No. 828,497. PATENTED AUG. 14, 1906.

G. H. MORGAN.

POWER CONVERTING APPARATUS.

APPLICATION FILED AUG. 9, 1904.

Fig 1

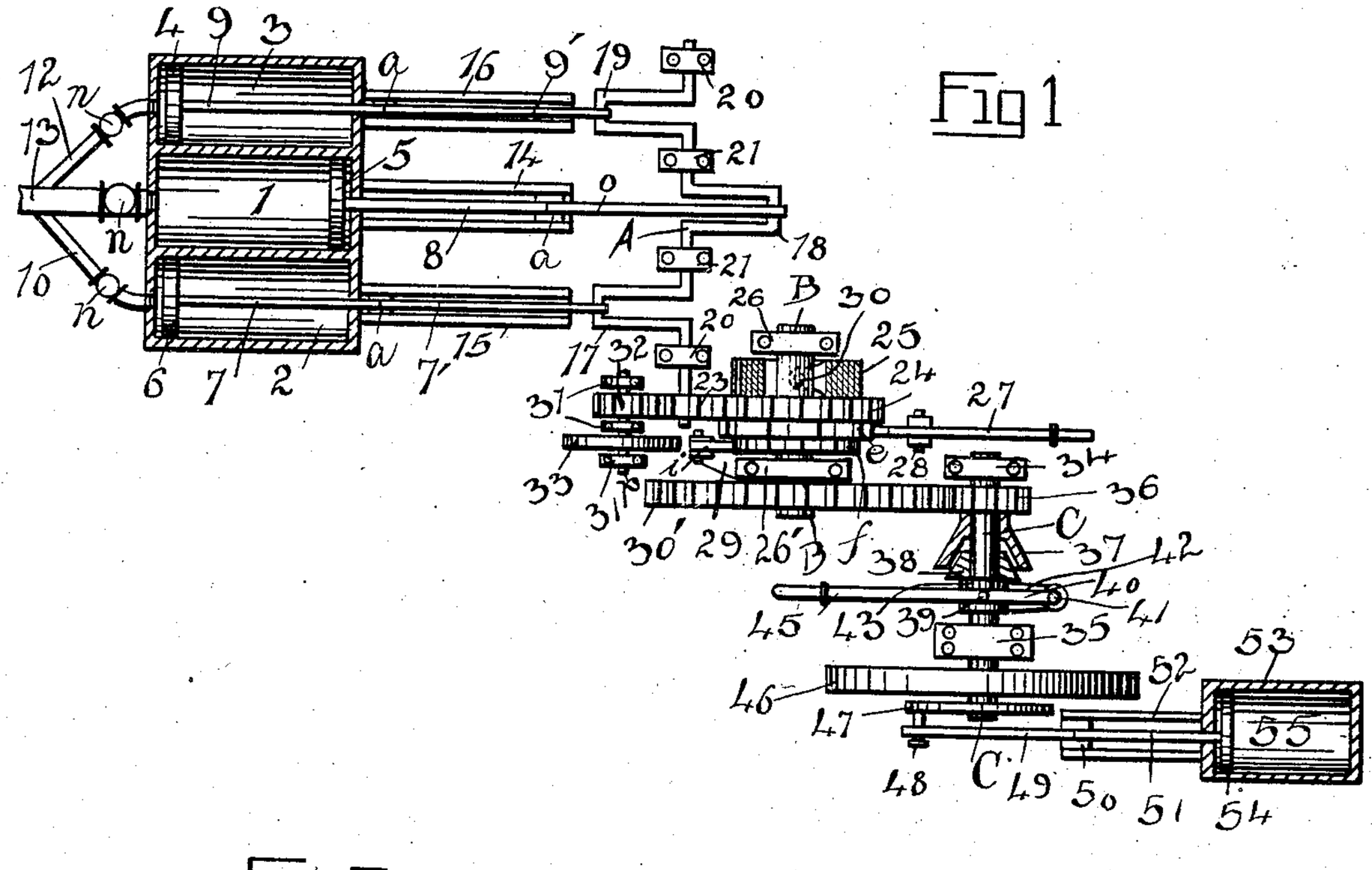
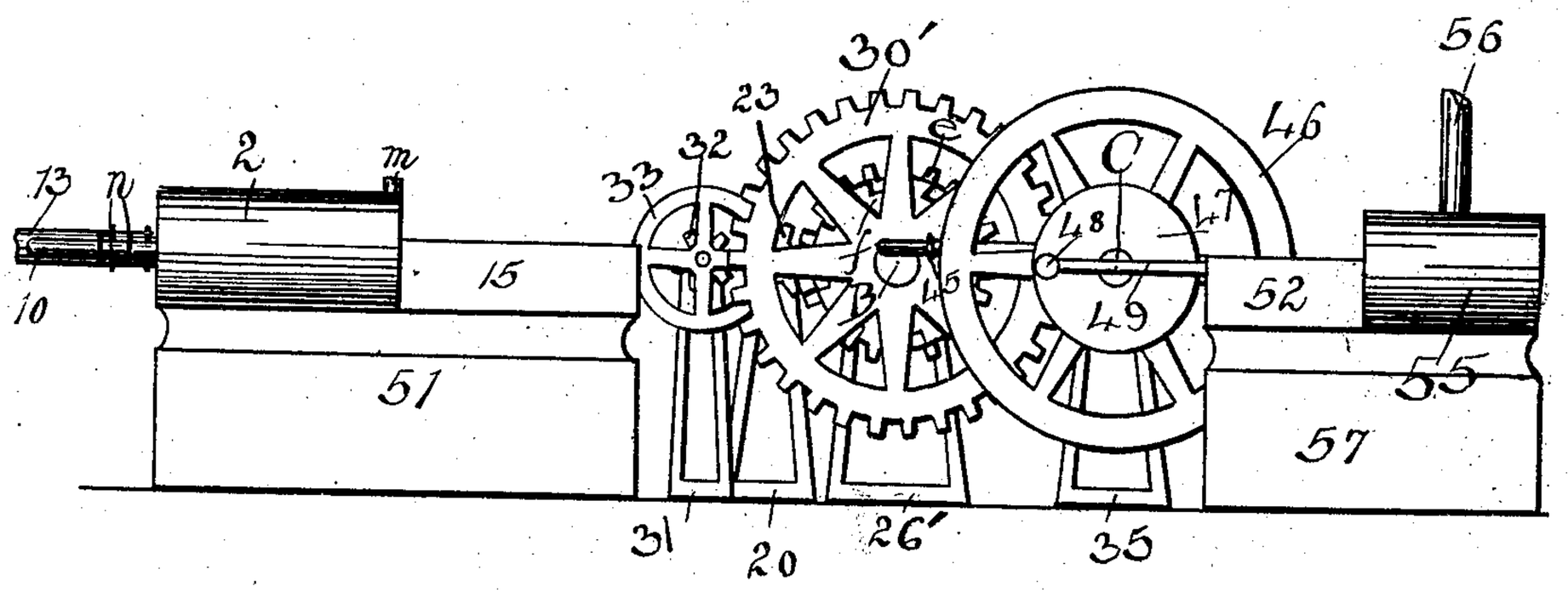


Fig 2



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POWER-CONVERTING APPARATUS.

No. 828,497. Specification of Letters Patent. Patented Aug. 14, 1906.

Application filed August 9, 1904. Serial No. 220,139.

To all whom it may concern:

Be it known that I, GEORGE H. MORGAN, a citizen of the United States, and a resident of Loup City, in the county of Sherman and State of Nebraska, have invented certain new and useful Improvements in Power-Converting Apparatus, of which the following is a specification.

In a great many factories where steam-power is used certain machines are thrown out and disconnected, so that the engine has not the same amount of work to do at all times.

The object of my invention is to provide an engine with an air-compressor, so arranged that the engineer when he notices that certain of the power-requiring machines have been momentarily thrown out of connection may throw into gear a spring-motor, which requires approximately the same force to wind as he did to work the machine temporarily thrown out of connection. While I have shown and described a steam-engine provided with my spring-motor and air-compressing attachment, it should be understood that this device could also be used in connection with an electric motor.

From this it will be seen that the object of my invention is to provide a spring-motor adapted to be thrown into play in connection with a suitable engine when certain of the machinery driven by the engine are thrown out of work or disconnected.

In the accompanying drawings I have shown in Figure 1 a top view of an engine, partly in section, disclosing my connected spring-motor and air-compressor, while Fig. 2 shows a side view thereof.

In the accompanying drawings I have shown a suitable base 57, supporting an ordinary cylinder 55, which is provided with the usual live-steam pipe 56 and the guideway 52, within which reciprocates the usual cross-head 50, to which is secured the piston-rod 51, extending from the piston 54, as disclosed in Fig. 1. From this cross-head 50 extends the pitman 49, and this pitman 49 is secured to the crank-pin 48, fixed to the governor-disk 47, supported upon the main driving-shaft C. This main driving-shaft C is supported within the bearings 35 and 34 and carries the usual belt-pulley 46, to which is secured the belt intended to drive the certain machinery within a suitable shop or factory. Further secured to this shaft C by any suitable means is the sliding collar 43, which is provided with a suitable groove, within which is adapted to work the pin 39, extending from the lever 45, which lever by means of its rear end 40 is secured to a pin 41, extending from the bracket 42, so that by means of this lever 45 the collar 43 may be slid backward and forward upon the shaft C. Loosely working upon this shaft C is the cup 37, carrying the pinion 36, and extending from this sliding collar 43 is the cone 38, adapted to work into the cup 37, so that the rotary movement of the shaft C may be imparted to the cup 37 to rotate the pinion 36.

Held within the standards 26 and 26′ is a shaft B, to which is secured a suitable gear 24, to which gear is fastened a coil-spring 25, secured by means of its end 30 to the shaft B. Secured to the gear 24 is the auxiliary gear *e*, and to this is secured the ratchet-wheel *f*, a pawl *i* working in conjunction with the ratchet-wheel *f*, so that this spring 25 may be wound up as is in ordinary clock-springs, the pawl *i* being supported by the bracket 29, as shown. In connection with the gear *e* I use a dog-lever 27, supported within the standard 28, this dog-lever 27 engaging the gear *e*, so that said gear may be stopped by the lever 27, being brought into frictional contact therewith to check the speed and stop the gear 24. Secured to this shaft B is the gear 30′, meshing with the pinion 36 upon the main driving-shaft C, so that by means of this pinion 36 the gear 30′ may be rotated to wind the coil-spring 35 exactly as an ordinary clock-spring is wound, as has been stated. Connected with the spring 25 is the driving-gear 24, meshing with the gear 23, mounted upon a multiple-crank shaft A, provided with the cranks 17, 18, and 19 and supported within the bearings 20 and 21, as shown in Fig. 1, so arranged that as the spring 25 unwinds it operates this multiple-crank shaft A.

In order to impart a steady rotary movement to the multiple-crank shaft A, I use a stub-shaft *p*, held within the bearings 31, which is provided with a governor-wheel 33 and a pinion 32, meshing with the pinion 23, as shown in Fig. 1. Upon a suitable base 51 are mounted the air-compressing cylinders 1, 2, and 3, provided with the usual intake-valves *m* and the exit-pipes 13, 10, and 12, respectively, as shown in Fig. 1, each provided with a usual valve *n*. Within the cylinders 1, 2, and 3 are the pistons 5, 6, and 4, provided with the piston-rods 8, 7, and 9,

each secured to a cross-head *a*, these several cross-heads working within the guides 14, 15, and 16, as shown in Fig. 1. The middle cylinder by means of the pitman *o* is secured to the crank 18, and the pitman 7′ extending from the cylinder 2 to the crank 17, and the pitman 9′ extending from the cylinder 3 to the crank 19. Now when the engineer notices that certain of the larger machines are temporarily thrown out of gear he promptly throws into gear the pinion 36 to wind the spring 25, and this spring after being wound in releasing the dog-lever 27 is permitted to rotate the multiple-crank shaft A to compress the air within the cylinders 1, 2, and 3. It is of course understood that these cylinders 1, 2, and 3 are of a necessity of a small capacity, as it is understood that no very great force can be exerted by means of a coil-spring, as the one shown at 25; but in my present arrangement it is possible to quickly wind up this spring 25 by means of certain power which is available but for various short periods, so that during the long intermissions, during which the pinion 36 cannot be brought into play, the spring 25 slowly unwinds to operate the air-compressors, and this compressed air is stored and used for various purposes.

It will be observed that the power may be taken off from the spring-actuated gear 24 while the engine is at the same time winding up the spring and storing energy in the motor, so that as a matter of fact the motor forms a part of a train of gearing connecting up the driving-shaft with the driven shaft. By thus simultaneously storing up energy in the spring-motor and taking it out of the spring-actuated gear a resilient drive is secured, and if the primary motor or engine speeds up sufficiently to wind up the spring tightly no harm can result to the mechanism, as a positive drive is then secured. If for any reason the primary motor or engine should stop, the spring-motor will come into action, utilizing its stored-up energy through the spring-actuated gear 24. Thus the driven shaft is continuously operated. The governor, applied as it is to the driven pinion, acts to regulate the speed of the driven shaft under all conditions of operation. It will thus be observed that the action of the mechanism is automatic and that therefore it will afford a very useful adjunct to a power plant in that it is always ready to store and transmit the surplus power not needed in running the regular machinery of the plant.

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

In a power-transmitting apparatus, the combination of a drive-shaft, a driven shaft, a train of gearing between the driving-shaft and the driven shaft, said train of gearing embodying a spring-motor through the medium of which the driven shaft is driven, a pawl-and-ratchet device for preventing the spring-motor expending its energy backward manually-controlled means for connecting one end of said train of gearing to the drive-shaft, manually-controlled means for controlling the spring-motor, and a governor device geared to the driven shaft.

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

GEORGE H. MORGAN.

Witnesses:
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