W. SHAW & N. F. KEPPLE.

DIFFERENTIAL MOTION FOR FLY FRAMES.

APPLICATION FILED MAY 4, 1910.

994,692. Patented June 6, 1911.

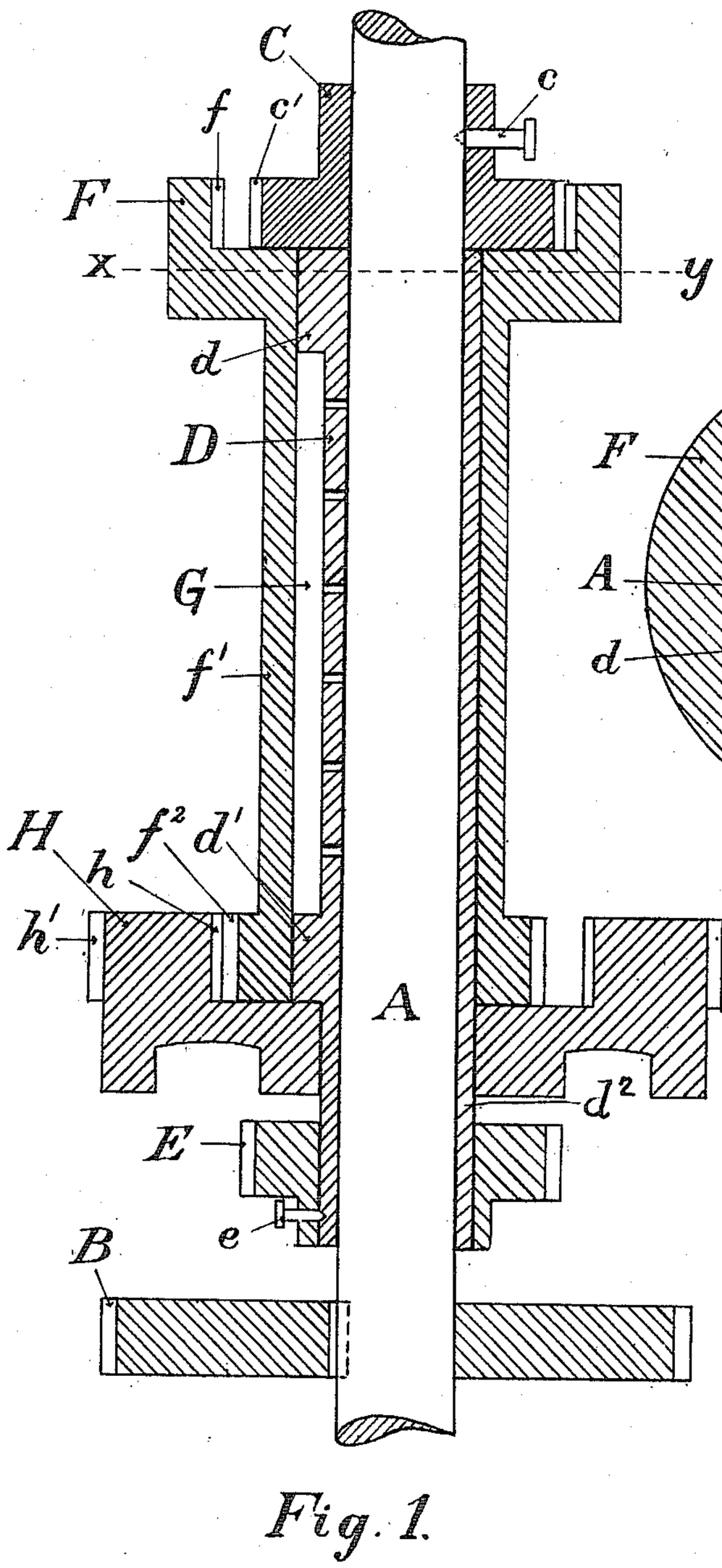

Fig. 1.

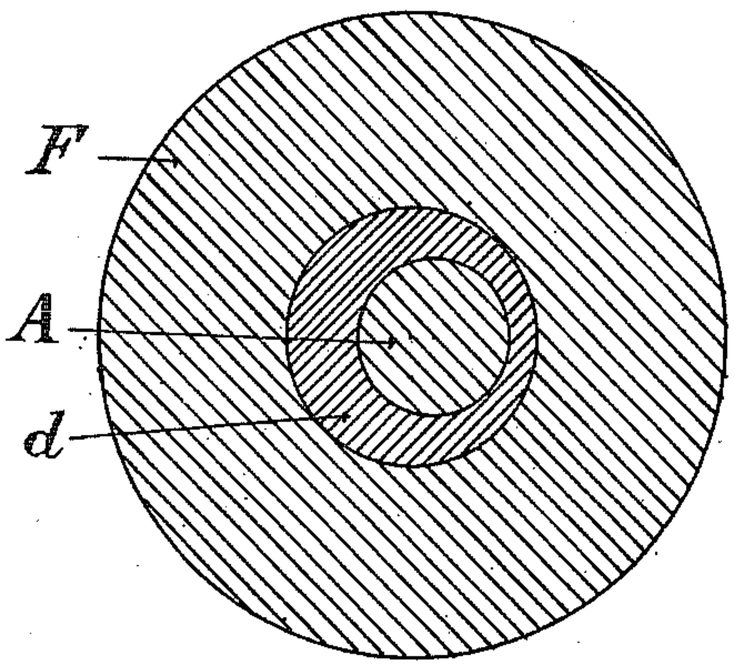

Fig. 2.

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DIFFERENTIAL MOTION FOR FLY-FRAMES.

994,692. Specification of Letters Patent. **Patented June 6, 1911.**

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To all whom it may concern:

Be it known that we, WILLIAM SHAW and NICHOLAS F. KEPPLE, both of Fall River, in the county of Bristol and Commonwealth of Massachusetts, have invented an Improvement in Differential Motions for Fly-Frames and other Machinery, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention relates to differential motions especially adapted to controlling the speed of the bobbins on fly frames in spinning machinery.

In order properly to wind the roving on the bobbin in a fly frame it is necessary that the excess of circumferential speed of the bobbin over the flier (or vice versa) shall be at all times equal to the circumferential speed of the front roll, so as to take up the roving as fast as it is delivered from the front roll. As the circumferential speed of the bobbin increases as its diameter increases with the roving which is wound thereon, it is necessary to decrease the rate of revolution in proportion to the increase in size of the bobbin. The required variation in speed of the bobbin is secured by the cones in connection with the differential motion.

The object of this differential motion is to provide means whereby the power from the jack-shaft can be transmitted to the bobbin at a varying speed determined by the cones. It is inadvisable to varry the load of the bobbins directly from the driven cone; and the organization described (which is common), is adopted for the purpose of taking the load off the cones and leaving to them the function of regulating the speed. The differential motion receiving on one side power from the jack-shaft at fixed speed, and on the other side, a varying speed from the cones, gives as a resultant the necessary power and the proper speed for driving the bobbins.

In the annexed drawing, Figure 1 is a longitudinal section of our improved differential motion. Fig. 2 is a cross section on line X, Y.

The jack-shaft A is supported by suitable bearings and driven from some sources of power. It carries the spur gear C, having teeth c', and fastened to the shaft by the set screw c, which also serves as a collar to retain the cam D against lateral motion. The cam D is loosely mounted upon the shaft A and is composed of a cylindrical portion D having at each end similar eccentric cams d, d'; and at one end a sleeve d^2 upon which the cam gear E is mounted and fastened by the set screw e.

Revolubly mounted upon the cams d, d' is the cam gear. This cam gear is of peculiar shape and consists of the internal gear F, having teeth f, adapted to mesh with the teeth on C, a cylindrical portion f', the ends of which form a running fit wth the cams d, d', and the spur gear f^2. The space G between the cylindrical portion of the cam and the cylindrical portion of the cam gears serves as an oil retainer, suitable openings being made through the cam cylinder D to allow the oil access to the shaft. The bobbin gear H is revolubly mounted on the cam sleeve d^2. It is provided with internal teeth h adapted to mesh with those on cam gear f^2, and with external teeth h' adapted to mesh with the gearing through which the bobbins are driven. The spindle gear B is keyed to the jack-shaft A.

The operation of the device is as follows: The spur gear C is driven by the jack-shaft at constant speed. It is always in mesh with some point of the internal cam gear F. While the cams d, d' are stationary, F is rotated upon them at a speed proportionate to the number of teeth in F and in C. The external cam gear f^2 is always in mesh with some point on the internal bobbin gear h. As long as the cams are stationary, f^2 revolving with F drives H at a speed proportional to the number of teeth in f^2 and in the internal gear h. When the cams d, d' are rotated (through the cone gear E) at the same speed of the jack-shaft A, the whole system of gearing revolves together, and the speed of H is the same as the speed of the spindle gear B. If the speed of the cams d, d' is greater than the speed of the jack-shaft A, a rolling motion is communicated to the cam gears F, f^2 which accelerates the speed of the bobbin gear H. If the speed of the cams d, d' is less than that of the jack-shaft A, the backward rolling motion of the cam gears F, f^2 thereby caused reduces the speed of H.

Having thus described my said invention, I claim:

1. A differential motion consisting of a

shaft a spur gear affixed to the shaft, a sleeve loose on said shaft and carrying two eccentric cams, an internal gear mounted on and actuated by one of said cams, and adapted to mesh with said spur gear, an external gear mounted on and actuated by the other cam, a sleeve connecting said internal and external gears, a ring gear having internal and external teeth loosely mounted on the cam sleeve, the internal teeth thereof being adapted to engage the teeth of the external cam-gear, and a spur gear affixed to the cam sleeve.

2. A differential motion consisting of a shaft, a spur gear affixed to said shaft, a cam-shaped sleeve loose on said shaft, an internal gear mounted on and actuated by said cam-shaped sleeve and adapted to mesh with said spur gear, an external gear mounted on and actuated by said cam-shaped sleeve, a sleeve connecting said internal and external gears, and a ring gear having internal and external teeth loosely mounted with respect both to the shaft and to the cam-shaped sleeve, the internal teeth thereof being adapted to engage the teeth of said external gear on said cam-shaped sleeve.

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