Nov. 8, 1927. 1,648,479

H. HILBERT

EQUALIZING DEVICE FOR REWINDING WEB PAPER

Filed Sept. 3, 1925

Fig. 1.

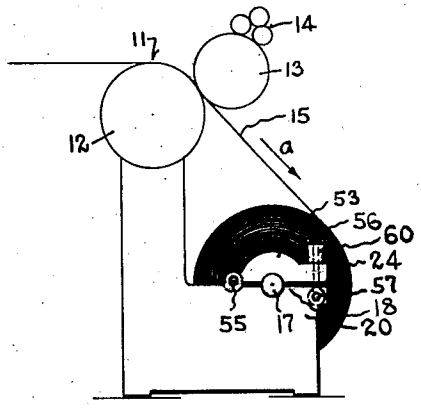



Fig. 5.

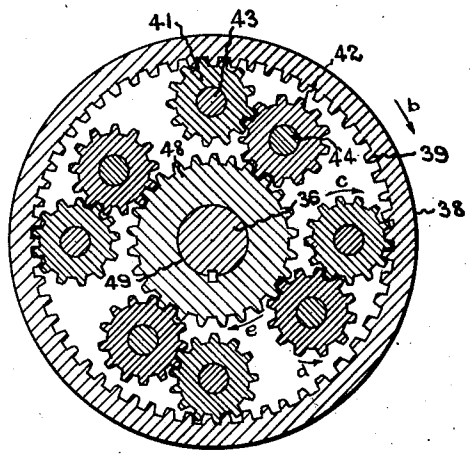



Fig. 2.

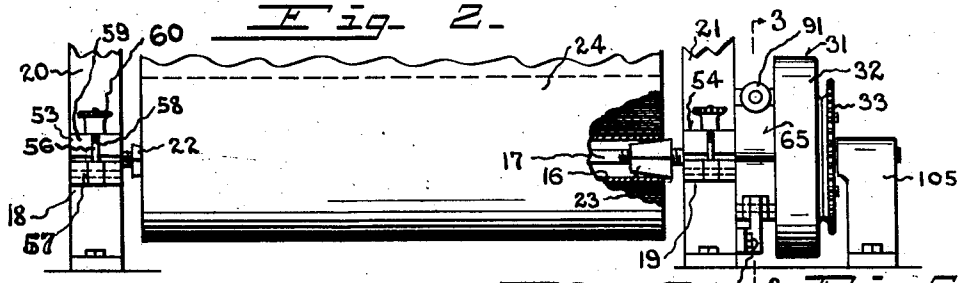



Fig. 3.

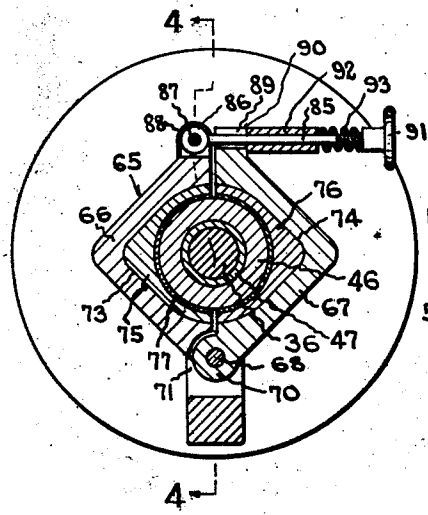



Fig. 4.

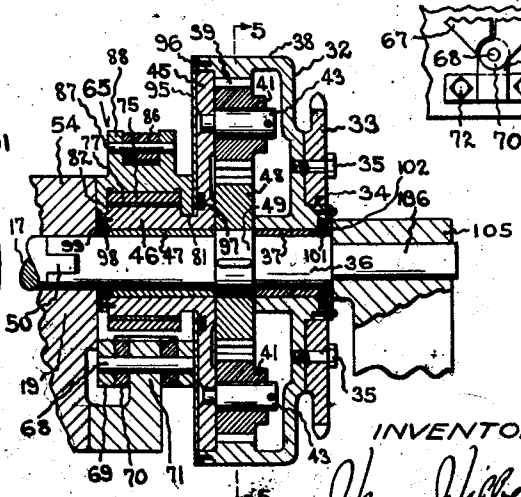



Fig. 6.




INVENTOR.

Henry Hilbert,

by his Attorneys.

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# UNITED STATES PATENT OFFICE.

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## EQUALIZING DEVICE FOR REWINDING WEB PAPER.

Application filed September 3, 1925. Serial No. 54,175.

My invention relates to mechanism for rewinding web paper upon a roll as it is fed from a printing press, waxing machine, coating machine, gluing machine, pasting machine, or the like.

It is the object of my invention to provide novel means whereby to gradually decrease the speed of rotation of the rewind roll as it increases in diameter; further, to provide novel means whereby to maintain the same surface speed on the roll as the diameter of the roll increases; and, further, to provide a novel compensating device to regulate the surface speed of the roll and formed as a unit for attachment to the machine in which the web of paper is being rewound.

The invention will be further readily understood from the following description and claims, and from the drawings, in which latter:

Fig. 1 is a graphical side elevation of a part of a printing press, having my invention applied thereto.

Fig. 2 is a rear view of my improved device applied to a machine, partly broken away.

Fig. 3 is a vertical section of the same, taken on the line 3—3 of Fig. 2.

Fig. 4 is an axial section of the same, taken in the plane of the line 4—4 of Fig. 3, and partly broken away.

Fig. 5 is a vertical section of the same, taken in the plane of the line 5—5 of Fig. 4; and,

Fig. 6 is a detail view, partly broken away, showing an end elevation of the bracket lug for the brake.

I have shown my invention applied to a printing press 11, but it is understood the same can be applied to a variety of machines, as heretofore stated. The printing press comprises an impression cylinder 12 and a plate cylinder 13. Suitable inking mechanism 14 supplies ink to the plate cylinder. The web of paper 15 passes between said cylinders from a suitable source, as a roll of paper, not shown. The web is rewound around a hollow spool 16.

The spool is suitably mounted on a releasable shaft 17, which is mounted in releasable bearings 18, 19, in the side frames 20, 21, of the printing press. The spool is mounted in usual manner upon the shaft, being clamped between split conical bushings 22, 23, adjustable in usual manner on the shaft to hold and to release the spool.

In rewinding the web, as it is received from the printing couples, in a web printing press, or from similar devices in other machines which treat web paper, the web 15 is rewound about the spool, and forms a roll 24, which at the beginning of the operation is small in diameter, gradually increasing in size as the web is wound about the spool. The web is instanced as traveling in the direction of the arrow *a*.

As the diameter of the roll increases, its peripheral speed would also increase, if the shaft 17 were maintained at a given speed, and there would be a continually increasing difference between the normal rate of travel of the web, and the rate of winding about the spool.

In order to compensate for this continually increasing difference in the relative rates of speeds, I provide an equalizing device 31.

This equalizing device consists of a shell 32, which is rotated at a uniform rate of speed, in the direction of the arrow *b*, by a suitable sprocket chain, which receives its motion from any suitable element of the web printing press or other device from which the web is being fed, and is received about a sprocket wheel 33, which is fast with the shell 32, shown as mounted on a hub 34 of the shell and secured by cap screws 35 thereto. The hub is journaled about a shaft 36, a bushing 37 being interposed between the shaft and the hub.

The shell comprises an annular flange 38 on the inner periphery of which an internal gear 39 is located. There are pairs of meshing pinions 41, 42, shown as four in number, which are respectively journaled about studs 43, 44, fixed to a plate 45. The plate 45 is provided with a hub 46, which is journaled about the shaft 36, a bushing 47 being interposed between the hub and the shaft.

The pinions 41 mesh with the internal gear and the pinions 42 mesh with the pinions 41 and also with a gear 48 mounted on an enlargement 49 of the shaft 36 and fixed thereto.

The bushings 37 and 47, and the hubs 34 and 46, are at the respective sides of the enlargement 49 and the external gear 48, said

enlargement and gear forming endwise separating means between said hubs. The shaft 36 has releasable connection with the shaft 17 in the form of a releasable tongue and groove joint 50.

The shaft 17 is journaled at one end in the bearing 18 having a releasable cap 53. The other end of the shaft 17 and the proximate end of the shaft 36, including the releasable connection between the same, are journaled in the bearing 19, having a releasable cap 54. These caps may swing on pivot-pins 55, received through lugs on the cap and bearing. They may be held in place by clamp bolts 56 pivoted to the bearings on pins 57 and received in slots 58 in cheeks 59 on the releasable caps, nuts 60 being threaded to said bolts and bearing upon the cheeks to clamp said caps toward their bearings.

A brake mechanism 65 surrounds the hub 46 and consists of a pair of jaws 66, 67, which are hinged together on a pin 68 in lugs 69, 70, on said respective jaws, and supported in a bracket lug 71, which is attached to the bearing 19 proximate thereto, as by bolts 72.

The jaws 66, 67, are provided with inner sockets 73, 74. Brake shoes 75, 76, which may be of wood, are located in the respective sockets. These brake shoes may be provided with suitable fibre linings 77. They coact with the hub 46 and frictionally engage the same.

The hub 46 has annular grooves 81 at its respective ends in which flanges 82 on the brake jaws are received to position the brake jaws, the brake shoes being located between said flanges.

Means are provided for varying the frictional force applied to the hub 46, shown comprising a rod 85, which has a bearing 86 at one end. A pin 87 is received through said bearing and lugs 88 of the jaw 66, for hingedly connecting the rod. The jaw 67 has a slot 89 in its cheek 90 to receive the rod 85. A hand-wheel 91 is received over the threaded end of the rod. A thimble 92 and a spring 93 are received over the rod between the hand-wheel and the cheek.

By turning the hand-wheel in one direction, frictional force is applied to the hub, and when the hand-wheel is turned in the opposite direction, the frictional force will be relieved.

A plate 95 is secured to the end of the annular flange 38 of the shell, as by screws 96, and extends alongside of the outer face of the plate 45, between the plate 45 and the braking mechanism, for separating the same and for closing the shell.

The shell may form a lubricant-containing housing in which the gears are located. An oil-arresting washer 97 is located in an annular groove in the plate 45, and is retained in place by the plate 95, for retaining the lubricant at the inner end of the shell. An oil-arresting washer 98 is received about the shaft 46 across the inner end of the bushing 47 in an annular groove in the hub 46, and is retained in place by a washer 99 secured to the inner end of the hub 46.

An oil-retaining washer 101 is received about the shaft 36 across the outer end of the bushing 37 in an annular groove in the hub 34, and is held in place by a washer 102 secured to the outer end of the hub 34. The space within the shell may contain a suitable lubricant, and I provide the washers 97, 98 and 101, to retain this lubricant within the shell.

In operation, the outer member, comprising the sprocket wheel 33, the shell 32 and the internal gear 39, is caused to rotate in the direction of the arrow *b*, which causes the pinions 41 to rotate in the direction of the arrow *c*, and the pinions 42 to rotate in the direction of the arrows *d*, thereby rolling the pinions planet-wise about the external gear 48 or causing said external gear to rotate, or causing both such rolling and rotation, dependent on whether the anchoring plate 45 is stationary or permitted to rotate, the speed of rotation of the external gear being dependent on the adjustment of the friction-brake.

The rotation of the external gear is in the direction of the arrow *e*, being the same direction as the direction of rotation of the shell 32.

When the rewinding of the web is begun, the shaft 17 is caused to rotate at a speed sufficient to wind the web as it is received from the machine to form the beginning of the roll. During this stage of operation the speed of the shaft 36 is fastest as the roll is of least diameter, the friction-brake being applied to reduce rotation of the anchor-plate or cause cessation of its rotation.

As the roll increases in diameter, due to the continued winding of paper thereon, which would cause increase in peripheral or surface speed of the roll if its speed of rotation were maintained, the speed of rotation of the roll is diminished to maintain the same peripheral or surface speed thereof, by manipulation of the hand-wheel 91 for relieving frictional resistance in the friction brake, and providing more slippage between the hub 46 and the brake, permitting more ready rotation of the anchor plate with the pinions thereon for proportionately decreasing the speed of rotation of the shafts 17 and 36, and maintaining the peripheral or surface speed of the increasing roll substantially constant.

The weight of the roll also increases with its increasing diameter, requiring greater power to rotate the roll 24, which results in greater slippage in the friction brake, and aids in equalizing the peripheral or surface speed of the roll with a minimum of adjust-

ment of the friction brake in my improved device.

An outer bearing 105 may be provided for the outer end 106 of the shaft 36, which is preferably reduced in said bearing. The hub 34 of the shell is held endwise between the enlargement 49 of the shaft and said outer bearing, and the hub 46 of the anchor plate 45 is held endwise between said enlargement and the bearing 19.

My improved device may be formed as a unit, readily attachable to the machine from which the web is to be rolled.

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

1. In an equalizing device of the character described, the combination of a shaft, an external gear fixed thereto, a shell journaled about said shaft at one side of said external gear, means for rotating said shell, said shell provided with an annular flange having an internal gear on its inner periphery, a plate provided with a hub journaled about said shaft at the other side of said external gear, pairs of meshing pinions rotatable on said plate in said shell, the respective pinions of said pairs of pinions meshing with said internal gear and said external gear respectively, a friction brake about said hub, means for adjusting said friction brake, and a plate secured to said annular flange and extending between said first-named plate and said friction brake to inclose said first-named plate and said gears in said shell, and constructed and arranged whereby to rotate said shell and said external gear in the same direction and to control the speed of rotation of said hub.

2. In an equalizing device for rewinding web paper, the combination of a shaft, an external gear fixed thereto, a plate provided with a hub journaled about said shaft at one side of said external gear, pairs of meshing pinions rotatable on the side of said plate nearest said external gear, a shell provided with a hub journaled about said shaft at the other side of said external gear, means for rotating said shell, said shell formed as an annular housing received about said aforenamed gears and said plate and forming a lubricant casing, said annular housing provided with an internal gear, the respective pinions of said pairs of pinions meshing respectively with said internal gear and said external gear, a friction brake about said first-named hub, means for adjusting said friction brake, a lubricant-retaining plate secured to said annular housing and extending toward said first-named plate, a lubricant-retaining washer between said plates, and a lubricant-retaining washer between said hub of said shell and said shaft, constructed and arranged to form a lubricant-retaining unit in which said shell and said external gear rotate in the same direction and whereby to control the speed of rotation of said hub.

3. In an equalizing device of the character described, the combination of a shaft, an external gear fixed thereto, a shell journaled about said shaft at one side of said external gear, means for rotating said shell, said shell provided with an annular flange having an internal gear on its inner periphery, a plate provided with a hub journaled about said shaft at the other side the said external gear, pinions in said shell rotatable on said plate meshing with said internal gear and said external gear respectively, friction braking means for said hub whereby to control the speed of rotation of said hub, means for adjusting said friction braking means, a plate secured to said annular flange and extending between said first-named plate and said hub to inclose said first-named plate and said gears in said shell, and lubricant retaining means between said plates.

In testimony whereof, I have hereunto signed my name.

HENRY HILBERT.