Oct. 21, 1924. 1,512,647

B. D. STEVENS

DRIVING AND COUNTERBALANCING MECHANISM

Filed March 16, 1921

Fig. 1.

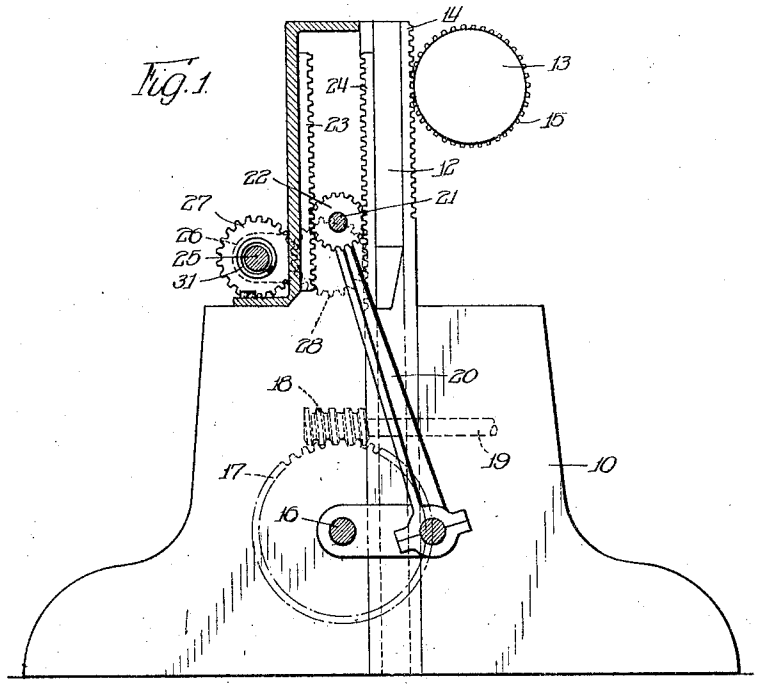
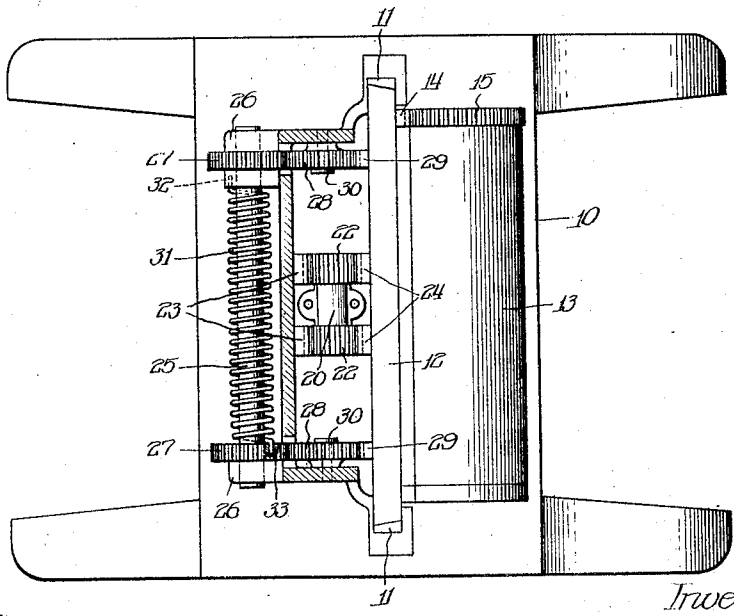


Fig. 2.



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Patented Oct. 21, 1924. 1,512,647

UNITED STATES PATENT OFFICE.

BURT D. STEVENS, OF EVANSTON, ILLINOIS, ASSIGNOR TO MIEHLE PRINTING PRESS & MANUFACTURING COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

DRIVING AND COUNTERBALANCING MECHANISM.

Application filed March 16, 1921. Serial No. 452,889.

To all whom it may concern:

Be it known that I, BURT D. STEVENS, a citizen of the United States, residing at Evanston, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Driving and Counterbalancing Mechanism, of which the following is a specification.

This invention relates to driving and counterbalancing mechanism for printing presses and finding particular application in the vertical bed type.

One object of the invention is to provide a printing press including simple, efficient and durable operating mechanism for the form carrying bed and associated cylinder and for maintaining the running parts substantially in a balanced condition regardless of the point at which the press is stopped and the leverage which ordinarily would be imposed upon the crank shaft.

Another object is to provide a compact vertical type of printing press in which members of the printing couple have a relative vertical movement and are actuated in a manner to meet all of the requirements for successful commercial operation.

These and other objects are accomplished by means of the arrangement disclosed on the accompanying sheet of drawings, in which—

Figure 1 is a fragmentary side elevation, parts being in section, of a printing press embodying my invention; and,

Figure 2 is a top plan view of the same, parts being shown in section for the sake of clearness.

The various novel features of my invention will be apparent from the following description and drawings and will be particularly pointed out in the appended claims.

Referring to the drawings, it will be noted that the printing press includes a suitable frame 10 with vertical guideways 11 in which a form carrying bed 12 is mounted for vertical reciprocatory movement. The printing form carried by the bed 12 cooperates with the adjacently arranged cylinder 13 for making impressions. In this particular case the cylinder 13 has no rectilinear movement. However, it will be understood that if desired the cylinder may be reciprocated at the same time that the bed 12 is, but in an opposite direction. The cylinder 13 is rotated by means of a rack 14 movable with the bed 12 and which meshes with a gear 15 carried by the cylinder 13.

A crank shaft 16 is mounted in suitable bearings in the frame 10 which may be driven in any suitable manner but preferably through a worm gear 17 which meshes with a worm 18 formed at one end of a drive shaft 19. Operatively connected to the crank of the shaft 16 is a connecting rod 20, the upper end of which carries a shaft 21 having mounted thereon gears 22 which mesh on one side of the shaft with upright stationary racks 23 mounted on the frame 10 and on the opposite side of the shaft with vertical racks 24 fixed to and movable with the reciprocatory bed 12, the sliding movements of the latter, as stated above, being employed to rotate the cylinder 13 through the rack 14 and the gear 15 coaxially arranged with respect to the cylinder to which it may be clutched and unclutched by mechanism of any suitable type, which it is deemed unnecessary to illustrate in view of its being well known in the art.

Referring more particularly to the drive for the bed, it will be noted that because the racks 23 are stationary and the connecting rod 20 is connected to the shaft 21 carrying gears 22, the travel of the bed 12 effected by the combined bodily and rotative movements of such gear will be twice the throw of the crank or twice the diameter of the circle described by the rotating lower end of the connecting rod. Such a construction permits of the employment of the relatively short crank which requires but comparatively small space for its movements, and this is particularly true when it is compared with the actual length of travel or stroke of the bed. On the other hand, the action of the weight of the bed and its printing form on the crank shaft is doubled by reason of the leverage which they have thereon through the gear connection, but the substantial balancing of the parts is effected by means of an energy-storing and releasing mechanism including a shaft 25 mounted in bearings or brackets 26 formed on the bed 10, said shaft near the ends thereof having gears 27 secured thereto which mesh with gears 28, which in turn mesh with racks 29 carried on the back of the reciprocatory bed 12 near the sides thereof. The gears 28 are rotatably mounted on trunnions 30 secured to the

frame 10 to the rear of and adjacent the bed 12. Surrounding the shaft 25 is a coiled spring 31, one end 32 of which is anchored in one of the bearings brackets 26 and the other end 33 of which is anchored in one of the rotatable gears 27. It is apparent, therefore, that as the shaft 25 is rotated in one direction the spring will be wound up a predetermined amount for storing energy therein, and when the shaft is permitted to rotate in the opposite direction during the normal operation of the machine the spring will give up its energy. In other words, as the relatively heavy type bed moves downwardly the shaft 25 will be rotated in one direction for winding up the spring 31 to store energy therein and when the type bed moves upwardly the spring unwinds, thereby giving up its stored energy for assisting the type carrying bed in its upward movement.

It may be impossible to accurately counterbalance the moving parts of the machine under all conditions of service and operation because of the variable factors, such as printing forms of different dimensions and weights, which may be carried by the bed, the cylinders sometimes being clutched and at other times unclutched, yet it is helpful or convenient to be able to stop the machine with the form or bed in any position without having the latter, as a result of an unbalanced condition, move in one direction or the other. The counterbalance spring mechanism is assisted in holding the form or bed in any position by the worm 18 and associated gear 17 which are irreversible in their driving action, so even though there may be slightly unbalanced condition which is increased some in its effect upon the crank shaft through the gearing, such unbalanced condition is compensated for by the worm and worm gear which act to effectively lock and prevent turning or displacement of any of the parts of the mechanism except when actually driving the press.

In connection with the counterbalance mechanism, attention is called to the fact that a minimum amount of power is required to drive the operative parts of the press, including the counterbalance means in its energy storing movements, for the reason, among others, that little or no inertia has to be overcome in storing energy in the spring or counterbalance means as compared with counterbalance means in the form of a weight or weights.

It is my intention to cover all modifications of the invention falling within the spirit and scope of the following claims.

I claim:

1. In a printing press, a vertically movable printing form bed, means for reciprocating said bed vertically, a rack on said bed, a gear secured to a fixed portion of the press and meshing with the rack, and spring means associated with the said gear whereby energy is stored in said spring as the bed moves downwardly and is released by the spring as the bed moves upwardly.

2. In a printing press, a vertically movable printing form bed, means for reciprocating said bed vertically, a pair of spaced racks on said bed, gears secured to fixed portions of the press meshing with said racks, a second pair of gears meshing with the first pair of gears, said second pair of gears being secured to a common shaft, and a coil spring surrounding said shaft having one end secured to the shaft support and the other end secured to rotate with the shaft and gears whereby energy is stored in said spring as the bed moves downwardly and is released by the spring as the bed moves upwardly.

Signed at Chicago, Illinois, this 8th day of March, 1921.

BURT D. STEVENS.