No. 620,898. Patented Mar. 14, 1899.

C. EICKMANN.

SPRING APPLIANCE FOR SHAFTS.

(Application filed Nov. 29, 1897.)

(No Model.)

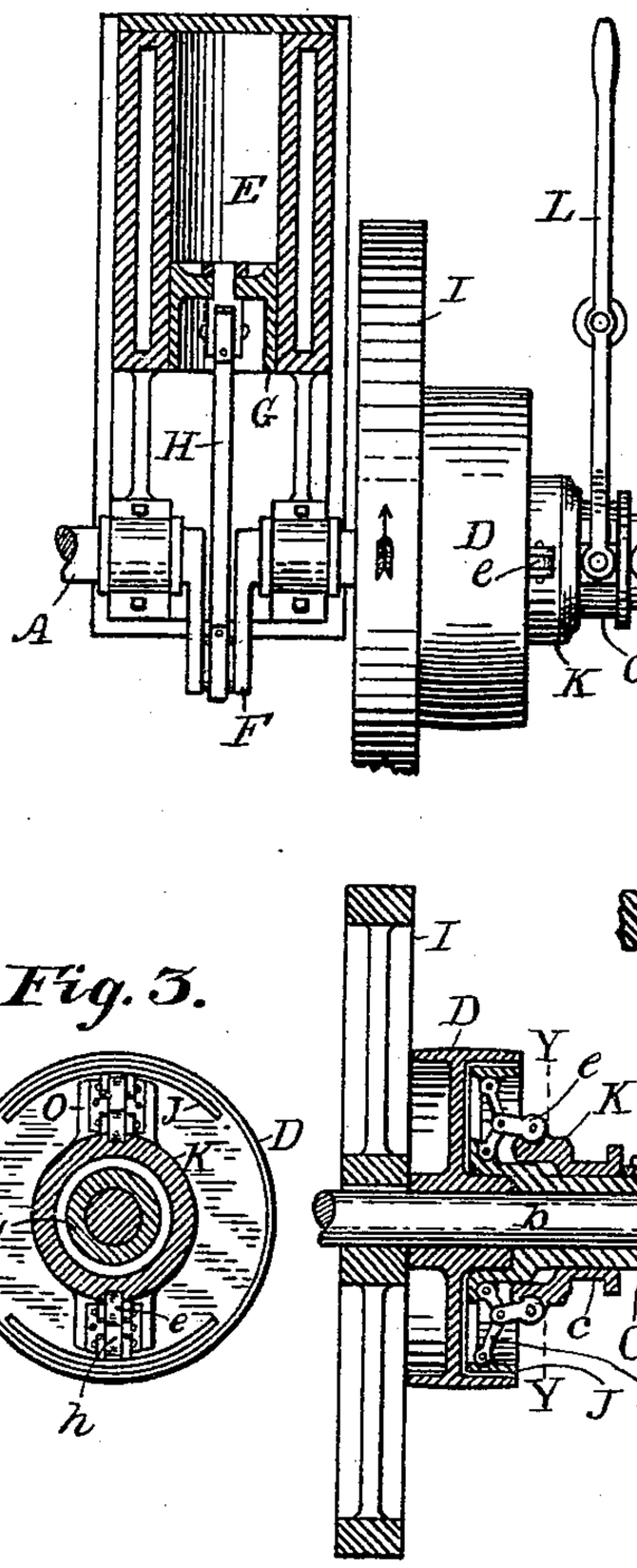


Fig. 1.

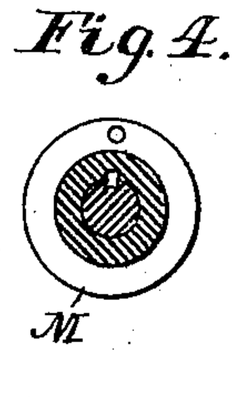


Fig. 4.

Fig. 5.

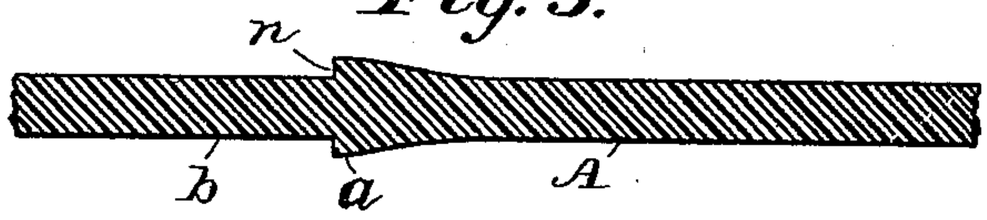


Fig. 3.

Fig. 2.

Fig. 6.

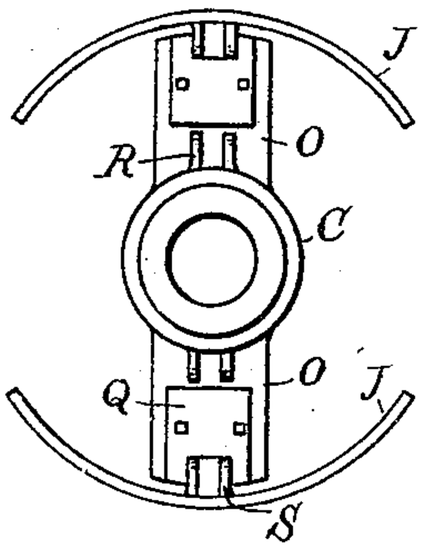


Fig. 7.

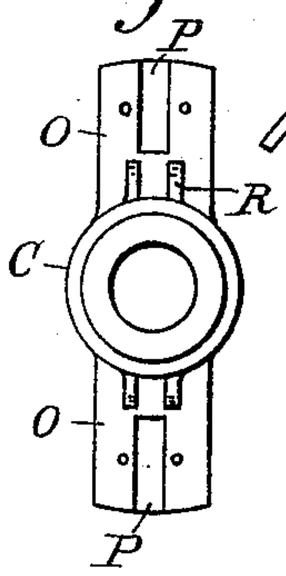


Fig. 8.

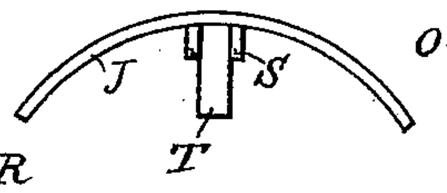


Fig. 10.

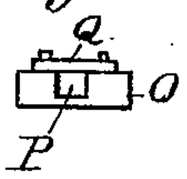
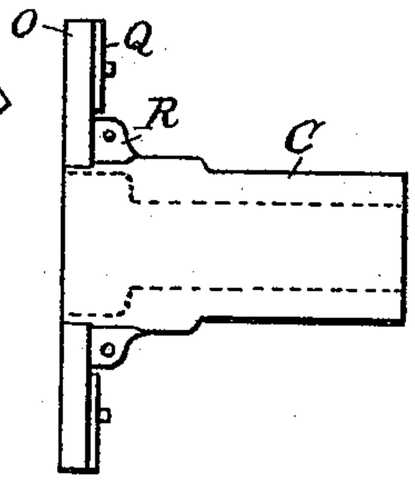


Fig. 9.



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UNITED STATES PATENT OFFICE.

CHRISTIAN EICKMANN, OF INDIANAPOLIS, INDIANA.

SPRING APPLIANCE FOR SHAFTS.

SPECIFICATION forming part of Letters Patent No. 620,898, dated March 14, 1899.

Application filed November 29, 1897. Serial No. 660,121. (No model.)

To all whom it may concern:

Be it known that I, CHRISTIAN EICKMANN, a citizen of the United States, residing at Indianapolis, in the county of Marion and State of Indiana, have invented certain new and useful Improvements in Spring Appliances for Shafts; and I do 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, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

My invention relates to improvements in the construction of gas-engines and affecting particularly the parts by which the power is transmitted; and it consists in a main shaft, a spring operating in connection with the shaft, and a clutch whereby the power is transmitted from the shaft through the spring to the belt-pulley; and it consists, further, in the parts and combination of parts hereinafter more fully described and claimed.

In operating gas-engines it is well known that much difficulty is experienced when starting them when the belts are connected to the line-shafts, as it is necessary to manually turn the engine and all the connected shafts one or more revolutions before compression and explosion takes place, which in some cases requires several men to accomplish. If, however, a shifting belt is used or a clutch by which the line-shaft is cut out when starting, much difficulty is found in preventing the belts from flying off the pulleys when it is attempted to start the line-shaft after the engine is under headway.

It is my object to provide means by which these evils are obviated and the greatest advantages desired in the use of gas-engines realized. This is attained in my invention, which is of few parts, cheaply constructed, and is durable and economical in use.

Referring to the drawings, Figure 1 represents a top plan view of a gas-engine shaft to which my invention is applied, the cylinder and piston of the engine being shown in central section; Fig. 2, a fragment of said shaft having my devices shown in central vertical section; Fig. 3, a transverse sectional view on the line Y Y in Fig. 2, looking toward the pulley and clutch; Fig. 4, a transverse sectional view on the line X X; Fig. 5, a longitudinal central view of a shaft embodying my improvements; Fig. 6, a front elevation of the clutch; Fig. 7, a front view of the clutch hub and arms; Fig. 8, a front view of the clutch-shoe; Fig. 9, a side view of the clutch hub and arms; Fig. 10, an end view of a clutch-arm.

In the drawings, A designates the main shaft; B, the compensating spring; D, the pulley; E, the cylinder; F, the crank of the main shaft; G, the piston; H, the connecting-rod or pitman, and I the balance-wheel.

In the construction of my invention I employ such material as may be best adapted for the various parts and of varied design in size and shape adapted to various situations. A straight cylindrical shaft may be fitted with my spring device by adapting the several parts to it; but I preferably form the main shaft A with an enlarged portion *a* either integrally or by attachment, having a gradual taper at one side and an acute angle or shoulder *n* at the other side of the point of greatest diameter, which shoulder serves as an end bearing for the hub C of the clutch which is fitted revolubly on the part *b* of the shaft. The external diameter of the portion *a* and the hub C are equal where they abut. The opposite end of the hub may suitably bear against the hub of the pulley D adjoining, and the latter may bear against the hub of the fly-wheel I or a suitable collar rigidly secured to the shaft by a key or set-screws. A flanged collar M is rigidly secured to the shaft at a suitable distance from the hub C either by a key or by set-screws.

The spring B is made in any suitable length and shape, but is preferably composed of steel and formed, as shown, in a partially conical spiral coil and particularly of somewhat greater internal diameter than the shaft which it encircles and of comparatively great length, although it may be suitably formed of "flat" bar-steel in overlapping open coils, thus requiring a shorter shaft. One end of the spring is firmly secured to the collar M, as by a bolt *l*, and the other end is secured to the hub C, as by a bolt *i*. The pitch of the spiral is designed so that in the case shown the driving-shaft tends when rotating in the

direction of the arrow on the balance-wheel to draw the spring closely to the shaft and set the hub C in motion. In this form the pulley D may rotate in the opposite direction and drive the shaft; but if the shaft be rotated in the opposite direction the pitch of the spring should be the reverse, so that strain upon it is tensile.

Any suitable clutch mechanism in connection with the hub C may be employed; but I preferably use the simple form shown, in which the pulley D, running loosely upon the end *b* of the shaft, is provided with a frictional bearing-surface, with its rim at one side of its disk body or arms, and friction-shoes J, adapted to engage the said inner surface. These shoes are controlled to form and release their contact by means of a collar K and spreading links *e h*, suitably jointed and connected to the lugs R and S. The arms O, of any suitable number, are integral with the hub C and have a groove P in the end, in which is carried the shank T of the shoe, a retaining-plate Q being bolted to the arm to support the shank, yet permit of its sliding in the groove. The collar K is loose upon the hub C and has an annular groove *c*, which is engaged by a forked lever L, suitably supported, by which the clutch is operated in the usual manner.

In some cases where it is desirable to use a very short main shaft upon the engine I may apply my devices to the line-shaft instead, in which case a belt from the engine would drive the pulley D upon the line-shaft A when in contact with the clutch, otherwise the pulley would run loose.

In operation the engine being run in the direction of the arrow on its balance-wheel and the clutch disengaged the shaft A, spring B, and clutch-hub C, with its mechanism, may rotate without imparting motion to the pulley D until the desired speed is attained, when the clutch may be put into contact with the pulley D, and the sudden strain incident to putting the line-shaft in motion is absorbed by the spring B until it is gradually closed about its shaft, thus avoiding the delays, inconvenience, and wear and tear hereinbefore alluded to.

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

1. In a gas-engine, the combination of the extended shaft provided with the enlarged and tapering portion, the sleeve C and the pulley D loose on said shaft, the collar K sliding on said sleeve, the clutch mechanism and means whereby the same may be operated, and the conical spiral spring B on said tapering portion and having its smaller end operatively connected to said shaft and its larger end connected to said sleeve, substantially as shown and described.

2. In a gas-engine, the combination of the extended shaft A having the tapering portion *a* terminating in the shoulder *n*, the straight portion *b* and the loose sleeve C and the loose pulley D thereon, the collar K sliding on said sleeve, the clutch mechanism and means whereby the clutch is operated, the collar M, and the conical spiral spring B having its smaller end connected to said collar M and its larger end connected to said sleeve C, substantially as shown and described.

3. In a gas-engine, the combination of the extended shaft A having the tapering portion *a* terminating in the shoulder *n*, the straight portion *b* and the loose sleeve C and loose pulley D thereon, the collar K sliding on said sleeve, the clutch mechanism, the clutch-lever, the collar M, the conical spiral spring B having its smaller end connected to said collar M and its larger end connected to said sleeve C, and the balance-wheel, substantially as shown and described.

In testimony whereof I affix my signature in presence of two witnesses.

CHRISTIAN EICKMANN.

Witnesses:
WM. C. THOMPSON,
E. T. SILVIUS.