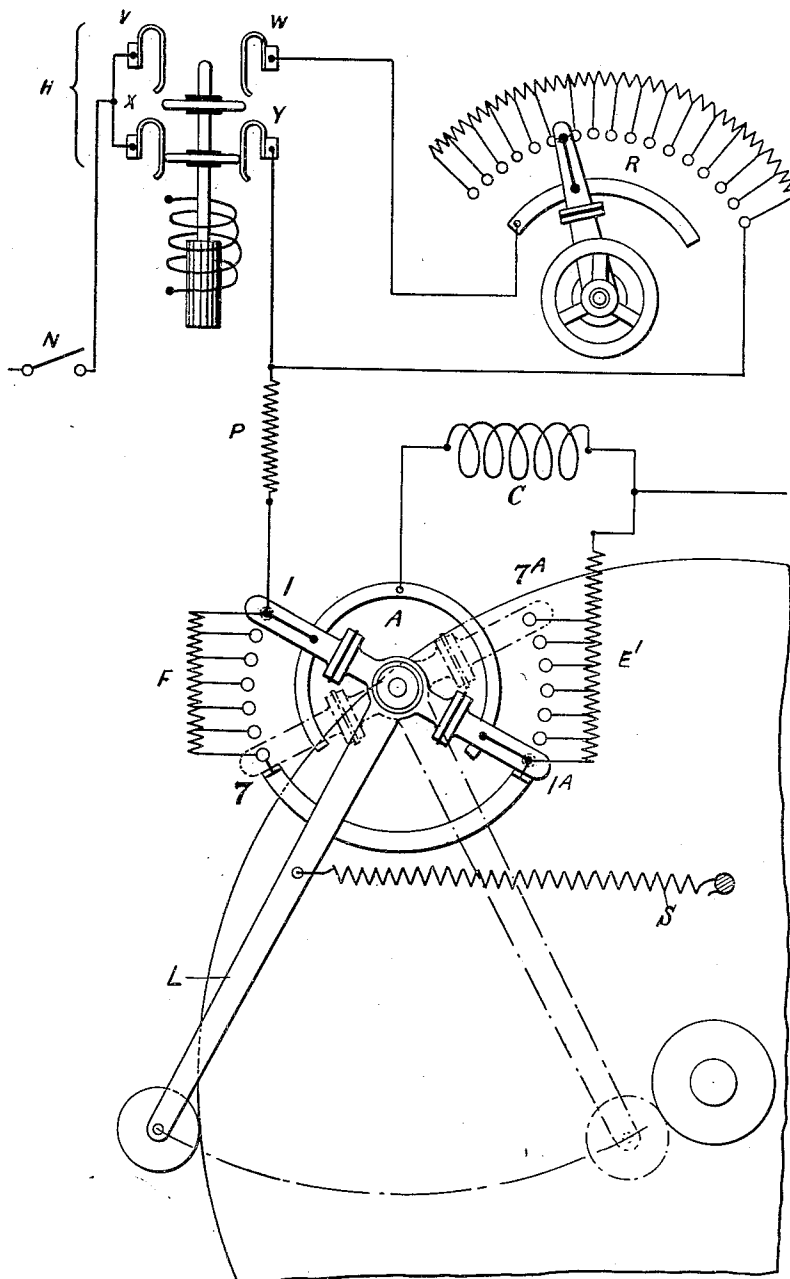


H. V. JAMES.  
CONTROLLING MEANS FOR ELECTROMAGNETIC FEED REEL BRAKES.  
APPLICATION FILED AUG. 13, 1918.

1,353,401.

Patented Sept. 21, 1920.



INVENTOR,  
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# UNITED STATES PATENT OFFICE.

HENRY VINCENT JAMES, OF RADLETT, ENGLAND.

CONTROLLING MEANS FOR ELECTROMAGNETIC FEED-REEL BRAKES.

1,353,401.

Specification of Letters Patent.

Patented Sept. 21, 1920.

Application filed August 13, 1918. Serial No. 249,606.

*To all whom it may concern:*

Be it known that I, HENRY VINCENT JAMES, a citizen of the United Kingdom of Great Britain and Ireland, and resident of "Cintra," Aldenham avenue, Radlett, in the county of Hertfordshire, England, have invented certain new and useful Improvements in Controlling Means for Electromagnetic Feed-Reel Brakes, of which the following is a specification such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to means for automatically varying the energy value of the energizing coil of an electromagnet whereby its operative value is varied in a like manner.

The object of the invention is to automatically regulate the power of an electromagnetic device so that the latter is able to operate a mechanism in an increasing or decreasing manner as desired.

Referring to a rotary web fed printing press I will explain that the paper web is gripped between the printing and impression cylinders and the reel thus unwound as they are rotated. The web feed so obtained is required under tension varying according to paper and press conditions as to the same printing unit from time to time, and relatively as to various units where same are used collectively as one printing machine. In such latter combination one unit so used may require a heavy brake and web tension, whereas another unit forming part of the same combined press will require practically none, but the brake necessary to overcome the maximum momentum of all reels of the same given diameter and bring same to rest will be approximately equal, and this invention is designed to meet the requirements of these conditions.

The form of feed reel brake usually employed at the present day is of the double shoe type clamped around a brake member by a screw and hand wheel, which theoretically should have the shoe pressure continuously reduced as the feed reel diameter—but this is impracticable, with the result that brakes are frequently allowed to become excessive as the reel is unwound and web fractures occur with consequent waste of time and material. Further, as it is also impracticable to manually adjust such brakes to prevent reel overrun as the press is quickly brought

to rest, a heavier brake than is needed for web feed tension purposes is frequently carried so as to limit the possibility of reel overrun as far as practicable, resulting in considerable waste of power.

The object of my invention may be described as a means whereby the determined effective electrical energy applied (fed) to the energizing coil of an electro-magnetic feed reel brake will be automatically varied in approximately like percentage value, by operation of the means between given limits corresponding to maximum and minimum feed reel diameters whether the energy be that necessary to effect maximum brake or minimum,—whereby the applied brake energy will be at all times uniformly reduced in proportion to the reel diameter and consequent leverage operating through same against the brake applied at constant radius, for the purpose of automatically obtaining a constant web feed tension during normal running conditions whether such tension be light or heavy to suit the requirements—and further as a means whereby the effective electrical energy applied to the brake energizing coil as the press is brought to rest will be automatically proportionate to the feed reel diameter and be capable of overcoming its maximum momentum to prevent reel overrun, but be of such value only as will insure this without risk of web fracture by excessive brake entirely irrespectively of the brake employed for web feed tension purpose, by which means it will be possible to employ any minimum required brake for web feed tension purposes without any risk of reel overrun.

My invention will be ascertained in and by the following statement:—

By means of suitable electric switch gear I electrically connect and variably feed the energizing coil of an electromagnetic feed reel brake in parallel potentiometer method across various sections of an ohmic resistance and thereby feed variable effective electro-motive-force to the energizing coil for the purpose of a variable brake in relation to the feed reel diameter. This operation by itself would vary the ohmic value of the parallel circuit formed by the ohmic resistance and coil in parallel with it, decreasing the ohmic value of the combination as the effective electro-motive-force applied to the coil is decreased, and reversely. Therefore by means of mechanically inter-

locked switchgear simultaneously operated I electrically connect and cut into series with the parallel combination a variable ohmic resistance of such ohmic value as will maintain a controlling combination formed by the ohmic resistances and brake energizing coil of approximately constant ohmic value. Thereby I obtain like percentage variation of the effective electro-motive-force applied to the brake energizing coil by operation of the switchgear through given limits, say between those corresponding to maximum and minimum feed reel diameters, regardless of the value of the electro-motive-force applied to the combination and likewise the energy applied to the brake energizing coil, either as an initial quantity or that later determined as to increase or decrease at any reel diameter while same is being unwound. I employ further variable ohmic resistances by which the effective electro-motive-force applied to the complete automatic coil controlling means shall be determined, for the purpose of a web feed tension and to prevent reel overrun, the value of the one being entirely independent of that of the other, whereby a positively effective brake proportionate to the reel diameter will be developed to prevent overrun, though the brake immediately previously employed for web feed tension may have been maximum or minimum—and automatic switch means for the operation of the circuits including the foregoing variable ohmic resistances and brake energizing coil. I control the said switch means by a mechanical device such as the known form of lever resting on the feed reel and mechanically connected to the switch for the purpose of its operation in relation to the feed reel diameter.

I will now describe my invention with reference to the drawing representing one method of putting same into operation.

C, is the energizing coil of an electro-magnetic feed reel brake.

A, is a two section switch shown in the position corresponding to maximum feed reel diameter in relation to the ohmic resistance elements, E and E', which latter are each of such ohmic value and so spaced and electrically connected, that with the switch bridging any steps from 1 and 1<sup>A</sup> to 7 and 7<sup>A</sup>, the ohmic value of the circuit including resistance E in series with resistance E' and coil C in parallel, will remain approximately constant. With the switch bridging contacts 1, 1<sup>A</sup>, (before the function of control is commenced), the series resistance E is short circuited and not yet cut into effective circuit.

L, is a lever with a wheel at one end bearing against the surface of the feed reel at all diameters by means of spring S, and mechanically coupled to the controlling arm of switch A but insulated therefrom.

R, is a hand operated rheostat by which the effective electro-motive-force in the circuit of the combination of resistance E when effective in series with resistance E' in parallel with coil C is determined, and likewise the electrical energy applied to the brake.

H, is an electro-magnetically operated switch controlling the electricity supply of the circuit through either of two paths—one through contacts V, W, and alternatively through X, Y.

N, is a limit switch by which the electricity supply circuit is cut off with the plant at rest.

The operating coil of switch H is energized simultaneously with the main driving means of the printing press and a circuit to the brake magnet coil C established through contacts V, W,—rheostat R,—resistance P,—switch A and such of the resistances E, E' as may be cut into circuit thereby when operated by lever L, according to the feed reel diameter.

The energy applied to the coil C is first determined by adjustment of rheostat R, in accordance with the brake required for web feed tension purposes, after which the effective energy so determined is automatically reduced by switch A operated by lever L proportionately as the reel diameter diminishes—and entirely regardless of the value of the energy as determined by rheostat R, the effective values being previously determined to give the required varying brake torque.

As the main driving means of the printing press is brought to rest, the operating coil of switch H is deenergized and the switch falling by gravity, a circuit is established through contacts X, Y, and that through V, W, opened, thus completing a circuit to coil C, through resistance P,—switch A, and such of the resistances E, E', as may be cut in thereby, and energy fed to the coil and a brake established in proportion to the reel diameter as first determined by resistance P, and regulated by switch A, operated by lever L, regardless of the degree of energy previously employed for web feed tension purposes.

The ohmic value of the series-parallel circuit including resistances E, E' and coil C, being at all times approximately constant whether the switch A be in the position bridging contacts 1, 1<sup>A</sup>, corresponding to full reel diameter or any intermediate position to 7, 7<sup>A</sup>, corresponding to minimum reel diameter, the effective energy of the circuit determined by rheostat R, will thereby be varied at all times in like percentage value by maximum movement of switch A, between minimum and maximum reel positions whether the applied energy determined by rheostat R be minimum or maximum, and

likewise the effective energy fed to the brake through contacts X, Y, will be varied in relation to the feed reel diameter to prevent reel overrun and a brake be established as previously and permanently determined by the ohmic value of resistance P.

What I claim and desire to secure by Letters Patent is:—

1. Means for the automatic regulation of a controlling electro-magnet or solenoid in varying degree comprising in combination variable ohmic resistance elements,—a controlling electro-magnet coil electrically connected in parallel with a part of same, and electric switch means by which the coil may be variably connected across various sections of the resistance elements, and means for operating the switch means to simultaneously vary the ohmic values of the resistances to maintain a constant ohmic value of the control combination formed by the ohmic resistance and controlling coil, whereby the same percentage variation of the electro-motive-force applied to the coil will occur within given limits of operation regardless of the value of the electro-motive-force applied to the complete combination.

2. Means for the automatic regulation of a controlling electro-magnet or solenoid in varying degree, comprising, in combination, a pair of variable ohmic resistance elements adapted to be connected in series with such parallel circuit, and automatic means associated with said pair of resistance elements for varying their relative ohmic values in such a manner that with any given constant value of electro-motive force applied to the series-parallel circuit, the relative ohmic values of the pair of resistances may be altered, the one increased as the other is decreased, and reversely, without altering the total ohmic value of the series-parallel circuit, but thereby changing the value of the balance of electro-motive force across each resistance of the pair and likewise the effective electro-motive force applied to the controlling coil.

3. Means for the automatic regulation of a controlling electro-magnet in varying degree comprising in combination a controlling electro-magnetic coil, a variable ohmic resistance, a part of which is electrically connected in parallel therewith, and means for varying the ohmic value of the resistance whereby the series-parallel combination of the ohmic resistance and coil will be maintained of approximately constant total ohmic value.

4. Means for the automatic regulation of a controlling electro-magnet in varying degree comprising in combination a controlling electro-magnetic coil, a variable ohmic resistance connected in parallel therewith, and means whereby the coil is variably connected in parallel with the resistance and simultaneously the ohmic value of the resistance is regulated to maintain a complete combination of constant ohmic value, whereby the effective electro-motive-force applied to the coil will be varied in like percentage within given limits of operation regardless of the value of the electro-motive-force applied to the complete control combination.

5. Means for the automatic regulation of a controlling electro-magnet in varying degree comprising in combination a variable ohmic resistance, a controlling electro-magnetic coil electrically connected and variably fed in parallel with same—a variable ohmic resistance adapted to be electrically coupled in series with the foregoing parallel circuit forming a series-parallel control combination, and electric switch operating means whereby the effective electro-motive-force applied to the controlling coil will be varied but the ohmic value of the control combination be maintained constant.

In witness whereof I have hereunto set my hand in presence of two witnesses.

HENRY VINCENT JAMES.

Witnesses:

LOUISE ISABEL WILSON,  
CHRISTINA WINIFRED CLARKE.