by a shaft *v* which is fitted to slide in brackets *p* and *q* attached to the main casting *g*. In this arrangement the variation in speed is obtained by moving the disks across the rollers,

one way of doing this being by a shaft u and gear wheels t , one of the latter being screw threaded to act as a nut for a screw thread on the shaft r .

5 It will be seen that in both arrangements the principle can be applied with slight alterations to driving and driven shafts in the same plane but not necessarily in the same straight line.

10 In the arrangement shown in Fig. 5 the shaft a' is fitted with disks c' and d' , and the shaft b' with disks e' and f' , (the disks d' and f') being provided with springs i , antifriction arrangement h , and the ends of both shafts 15 with bearings k . Either of the shafts may be the driver, and motion is communicated from one shaft to the other by a cross shaft r' which is fitted with rollers l' and m' , and supported by bearings s' and t' . The shaft r' is 20 also provided with collars u' by which it may be moved endwise by a lever, or other mechanism. The bearings p' and q' between the two disks carry spacing rollers n' and o' which are used for maintaining the disks of each 25 pair parallel with each other.

In Fig. 6 we show an arrangement for shafts at right angles to each other, the driving or driven shaft a^2 being fitted with disks c^2 and d^2 , spring i , and anti-friction arrangement h , 30 while the driven or driving shaft b^2 is fitted with a roller e^2 which is arranged to slide upon the same and yet is so connected as to rotate therewith. The central support l^2 is also arranged to carry a spacing roller f^2 .

35 In Fig. 9 the disks $a^4 b^4$ and $a^3 b^3$ are of the same size and the shafts e^3 and f^3 are fitted with rollers c^3 and d^3 which are capable of being moved upon their respective shafts, but are compelled to rotate with the same. The 40 variation in speed may be obtained by moving each roller independently of the other, or, if the distance between the shafts is not too great, both rollers may be moved at the same time but in opposite directions by a lever 45 centered between the shafts e^3 and f^3 .

In the arrangement shown in Fig. 10 the disks $a^4 b^4$ are larger than the disks $a^3 b^3$ and the variation in the speed is obtained by moving the roller c^3 between the disks a^4 and b^4 .

50 In the arrangement shown in Fig. 11 the disks $a^4 b^4$ are the same size as the disks $a^3 b^3$, but the roller c^3 is less than the roller d^3 .

In these three arrangements the disks b^4 and a^3 are fastened upon a hollow spindle r^3 55 which may be of any desired length and supported by suitable bearings. The disks a^4 and b^3 are carried by a cross shaft s^3 which has bearings in the hollow shaft r^3 and at each end. The disks a^4 and b^3 are compelled to rotate together with the shaft s^3 , but can be moved endwise upon the same, and are 60 pressed upon the rollers c^3 and d^3 by springs i , which act through our antifriction arrangement h .

65 It will be seen from the arrangements shown in Figs. 10 and 11 that the speed of the driven shaft may be permanently different from the

speed of the driving shaft, and that a further permanent difference may be obtained by using different sized disks and rollers. Thus 70 if a larger roller be used with the smallest disks of Fig. 10, a great increase in the speed of the shaft e^3 would be obtained if the shaft f^3 were the driver, or a great decrease in the speed of the shaft f^3 supposing the shaft e^3 75 were the driver. Spacing rollers $n^2 o^2$ are used with these arrangements.

In the various arrangements described with reference to the accompanying drawings, the rollers running between the disks are made 80 or covered with a material upon which the face of the disks is able to obtain a sufficient grip. Thus, they may be of disks of leather bolted together, or of any other similar and 85 suitable construction. In an alternative method of constructing these rollers we make use of a metal or other suitable roller a^5 Figs. 7 and 8 having flanges b^5 and carried as the rollers shown in the before described arrange- 90 ment. Round this roller a^5 we place an endless band c^5 of leather or other suitable flexible material which fits loosely upon the same, or it may be made longer and passed over a tension pulley, this construction of roller being cheaper 95 than a solid roller of the same material as the band c^5 . It should also be understood that for appliances requiring a small amount of power a single disk with a pair of rollers may be used without departing from our invention. When a single disk is used it or 100 the rollers may be used for obtaining the variation speed as is most convenient. The driving and driven bands may also be used for the frictional surface of the rollers and these bands may be flat or round. 105

From the foregoing specification it will be seen that the variation in speed of the driven shaft is obtained by altering the position of the rollers relatively to the center of the disks; thus when the rollers on the driving shaft 110 is near the outside of the disk, and the roller on the driven shaft near the center of the disks, the driven shaft is rotated at its slowest speed, but when the two rollers relatively to the disks are reversed, then the driven shaft 115 is rotated at its highest speed, and that the velocity of the driven shaft will vary between the two extremes according to the position of the rollers with regard to the center of the disks. 120

What we claim, and desire to secure by Letters Patent of the United States of America, is—

1. In a frictional driving gearing for transmitting motion from one shaft to another, the combination with the driving and the driven shafts, of the two friction disks, one being free to slide upon its support, the friction roller arranged between the said disks, a spring which holds the disks in frictional engagement with the roller, and an antifriction device between the said spring and the sliding disk, substantially as described. 125 130

2. In a frictional driving gearing, the combi-

nation with the driving and the driven shafts,
of the rollers mounted on the said shafts re-
spectively, and with which they rotate, but
on which they are also free to slide, the disks
5 arranged upon opposite sides of the rollers with
which they have frictional engagement, the
said rollers engaging each disk at substan-
tially opposite points on the faces of each
disk, whereby the disks are kept parallel to
10 each other, means for holding the disks and

rollers in engagement with a yielding force,
and means connecting the said rollers where-
by they be moved simultaneously, substan-
tially as described.

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