

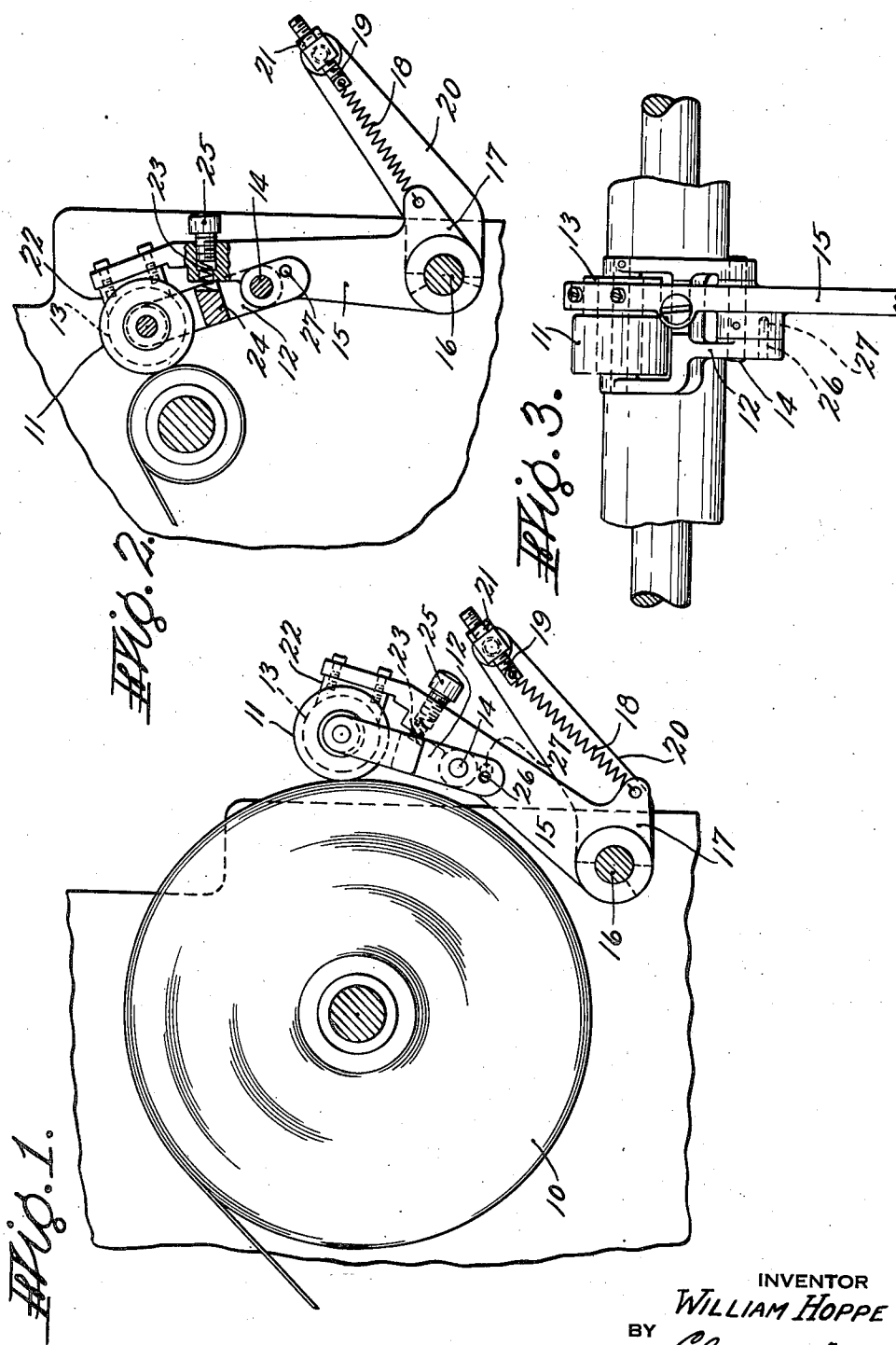
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PAPER REEL BRAKE

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PAPER REEL BRAKE

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This invention relates to braking devices for rolls of paper, such as are used in wrapping machines and the like to prevent overrunning of the roll as the latter is rotated by the movement of the web into the machine. In many machines of this character the web is intermittently advanced at a predetermined distance. One problem to be met is that of bringing the web to a stop within that distance regardless of the fact that the angular movement of the roll in feeding out a given length of web increases as the diameter of the roll decreases and the inertia of the roll becomes less as the roll becomes smaller, and at the same time maintaining a substantially uniform tension on the web in the feeding operation. A similar problem of maintaining a uniform tension is present when the web is drawn from the roll continuously.

One object of my invention is to provide a braking device which will, as compared with prior art devices, more nearly approach the ideal of applying a decelerating braking torque which will at all times bring the roll to rest after each feeding operation without overrunning of the roll and without an excessive degree of tension on the web.

A further object is to secure the above desirable result with a simplified structure and one which is easily adjustable for rolls of different lengths and weight and for different wrapping conditions.

The invention will now be described with relation to the accompanying drawing, in which

Fig. 1 is a side elevation of a paper reel provided with the improved brake;

Fig. 2 is a detail thereof, partly in section and with the parts in a position corresponding to a nearly exhausted reel; and

Fig. 3 is a side elevation of a portion of the mechanism.

It may be shown that the torque required to bring a paper reel to rest with a given overrun (measured by the length of web unwound) is proportional to the cube of the radius of the reel. It is therefore desirable to have force exerted by the brake mechanism also dependent on the cube of the radius so that the effect will remain constant as the reel is unwound. None of the ordinary brake mechanism even approximate this result, the usual clamp on the reel arbor having a constant torque and the common strap type having a torque directly proportional to the radius. In the present device use is made of a friction roll pressed by

a brake shoe against the surface of the web reel by a force which varies approximately with the radius in three separate ways, so that the decelerating torque is to a close approximation proportional to the cube of the radius.

For this purpose the reel 10 is provided with a friction roll 11 having a surface of rubber or other material which will exert a grip on the reeled web. This roll is journaled in a yoke 12 and is fitted with a brake drum 13. The yoke 12 is pivoted at 14 to a bell crank 15 swinging on a pivot shaft 16. The short arm 17 of the bell crank is coupled by a tension spring 18 with an adjusting screw 19 carried on a stationary arm 20 and held in adjusted position by a lock nut 21. The yoke 12 normally swings freely upon its pivot, so that as the spring 18 forces the long arm of the bell crank towards the reel 10 the brake drum 13 will be pressed against a friction block 22 fixed to the long arm of bell crank 15. A spring 23 compressed between an abutment 24 on the yoke and an adjusting screw 25 on the bell crank serves to regulate the braking pressure, particularly in regulating the action of the device for reels of differing lengths. A pin 26 fits into an oversized hole 27 in the bell crank to limit the oscillatory motion of the yoke.

As previously stated, it is desirable to have the decelerating torque exerted by the brake at least approximately proportional to the cube of the radius of the reel. The frictional drag exerted by the roll 11 on the reel 10 is proportional to the pressure with which the drum and shoe are pressed together, and this exerts a braking torque proportional to the force times the radius of the reel. The force itself varies in two ways, each approximately proportional to the radius of the reel. In the first place the spring 18 will be stretched more as the radius of the reel increases, and although the relationship is not strictly linear it may be considered so to an approximation sufficiently close for practical purposes. The force exerted by a spring is known to be proportional to its stretched length, and in the present case this force produces a torque on the pivot of the bell crank through a moment arm which becomes greater as the radius of the reel is increased. Again, this change in the moment arm is not exactly linearly proportional to the radius of the reel, but it is sufficiently close so as to serve for all practical purposes. The torque on the bell crank pivot is thus doubly proportional to the reel radius; or, in other words, proportional to the square of this radius. It acts upon

the brake shoe through the constant long arm of the bell crank, causing the pressure on the brake shoe to be again proportional to the square of the reel radius. As stated above, the braking torque on the reel axis is equal to this force multiplied by the reel radius; and this may be restated as being proportional to the cube of the radius.

If the tension on the web is to be varied, or if reels of differing lengths are to be used, the screw 19 may be turned to change the initial degree of stretching of the spring 18, leaving all the other proportionality factors unchanged, or a fine adjustment may be readily secured by turning the screw 25.

What I claim is:

1. A brake for a reel of web material including a member frictionally engaging the surface of the material on the reel to exert a drag upon the rotation of the reel, a support carrying the member for movement toward and from the axis of the reel of material as the reel diameter varies, and a spring connected at one end to said support and at its other end to a relatively fixed point, the points of connection of the spring being so positioned that the extension of the spring decreases directly and progressively with a decrease in the size of the reel and simultaneously the component of spring tension causing move-

ment of the support towards the reel decreases relative to the total force exerted by the spring.

2. A web reel brake comprising a bell crank, a friction block carried by one arm of the bell crank, a friction roll movably mounted on the bell crank to be pressed thereby against the reel and having a portion engageable with the block, a support, and a spring stretched between the support and the second arm of the bell crank, the second arm of the bell crank being positioned on that side of the line joining the bell crank pivot and the support-carried end of the spring remote from the first arm of the bell crank.

3. A web reel brake comprising a bell crank, a friction block carried by one arm of the bell crank, a friction roll movably mounted on the bell crank to be pressed thereby against the reel and having a portion engageable with the block, a support, a spring stretched between the support and the second arm of the bell crank, the second arm of the bell crank being positioned on that side of the line joining the bell crank pivot and the support-carried end of the spring remote from the first arm of the bell crank, and an adjustable spring compressible between the first arm of the bell crank and the friction roll to vary the pressure of the friction roll against the block.

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