

(No Model.)

J. BROOKS.

DIFFERENTIAL SPEED CLUTCH.

No. 400,293.

Patented Mar. 26, 1889.

Fig. 1.

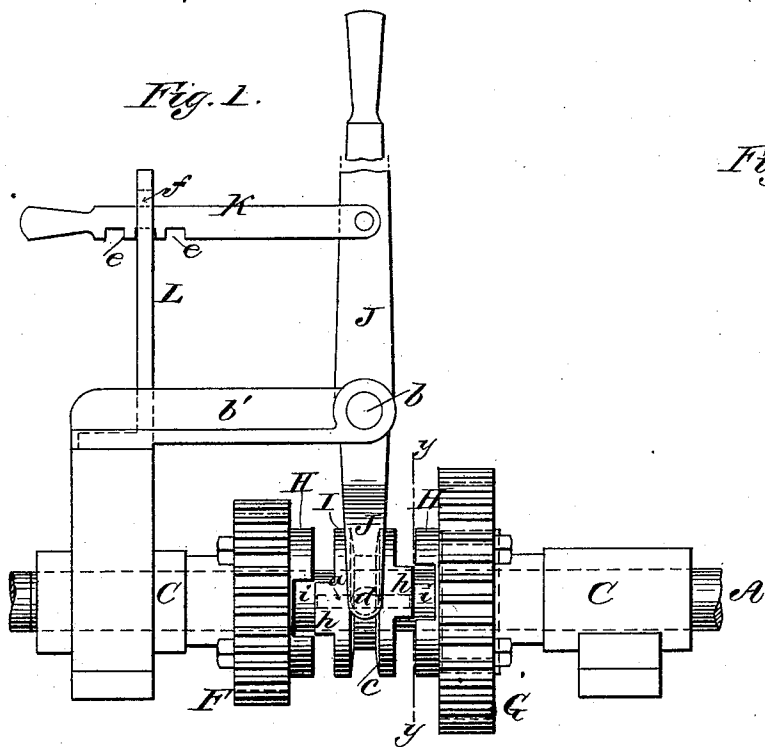


Fig. 3.

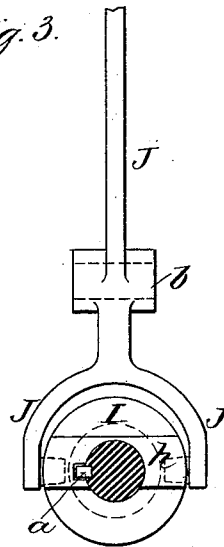


Fig. 2.

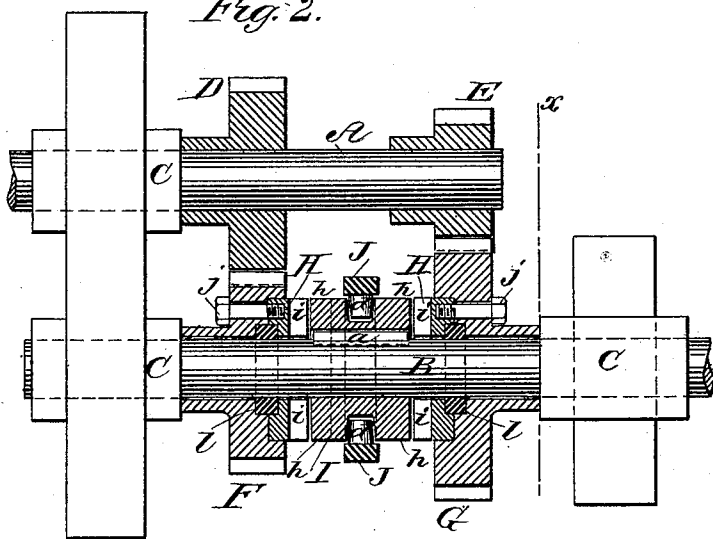
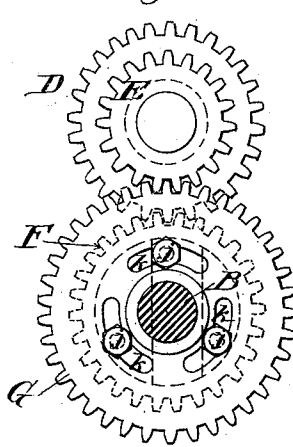


Fig. 4.



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DIFFERENTIAL SPEED-CLUTCH.

SPECIFICATION forming part of Letters Patent No. 400,293, dated March 26, 1889.

Application filed March 24, 1888. Serial No. 268,354. (No model.)

To all whom it may concern:

Be it known that I, JOHN BROOKS, a citizen of the United States, residing at Plainfield, in the county of Union, State of New Jersey, have invented certain new and useful Improvements in Differential Speed-Clutches, of which the following is a specification.

My invention relates to mechanism for imparting variable speeds to a driven shaft from a driving-shaft having a given speed of rotation, or for engaging or disengaging the connection of the shaft at will; and my said invention is applicable to machinery generally.

The object of my invention is to facilitate changing the rate of speed imparted to a machine or from one machine to another, or the relative speeds of different parts of the same machine, in cases where such change is required at frequent intervals or without loss of time. In this respect my invention is especially applicable to the practice of printing the different sheets of a newspaper by two machines driven in conjunction, and from which the sheets are folded together at their moment of delivery from the presses by a folding mechanism common to both machines. In the example of an eight-page paper, by this practice the two machines are driven at an equal speed, each delivering four-page sheets which are superimposed and folded simultaneously; or the example of a six-page paper, the one machine is employed to deliver a four-page sheet, the other a two-page or supplement sheet at half the speed of the former, so as to tally the leading end of each half-sheet with the folding-point in the double sheets, these features requiring an alterable speed-connection between the two presses. Heretofore this change has been accomplished by stopping the machines and interchanging the connecting-gearing, which involves a loss of time, which is of great importance.

My invention consists in the employment of two pairs of companion gear-wheels, the proportionate diameters of each pair being different—as, for instance, the one pair being of equal diameter, the other having the proportion of two to one. One gear-wheel of each pair is made fast to the driving-shaft,

the other of each pair running free upon the driven shaft. The gear-wheels upon the driven shaft are provided with opposite clutch-faces, the same being located at a suitable distance apart, and upon the intermediate portion of the driven shaft between the gears, which is provided with a feather, a clutch-collar is shifted to and fro by means of a lever to engage with the one or the other of the otherwise loose gears, or to disengage from both, and thereby cause the imparting of either speed or a cessation of the same at will.

My invention also consists of certain features of adjustment in the clutch mechanism, whereby the engaging-point of the clutch-collar with either of the loose gears may be adjusted to occur at any fractional period of rotation, and whereby a perfect synchronism may be established between co-operating machines.

Referring to the accompanying drawings, in which similar letters of reference indicate corresponding parts in the several views, Figure 1 is a side elevation; Fig. 2, a sectional view in plan; Fig. 3, a cross-section of Fig. 2 on the line *xx*; and Fig. 4, a detail view, being taken in cross-section on the line *yy*, Fig. 1.

The driving-shaft A and driven shaft B are mounted at a suitable distance apart in the bearings C, and to the shaft A are keyed or otherwise fixed the gear-wheels D E, which permanently engage or mesh with their respective companion gear-wheels F G, turning freely on the shaft B. In the present illustration the companion gears D F are shown of equal size, while the companion gears G and E are shown in the proportion of two to one, respectively. The alternate connection of the gear F or the gear G to the shaft B will therefore impart, respectively, the full speed or half the speed of the driving-shaft A. The opposite faces of the loose gears F G are provided with clutch-disks H H, attached thereto and having female clutch-faces which are adapted to receive the male clutch-faces on the opposite adjacent ends of the sliding clutch-collar I. The location of the male and female clutch-faces may, however, be re-

versed—that is to say, the male located on the gear-wheel disks, the female on the clutch-collar. Moreover, the clutch-disks H H, attached to the gears F G, may be made integral therewith, but are shown constructed separately for purposes of adjustment, which will hereinafter appear.

The clutch-collar is adapted to be rotatively fixed but longitudinally movable on the shaft B by means of a feather, *a*, ridged with the shaft, and a corresponding groove made in the collar as a preferred means of construction; but the same end may be accomplished by other well-known means than that shown, as a polygonal surface upon the portion of the shaft which receives the collar intermediate to the gears. The clutch-collar is shifted to and fro by means of the hand-lever J, fulcrumed at *b* on the end of the ridged arm *b'*. The lever J straddles the clutch-collar I at its lower bifurcated or yoked end and engages with the circumferential groove *c* in the said collar, leaving the latter free to rotate. The yoke of the lever J is provided with inwardly-projecting studs *d*, in order to promote durability. The hand-lever J is moved to a mid-position to disengage the clutch-collar I from both the loose gears F G or moved to either terminal position to engage the clutch-collar with one or the other of said loose gears, and when so moved is retained by means of the latch K, which is caught by the notches *e* in the slot *f* of the ridged arm L.

The form of construction which I prefer to employ in the clutch-engaging surfaces appears in Fig. 3, which shows a male or ribbed clutch-disk on the clutch-collar I. The female or grooved clutch-disks are the counterpart thereof and the engaging-surfaces of the ribs *h* and grooves *i* of both are cut in a continuous line traversing the disk. The positions of the ribs *h* and grooves *i* are such as to intersect the disk out of its center, the object being to insure the clutch-faces coinciding only at each full revolution of the gears F G instead of each half-revolution, as would be the case if the rib and groove of the faces were at a central line. The proper relative movement of the two machines in the instance of printing is thereby obtained at each change of speed. The disks H of the clutch are adapted for adjustment relatively to the gears F and G about their axis, being made separate therefrom and secured thereto by tap-bolts *j*, which travel in the concentric slots *k* when loosened to permit the independent movement of the disks. The interior collars, *l*, are fixed to the shaft B and prevent the displacement of the loose gears and their clutch-disks lengthwise to the shaft when the disks are bolted in place; but the latter are not permitted to bind upon the collars *l*.

In operation, and in the instance of connected printing-machines co-operating to produce, say, an eight-page paper, the driving-shaft A receives its motion at a given speed

from the one press delivering four-page sheets into the folding mechanism. The driven shaft B is employed to drive another press delivering the remaining four-page sheets at the same surface speed into the said folding mechanism, in which the leading ends of both sheets are registered alike and folded simultaneously. Hence the clutch-collar I is shifted to engage with the loose gear F of the equal pair, imparting to the shaft B the speed of the shaft A. To produce, say, a six-page paper, the shaft A maintains its given speed, the first press delivering the four-page sheets, as before. The second machine delivers the remaining two-page sheet, and in order to tally with the first machine in the number of sheets produced must therefore receive half the surface speed of the four-page-paper feed, the folding-point of each full sheet and the leading end of each half-sheet or supplement registering together in the folding mechanism. To effect this, the clutch-collar I is shifted to engage with the loose gear G of the unequal pair, imparting to the shaft B half the speed of the shaft A. The capacity of the combined presses is thus readily augmented or decreased by imparting proportionate speeds which will produce a six, eight, ten, twelve, sixteen, or greater page publication without delay or interchange of parts in the connecting mechanism; or the one machine may at once be used separately by disengaging the clutch. Moreover, the synchronism required in the delivery from each machine in order to tally the sheets in the folding mechanism, as aforesaid, is accurately adjusted by setting the disks H backward or forward upon the faces of the gears, subdividing the degree of adjustment, which can otherwise be approximately obtained by engaging different teeth of the gears.

It is obvious that the gears D F may be of other than equal proportions, the two sets being employed in any relative sizes, according to the requirements of the mechanism upon which they are used.

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

1. In a differential speed-clutch, the combination of the differently-proportioned fast and loose companion gears located, respectively, upon the driving and driven shafts, opposite clutch-disks upon the loose gears, having grooves located upon the faces of the said opposite disks, the sliding clutch-collar that is operative between said loose gears, having transverse ribs intersecting the grooves eccentrically to their axis, and adapted thereby to interlock at a single point of revolution of the adjacent disks, as and for the purposes set forth.

2. The combination, with the loose gears of the herein-described differential speed-clutch mechanism, of the clutch-disks rotatively adjustable thereupon to engage at different

points with the sliding clutch-collar, as set forth.

3. The combination, with the loose gears of the herein-described differential speed-clutch
5 mechanism, of the rotatively-adjustable clutch-disks thereon, the concentric slots extending through said loose gears, and the

clamping-bolts projected from the disks through said slots, adapted to secure them at variable points of adjustment, as described.

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