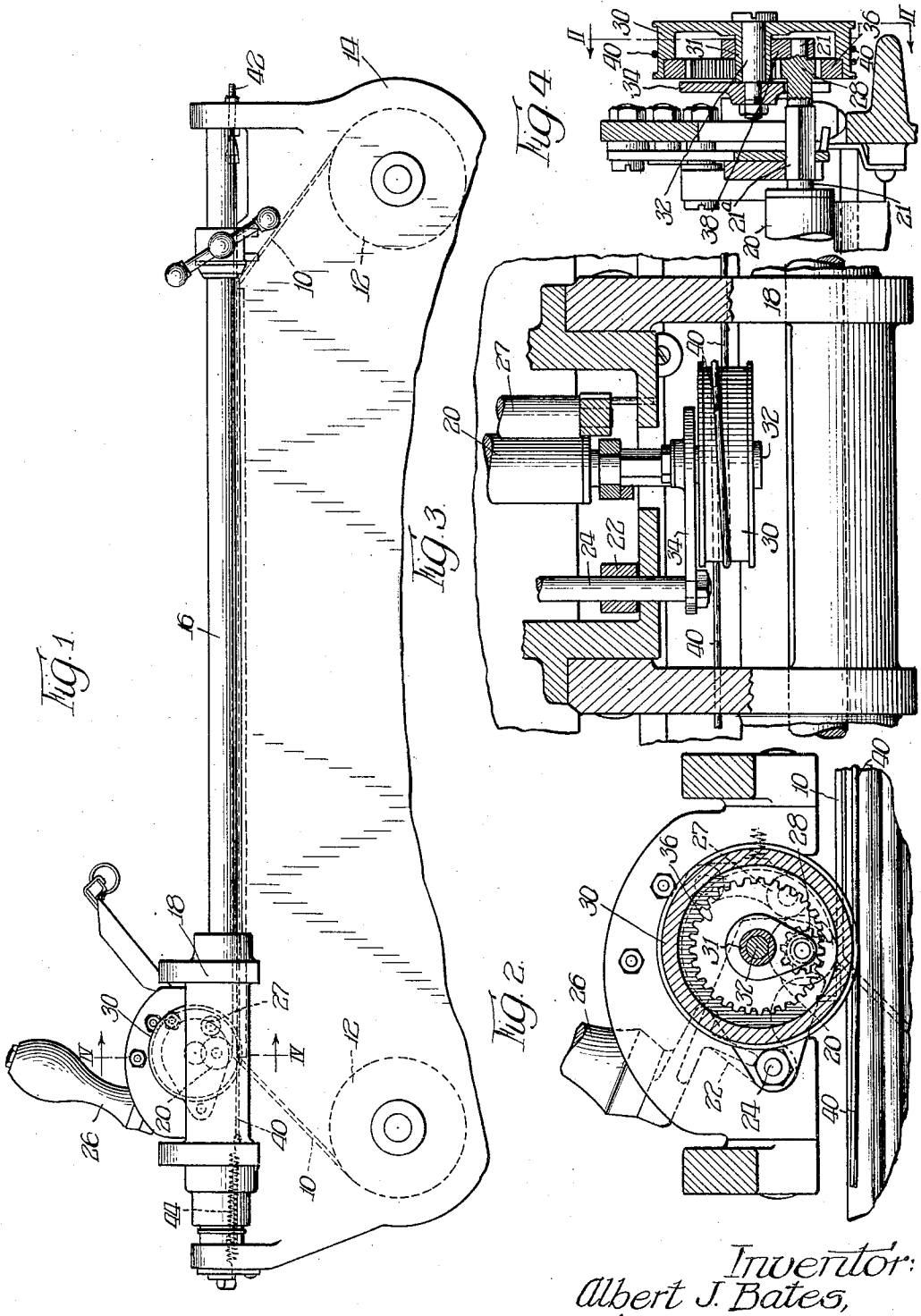
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DUPLICATING APPARATUS

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DUPLICATING APPARATUS

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This invention relates to duplicating machines, and is illustrated as embodied in a hectograph having means for causing its platen roller to rotate at the proper speed in relation to its linear movement.

In the illustrated form of the apparatus, a large drum mounted on the usual carriage is rotated by a stationary steel cable in accordance with the movement of the carriage. The drum carries an internal gear which meshes with a pinion on the platen roller to cause the latter to rotate at substantially a true rolling speed or a slight consistent variation therefrom.

According to the former practice, such a cable has been wound about a drum mounted directly on the shaft of the platen roller, and therefore of a diameter approximate to but slightly smaller than that of the platen roller.

One object of the invention which will reliably and consistently regulate the rotation of the platen roller to correspond accurately to the travel of the carriage in which it is mounted, so that the master and copy papers will be rolled smoothly on the copying band without either rumpling or undue sliding tendencies.

Another object of the invention is to provide means for driving for the usually comparatively small platen roller, said means including a drum of a diameter sufficiently large to permit the use of a steel cable with a minimum of crystallization due to flexing.

A further object of the invention is to provide, for the purposes described, a drum of sufficient size to decrease the wearing of both cable and the drum due to relative creeping between the two. By increasing the size of the drum the lead angle is proportionately reduced. The lead angle may nontechnically be described as the angle at which the cable coming onto the drum must extend from the perpendicular in order to prevent chafing with the cable leaving the drum.

Another object is to provide such a platen control device which is simple of construction, durable, and capable of being assembled together with the platen roller as a unit readily mounted on and removed from the machine.

The use of high grade steel cables has formerly been considered impractical with a small platen roller, because of the rapid crystallization accompanying its being wound around a small sized drum. On the other hand, catgut, which has been used formerly is very unsatisfactory not only because of its comparatively rapid wear, but also because it is nearly impossible always to get catgut of the desired diameter, and when a catgut of the right diameter is secured, its diameter varies with atmospheric conditions. Inasmuch as the size of the cable affects the speed rotation of the drum and the platen roller, such variation may be fatal to successful operation.

Steel cable can be cut by machinery to the exact length desired, and attached to screw adapters ready for quick insertion on the machine.

With these and various other objects in view, the invention may consist of certain novel features of construction and operation, as will be more fully described and particularly pointed out in the specification, drawing and claims appended hereto.

In the drawing which illustrates an embodiment of my invention,

Figure 1 is a fragmentary view of a hectograph illustrating the use to which my invention is put;

Figure 2 is a vertical section illustrating the details of my invention, taken along the line II—II of Figure 4;

Figure 3 is a plan view partly in section of the apparatus shown in Figure 2; and

Figure 4 is a vertical section at right angles to the section taken along the line IV—IV of Figure 1.

Although my invention may take many forms and have many uses, only one has been illustrated. The duplicating machine may be of the hectograph type and, as shown, includes the copying band 10 stretched between suitable drums 12, mounted on the frame 14. Also mounted on the frame 14 is the bar 16 on which is slidably mounted the carriage 18, the other end of which may be shiftably supported in any suitable manner, not shown. Carried by the carriage 18 is a platen roller

20, adapted, as is customary, to be lowered into pressing relationship with the copying band 10. The platen roller 20 is mounted on the shaft 21 which rotates in a hexagon bushing 21*a* which is secured in a bracket 22. This bracket is pivotally carried by a shaft 24, and is provided with a suitable handle 26 for operating the same and for moving the carriage 18. The usual pressure roller 27 is also provided.

The shaft 21 is extended beyond the bracket 22 and carries at its end a pinion 28. According to the former practice, a drum was mounted on this shaft, in place of the pinion 28, and cables of catgut were passed around the drum and secured at the ends of the frame to insure the proper rotation of the platen roller 20. To accomplish this result in that manner the drum had to be as small in diameter as the roller itself, or more exactly, a little smaller. This was so small that a steel cable could not be satisfactorily used as the severe flexing would rapidly cause its crystallization. Accordingly, catgut was used, but this also had many drawbacks. According to the present invention the platen roller is controlled by a large drum 30 so that a steel cable can be used with entire satisfaction.

The large drum 30 is provided with a sleeve 31 on a spindle 32 which is secured to a plate 34. The plate 34 is pivoted on the shaft 24 and fits loosely over shaft 21 to move with the platen roller 20.

On the inside of drum 30 is an internal gear ring 36 which is preferably set into a recess in the drum as shown in Figure 4. Gear ring 36 is held in proper engagement with pinion 28 by means of pivotal bearing 38 which is pivotally mounted on the central sleeve 31 of drum 30. A steel cable 40 is secured at one end to the frame by a suitable screw adaptor 42, is passed under, around and again under the drum 30, and is maintained taut by a spring 44 secured to a suitable bracket.

The operation of the above described apparatus is as follows: As the carriage 18 moves from left to right, the drum 30 is rotated by cable 40. The rotation of the drum causes a rotation of platen roller 20 through ring gear 36 and pinion 28. The parts are of course of such proportions that the roller 20 rotates at the desired speed. It is preferred that this be slightly less than true rolling speed, so as to cause a very slight drag on the paper being impressed. The drag should be just enough to keep the paper tight, without objectionably sliding it on the copying band.

Another part of the operation of the device for which there are special requirements, is the feeding. The paper is inserted between the platen roller 20 and pressure roller 27 while the platen roller is raised out of contact. In order that the paper may be properly spaced to give the correct margin, it is necessary that the platen roll be prevented from too much rotation during the lowering of the platen roller into contact. The cable and drum prevent undue rotation of the platen roller during the lowering operation, though they cause just the right rotation when the copying stroke is started.

It is frequently desired to tilt the carriage 18 as a whole, swinging it up about the rod 16. During this movement the cable and drum maintain the parts in the proper relationship.

The large drum not only permits the use of a steel cable but it permits the drum to be narrower and results in longer life of the parts for various reasons. There is comparatively less creeping of the cable relative to the drum; and a thousandth of an inch wear from the surface of the drum, being less in proportion to the diameter of the drum, has less effect on the speed of rotation of the platen roller. The narrower drum is possible because it makes fewer rotations in a stroke and therefore the cable is shifted less, laterally. This results in more uniformity and efficiency.

It is to be understood that I do not wish to be limited by the exact embodiments of the device shown, which are merely by way of illustration and not limitation, as various and other forms of the device will of course be apparent to those skilled in the art without departing from the spirit of the invention or the scope of the claims.

I claim:

1. In a duplicating machine, a roller mounted for linear movement, a drum mounted therewith for controlling the rotation of said roller, said drum being of larger diameter than the roller, and means to cause said drum to rotate in response to linear movement of said roller.

2. Duplicating apparatus including a movable member, a roller rotatably carried thereby, a drum carried by said movable member and rotatably mounted with respect to said roller for controlling the rotation of said roller, and means whereby a linear movement of said drum causes a rotation thereof, the proportions of the parts being such that said rotation causes a correct predetermined rolling speed of the roller.

3. A duplicating machine including a roller of comparatively small diameter, a drum adapted to control the rotation of said roller, and a steel cable having its ends permanently secured and extending around said drum, said drum having a radius of sufficient size to minimize the crystallization of said cable due to winding around the drum.

4. Duplicating apparatus including a roller adapted to roll over a given course, a pinion rigid with said roller, on internal gear ring meshing with said pinion, a drum rigid

with said gear ring, and means to cause said drum to rotate in accordance with the linear movement of said roller and said drum.

5. Duplicating apparatus including a roller adapted to roll over a given course, a pinion mounted on said roller, an internal gear ring constantly meshing with said pinion, a drum rigid with said gear ring and traveling with said roller, and a cable wound around said drum and extending along the path of said drum with an end substantially stationary.

6. Duplicating apparatus including a roller adapted to roll over a given course, a pinion rigid with said roller, an internal gear ring constantly meshing with said pinion, a drum mounted on said gear ring and traveling with said roller, and a cable wound around said drum and extending along the path of said drum, said drum having a radius greater than the rapid crystallization radius of said cable.

7. In a duplicating machine, a carriage mounted for linear movement and for rotation, a roller mounted in said carriage for linear movement and rotation with respect to said carriage, a pinion rigidly associated with said roller, and means including teeth adapted to mesh with said pinion for causing said pinion to rotate in proportion to the movement of said carriage, said means also controlling said pinion as to rotative movement during the linear movement of said roller with respect to said carriage, and said means remaining constantly in operative condition during rotation of said carriage.

8. In a duplicating machine, a carriage mounted for linear movement and for rotation, a roller mounted in said carriage for linear movement and rotation with respect to said carriage, a pinion rigidly associated with said roller, and means including teeth adapted to mesh with said pinion for causing said pinion to rotate in proportion to the movement of said carriage and with approximately true rolling motion, said means also controlling said pinion as to rotative movement during the linear movement of said roller with respect to said carriage to cause proper positioning of the paper as the roller is shifted into active position.

9. In a duplicating machine, a carriage mounted for linear movement and for rotation, a roller mounted in said carriage for linear movement and rotation with respect to said carriage, a pinion rigidly associated with said roller, and means including a stationary cable, a drum driven thereby and carried by said carriage and an internal gear ring carried by said drum and meshing with said pinion for causing said pinion to rotate in proportion to the movement of said carriage and with approximately true rolling motion, said means also controlling said pinion as to rotative movement during the linear movement of said roller with respect to said carriage to cause proper positioning of the paper as the roller is shifted into active position.

10. A duplicating machine including a slidable carriage, a roller of comparatively small size mounted on said carriage, a drum mounted on said carriage and adapted to control the rotation of said roller, and a steel cable extending around said drum and having its ends permanently secured to said machine; said drum having a radius larger than that of the roller and of such size that the cable in frequently passing around the drum is not flexed sharply enough to be rapidly crystallized, the relation of the parts being such as to give the roller approximately true rolling motion.

Signed at Chicago, Illinois, this 7th day of October, 1930.

ALBERT J. BATES.