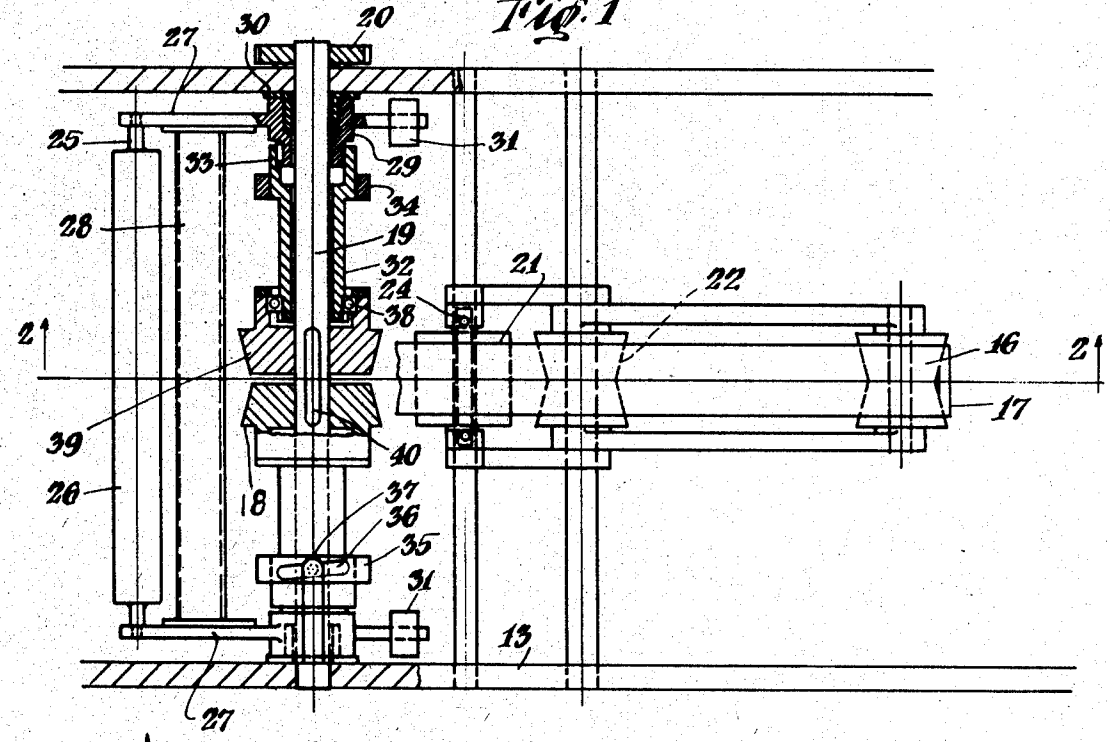
Oct. 22, 1940. J. PANGERL 2,218,548

DIFFERENTIAL TENSION DEVICE

Filed April 12, 1935

Fig. 1



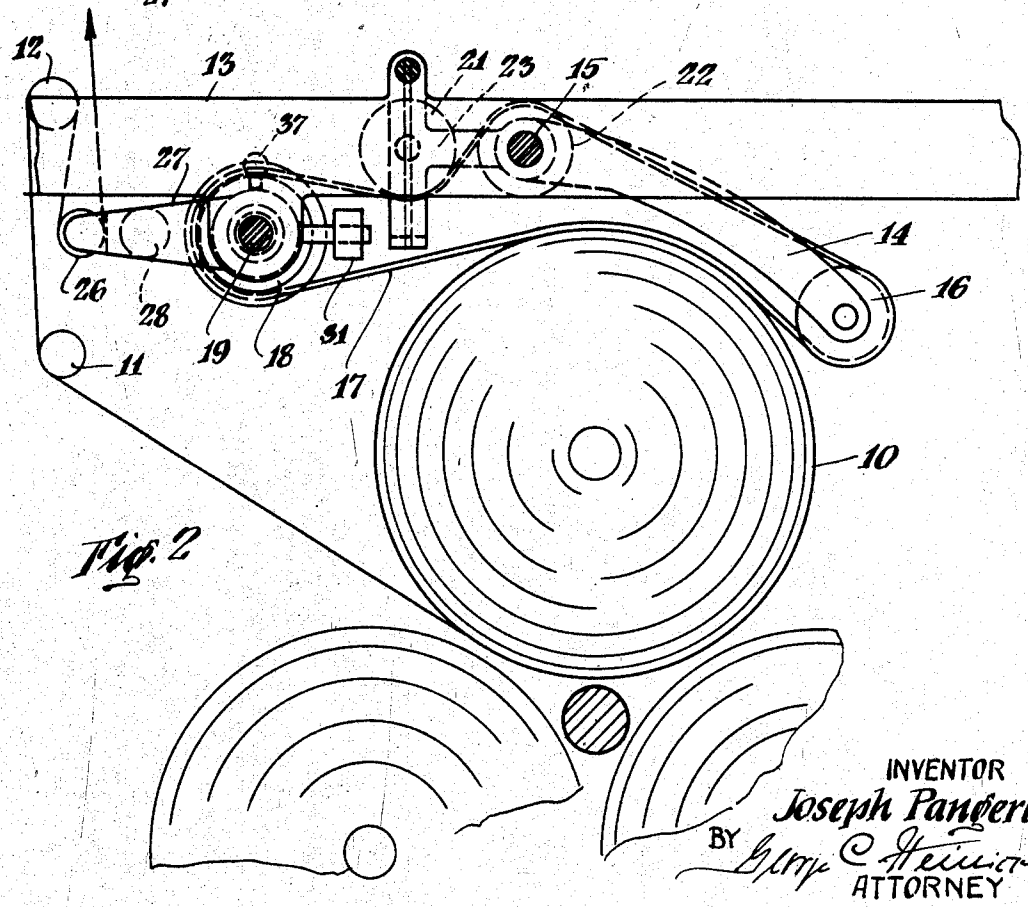


Fig. 2

INVENTOR
Joseph Pangerl
BY George C. Heinicke
ATTORNEY

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DIFFERENTIAL TENSION DEVICE

Joseph Pangeri, New York, N. Y., assignor to R. Hoe & Co., Inc., New York, N. Y., a corporation of New York

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6 Claims. (Cl. 242—75)

This invention relates to a differential tension device for automatically controlling the feeding of a sheet or web of material, such as for instance paper from or to a roll, principally for feeding the paper in printing presses from a web to the pressure and impression cylinders under constant tension.

As it is well known, the tension of the paper web is generally produced by the pull exerted on the paper by the cylinders, and the degree of tension varies on account of a sliding or gliding movement or slip of the paper beneath the driving elements. This slip is subject to variations controlled by the frictional conditions, etc., met at variations in speed.

It is the principal object of my invention to provide an automatically operating tension controlling mechanism for the paper in printing presses, thus maintaining a uniform tension in order to avoid injury to the web or sheet of material and delays in the working of the press.

Another object of the invention is the provision of a differential tension device for printing presses in which the prevailing tension of the paper web controls a means automatically compensating for any tendency of the paper to sag or to be unduly tensioned or subjected to lateral displacement by regulating a variable drive.

A further object of my invention is the provision of a differential tension device, preferably for the paper or material in printing presses, which includes a compensation roller regulating a variable drive on a machine driven shaft, which is so connected with the drive of the press that at times at which the tension has a tendency to slacken, it will move automatically in a direction to produce deceleration of the web, while at times at which the tension increases, it will produce acceleration of the web, so that the tension on the material of the web is substantially uniform at all times. These movements are to be looked at as being very small differential variations and can only be theoretically considered. In reality or practice during the operation of the machine a stable or uniform equilibrium is prevailing in the position of the device which has been automatically determined by the roller.

A still further object of my invention is the provision of a differential tensioning device equipped with a mechanism compensating for all inaccuracies in the press drive to impart to the paper web by way of means engaging thereon a constant, uniform tension and allowing an adjustment according to the prevailing conditions of operation. Those may for instance be of one or more belts. I also provide for direct transformation of an oscillating movement of the compensating element into a laterally gliding movement, adjustable within certain limits and controlling a variable web drive. Other objects concern means for adjusting the tension of the belt or belts.

These and other objects and advantages of my invention will become more fully apparent, as the description thereof proceeds, and will then be more specifically defined in the appended claims.

In the accompanying drawing forming a material part of this disclosure:

Fig. 1 is a fragmentary top plan view of a printing press equipped with a differential tensioning device constructed according to my invention, partly in section.

Fig. 2 is a side elevation thereof, partly in section on line 2—2 of Figure 1.

As illustrated, the paper web 10, from which the paper is fed by means of suitably disposed idler rollers 11, 12 journalled at convenient points of the frame 13 of a press, is engaged by the usual friction drive for feeding the paper.

This friction drive comprises an idler roller or pulley 16 arranged at the outer end of an arm 14 swinging at its inner end about a shaft or pin 15. By a belt or belts 17 roller 16 is driven from a pulley or roller 18 on a shaft 19, which in turn is driven by means of a gear 20 from the press drive. The belt 17 is also guided across a take-up roller or pulley 21 and an idler roller 22 on pin or shaft 15.

An adjusting arrangement for the tension of the belt or belts 17 is provided and consists of a substantially T-shaped member 23 swinging about pivot pin 15 so that the position of the roller 21 with respect to the belt may be changed and the pivot upon which the roller 21 is journalled may be adjusted to a preferred position by any suitable means generally designated 24 in Fig. 1 (not shown in Fig. 2).

The spindle 25 of the compensation roller 26 is journalled at its ends upon rearwardly extending compensator arms 27 which may be spaced apart by a brace 28.

The arms 27 comprise hubs or members 29 which are journalled on bushings 30 mounted on the frames 13 of the press, and their extreme front ends carry the weights 31 which can be suitably adjusted on said arms.

Over the shaft 19 loosely extend the sleeves 32; their suitably widened outer ends are provided

with feather keyways 33, for the reception of the keyed inner ends of members 29.

The sleeves 32, acting as transverse screw feeds, fixedly carry near their widened parts the cams 34 and 35 respectively, which are formed with obliquely or helically disposed slots 36. The headed pins or pegs 37 extend from the frames 13 and are slidably engaged in slots 36.

The inner ends of the sleeves 32 are longitudinally fixedly but rotatably engaged by way of ball bearings 38 in recesses at the ends of each of the halves or parts 39 of the bi-partite pulley 18. The parts 39 of the pulley 18 are nonrotatively keyed upon shaft 19 by means of the feather keyway 40 or the like.

In operation, any deviation from the uniform tension of the paper web will raise or lower roller 26, thus rocking or oscillating arms 27, hubs 29 and likewise sleeves 32. But, when thus rocked, the sleeves 32 are moved away from or towards each other, this transverse movement being caused and forced by the stationary pins 37 engaged in slots 36 of cams 34 and 35, respectively. The bi-partite pulley 18 rotates with shaft 19 at the speed, at which said shaft is driven by gear 20. While the conical parts or halves 39 of the bi-partite pulley are thus not affected in their rotation by the said oscillating or rocking of parts 26, 27, 29 and 32, they participate in the transverse movement of the sleeves 32, being respectively endwise connected with said sleeves. When the sleeves move towards each other, the halves 39 of pulley 18 move likewise, the effective driving diameter of the bi-partite grooved pulley being increased, so that belt 17 is tighened; and its speed, as well as the speed at which it drives web 10, is also increased. Conversely, when the sleeves 32 are moved away from each other, the halves 39 of pulley 18 part likewise, so that belt 17 slackens and is driven at less speed, driving web 10 at less speed also. The speed at which web 10 is driven, is therefore an immediate function of the rocking of roller 26.

It will be understood that I have described and shown the preferred form of my invention only as an example of the many possible ways to practically construct the same, and that I may make such changes in the general arrangement of elements and in the construction of the minor details of the device as come within the scope of the appended claims without departure from the spirit of my invention, and the principles involved.

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

1. In a press, a support for a roll of material, a driving shaft mounted on the press, a variable size pulley mounted on said shaft and adapted for rotating said roll, means guiding said material through said press, a compensating tension roller adapted to rest on said guided material, a compensator arm fulcrumed concentrically with said shaft in said press and carrying said roller, and a cam interconnecting said arm and said pulley and converting in screw feed fashion an oscillating movement imparted to said arm by the roller raised and lowered by the material it rests on into a cross movement of said cam and pulley in the direction of the axis of said shaft.

2. In a press, a frame, a driving shaft mounted in said frame, a bi-partite pulley mounted on said shaft, a belt carried by said pulley, engaged upon and serving to rotate a roll of material, a cone forming part of said pulley, axially movable on said shaft and changing the effective diameter at which said belt is engaged by said pulley when thus moved, a sleeve rotatably but endwise fixedly engaging said cone and engaged in screw fashion on said frame, so that it feeds said cone axially on said shaft when oscillated, a compensator arm angularly fixedly connecting to said sleeve, and a roller carried by said arm and adapted to rest on material extending from said roll through said press.

3. In a press, a device for feeding material from a web roll comprising a belt adapted to engage said web roll, a bi-partite pulley with relatively movable cones carrying said belt, so that the effective diameter at which said pulley engages said belt is increased and decreased as said cones are moved towards and away from each other, respectively, a screw feed operatively engaged upon one of said cones, an arm extending from and actuating said screw feed, and a roller on said arm adapted to rest upon said material at a point removed from said web roll.

4. In a press, a device for feeding material from a web roll comprising a belt for rotating said web roll, a bi-partite pulley with relatively movable cones carrying said belt, so that the effective diameter at which said pulley engages said belt is increased and decreased as said cones are moved towards and away from each other, respectively, a screw feed arranged concentrically with and operatively engaged upon one of said cones, an arm extending from and actuating said screw feed, and a roller on said arm adapted to rest upon said material extending from said web roll.

5. In a device for feeding the material of a web roll through a press, a driving shaft, a grooved pulley mounted on and driven by said shaft and comprising two cones which form the groove of the pulley and are relatively movable on said shaft, cams operatively connected with said cones, respectively, a belt adapted to drive said web roll and driven by said pulley at speeds depending on the relative position of said cones on said shaft, a roller adapted to rest on said material at a point removed from said web roll and to be raised and lowered by said material, and arms supporting said roller and operatively connected with said cams.

6. In a device for feeding the material of a web roll through a press, a belt engaging said web roll, a driving shaft, a grooved pulley driving said belt, mounted on and driven by said shaft and comprising on one side of the groove a cone engaging said belt, angularly fixed but axially movable on said shaft and changing the effective diameter of said pulley when moved upon said shaft, a rocker arm fulcrumed in said press concentric with said shaft, a sleeve and cam axially movably but nonrotatably engaged upon said rocker arm and axially unmovably but rotatively engaging said cone, and means stationary on said press, engaged upon said cam and controlling the axial movement of said cone when said arm is rocked.

JOSEPH PANGERL.