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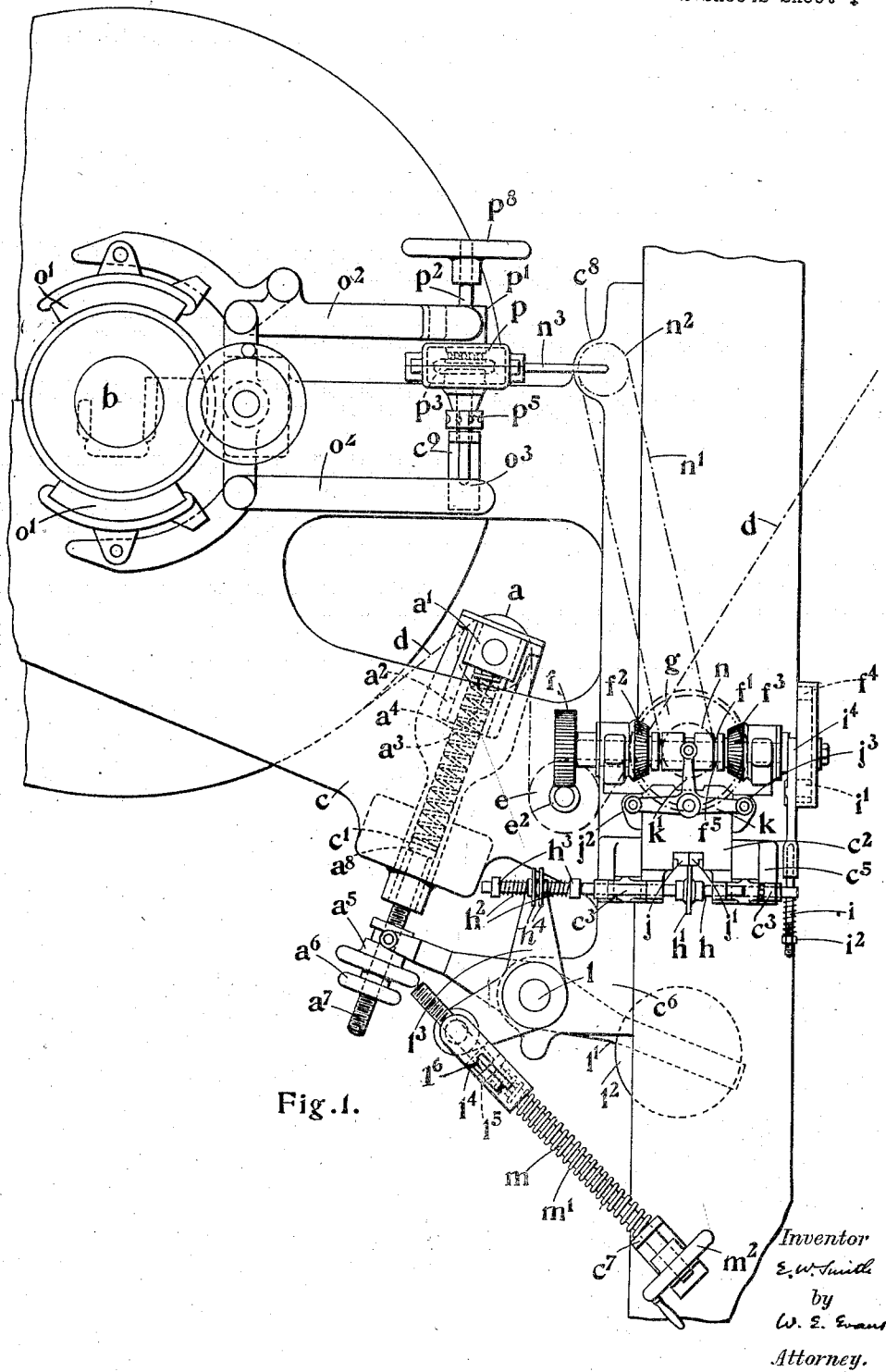
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PRINTING MACHINE

Filed Oct. 23, 1926

2 Sheets-Sheet 1



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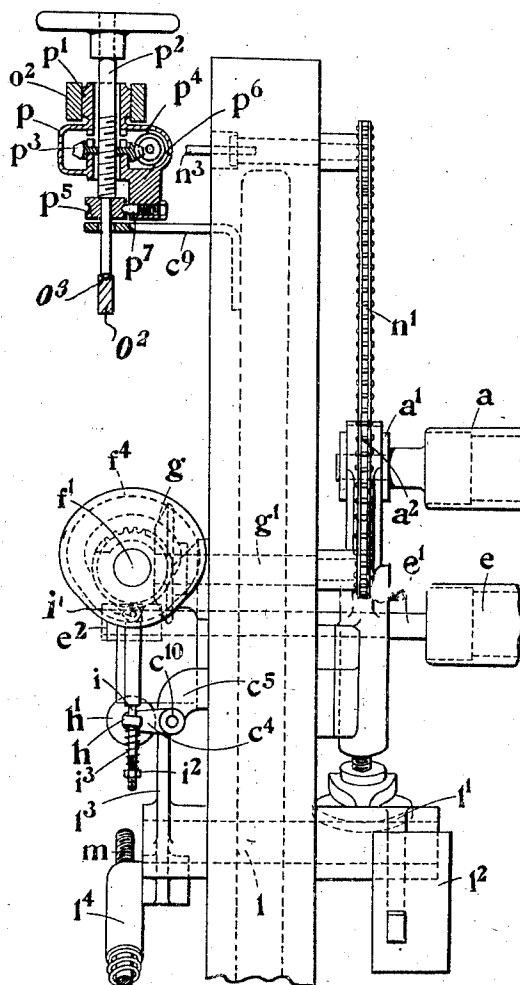


Fig.2.

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PRINTING MACHINE.

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This invention relates to rotary printing machines adapted to print upon a web and provided with a brake applied to the reel spindle for the purpose of adjusting the tension of the web.

The invention has for its object to provide automatically operating mechanism for regulating and maintaining the tension of the web during the operation of the printing machine.

According to the invention the web is led round a floating roller and the pressure upon the roller resulting from the tension of the web is balanced through mechanism which is adapted to be automatically actuated on variation of the tension of the web to bring into operation mechanical means for varying the pressure with which the brake upon the web is applied.

According to the invention, moreover, means are provided for the adjustment of the force by which the floating roller is supported against the tension of the web whereby the tension of the web may be varied as required.

According to the invention, moreover, the mechanical means for controlling the pressure with which the brake upon the reel spindle is applied are also adapted for hand operation independently of the automatic control mechanism.

According to the invention, moreover, the mechanical means for controlling the pressure with which the brake upon the reel spindle is applied comprise a continuously rotated control spindle and elements adapted to be alternatively driven according to the selection determined by the automatic control mechanism. The control spindle may conveniently be rotated from a roller around which the web is carried.

The invention further comprises the features hereinafter described.

The invention is hereinafter described with reference to the accompanying diagrammatic drawing, in which

Figure 1 is a part side elevation illustrating mechanism according to the invention, and

Figure 2 is a part cross-section corresponding to Figure 1.

In carrying the invention into effect, according to one particular construction, and with reference to the accompanying diagrammatic drawing, a floating roller *a* is

provided in a position in proximity to the reel spindle *b* and is supported in bearing blocks *a*¹ mounted in slideways *a*² formed in or mounted upon the machine frame *c*, each of the bearing blocks *a*¹ being provided with a spigot *a*³ disposed at right angles to the axis of the roller *a* and extending downwardly in the direction of the slideway *a*². A helical spring *a*⁴ is located at one end upon the spigot *a*³ and abuts at the other end against a head *a*⁵ provided upon the upper end of a screw-threaded spindle *a*⁷ which extends through a boss in the machine frame *c*, which head *a*⁵ is accommodated within a recess *c*¹ in the boss. By such means the roller *a* is resiliently supported upon the springs *a*⁴.

A second roller *e* around which the web *d* is led, is mounted in fixed bearings in the machine frame *c*, and the spindle *e*¹ of this roller *e* is at one end extended outwardly to receive a worm *e*² at a position outside the machine frame *c*. The worm *e*² engages a worm wheel *f* mounted upon a control spindle *f*¹ disposed at right angles to the axis of the roller *e* and also carried in fixed bearings upon the machine frame *c*, the said spindle *f*¹ having loosely mounted upon it two bevel wheels *f*², *f*³ adapted to engage a third bevel wheel *g* mounted upon a shaft *g*¹ whose axis is parallel to the axis of the roller *e*. The control spindle *f*¹ also carries a cam *f*⁴ of a shape adapted to impart a reciprocating motion in a direction at right angles to the axis of the control spindle *f*¹. A friction or dog clutch *f*⁵ is slidably mounted upon and is adapted to be continuously rotated by the control spindle *f*¹ between the bevel wheels *f*², *f*³ which are provided to engage therewith. In a position parallel with the control spindle *f*¹ a rod *h* is slidably mounted in bearings *c*³ carried at the outer ends of arms which are fixed upon a spindle *c*¹⁰ carried in bearings *c*⁵ which may be provided as auxiliary brackets advantageously formed integrally with the casing *c*², hereinafter referred to, containing the selective mechanism. The rod *h* is thus capable of an oscillatory movement about the spindle *c*¹⁰ and of endwise movement in the bearings *c*³. Upon one end of the spindle *c*¹⁰ an arm *c*⁴ is fixed, which arm *c*⁴ has at its outer extremity, a swivel fitting disposed substantially co-axially with the rod *h* and having a hole or slot through which a rod *i* passes.

The rod i is screw-threaded at its upper end to engage with the lower end of a forked lever i^1 which engages a boss upon the cam f^4 and carries a roller i^2 or stud for engagement with the cam f^4 . The rod i is extended downwardly beyond the end of the arm c^4 and the extension of the rod i is fitted with a helical spring i^3 bearing at one end against the swivel fitting at the end of the arm c^4 and at the other end upon a nut i^2 or head on the rod i in order that the cam f^4 may partially rotate the spindle c^{10} and thus lift the rod h , through the rod i and the arm c^4 , with a resilient force, the strength of which is adjustable, and at the same time to permit the upward movement of the rod h to be arrested at a determined point under the normal conditions of operation, as hereinafter described. In a position intermediate the rod h and the control spindle f^1 , there is provided on the machine frame c a casing c^2 containing two slides j, j^1 disposed side by side and extending at the lower end of the casing c^2 to a position adjacent the rod h which is fitted with a disc h^1 or contact member which, in the normal position of the rod h , is disposed in line with the adjacent edges of the slides j, j^1 . Each slide j, j^1 is provided with a lug j^2, j^3 respectively extending outwardly at the corresponding side of the casing c^2 , and upon this casing is pivoted a three-armed lever k of which the middle arm k^1 is provided to engage the clutch f^5 on the control spindle f^1 , and the other arms of which are pivoted by a slot or pin connection to the respective lugs j^2, j^3 of the slide blocks j, j^1 .

The relative movement or travel of the slides j, j^1 in the vertical direction necessary to throw the lever k over sufficiently to move the clutch f^5 into engagement with one or other of the bevel wheels f^2, f^3 is less than the oscillatory movement of the rod h , so that in the lowermost position of the rod h the disc h^1 is at a level below whichever of the slides j, j^1 happens to be in the lower position and may thus lift such slide upon rising. In the mid or normal position of the rod h the upward movement of the rod is arrested when the disc h^1 engages the two slides, with consequent compression of the spring i^3 as the arm c^4 is also unable to follow the full travel of the rod i .

In a position adjacent to the oscillatory rod h , there is provided a shaft l extending across the machine parallel to the axis of the roller e and carried in bearings e^6 upon the machine frame c , which shaft l has fixed upon it two levers l^1 each carrying at one end a weight l^2 , the position of which may be adjustable, and at the other end engages with a nut a^5 screwed upon the screw-threaded spindle a^7 , so that by adjustment of the nut a^5 the disposition of the weighted levers l^1 with reference to the bearing blocks a^1

may be varied. Locking nuts a^6 are also advantageously provided upon the spindles a^7 . The shaft l carrying the weighted levers l^1 is also provided at one end with a bell crank lever l^3 having at its upper end a pin or other part projecting at right angles thereto and adapted to engage between a pair of discs h^4 , or the equivalent, such as a collar having an annular groove, mounted upon an extension of the oscillatory rod h in such manner that movement of the bell crank lever l^3 may cause endwise movement of the rod h . The other arm of the lever carries a swivelling fitting l^4 through which passes a screwed rod m loosely carried in a bearing e^7 upon the machine frame c and fitted with a helical spring m^1 , bearing at the one end against the bearing e^7 and at the other end, against a fixed collar l^5 upon the rod m . The swivelling fitting is advantageously fitted with an indicator plate l^6 , disposed adjacent a longitudinal slot in the swivelling fitting, the indicator plate being provided with graduations or marks indicating the normal position of the collar l^5 which can be seen through the slot, and thus the extent of the adjustment of the collar l^5 with respect to the swivelling fitting, and consequently of the spring m^1 may be readily observed. The free end of the rod m is fitted with a hand wheel m^2 by which the rod m may be rotated. The discs h^4 or the equivalent, by which the connection of the rod h with the lever l^3 is effected, may be slidably mounted upon the extension of the rod h , and helical springs h^2 may be fitted on the extension at each side of the discs h^4 or the equivalent between adjustable collars or nuts h^3 upon the extension. By such means a resilient connection between the lever l^3 and the rod h may be secured.

The shaft g^1 carrying the third bevel wheel g is fitted with a chain wheel n for engagement with a chain n^1 by which a second chain wheel n^2 is driven. The said chain wheel n^2 is mounted upon a shaft carried in a bearing e^8 upon the machine frame c and transmitting the drive by way of a flexible shaft n^3 to the brake adjusting mechanism. The brake mechanism is of the usual type comprising a drum or grooved brake wheel o with which engage shoes o^1 carried by pivotally mounted arms o^2 .

In the application of the present invention, the upper pivoted arm o^2 of the brake is at its free end bifurcated or forked for the reception of a boss p^1 upon a worm wheel casing p which is fitted around the brake adjusting spindle p^2 . The boss p^1 may be pivoted or otherwise loosely connected to the brake arm o^2 . Within the casing p is a worm wheel p^3 concentric with the adjusting spindle p^2 . The bore of the worm wheel p^3 is threaded to engage a thread upon the adjusting spindle p^2 , and the worm wheel p^3 is

rotatably mounted within the casing p advantageously in ball bearings. The casing p is further fitted with bearing for a worm p^4 adapted to engage the worm wheel p^3 and receiving rotation from the flexible shaft n^3 . The lower end of the adjusting spindle p^2 passes through a slot in a bracket c^9 fitted upon the machine frame c , and engages in a footstep bearing o^3 provided on the lower brake arm o^2 . The bracket c^9 has for its object to prevent the brake adjusting mechanism carried by the pivoted brake arms o^2 from falling, when the brake shoes o^1 are thrown open to receive a new reel spindle, the collar p^5 provided upon the brake adjusting spindle p^2 engaging with the bracket p^7 for this purpose. The collar p^5 is provided to be slidable and non-rotatable with reference to the adjusting spindle p^2 and has recesses in its periphery, and the casing is provided with a lug p^6 serving to carry a locking pin p^7 radially movable with respect to the said collar p^5 and adapted to engage with one or other of the recesses therein. The said pin p^7 is advantageously mounted under spring action tending to maintain it in engagement with the collar. The spring is of sufficient strength to prevent rotation of the spindle p^2 by the worm wheel p^3 , but is capable of being readily overcome by hand actuation of the hand wheel p^8 .

The operation of the mechanism hereinbefore described is as follows:—

The reel of web having been placed upon the reel spindle b , the web d is carried first around the floating roller a and then around the roller e provided with the worm e^2 , and the brake spindle p^2 is operated by means of the hand wheel p^8 to secure approximately the pressure of the brakes that is desirable. In the operation of the printing machine and the forward feed of the web, the roller e provided with the worm e^2 is rotated, and thus effects rotation of the control spindle f^1 , whereby the cam f^4 effects an oscillatory movement of the rod h , so that the disc h^1 or contact member carried thereby is caused to contact with the slides j , j^1 . If the tension of the web d is that for which the mechanism has been adjusted, no action of the brake control mechanism takes place. Should, however, the tension of the web be greater than the opposing pressure of the springs a^4 of the bearing blocks a^1 , the weighted lever l^1 , and the springs m^1 of the screw-threaded rods m , the bearing blocks a^1 are depressed and thus the weighted levers l^1 turn the shaft l upon which they are mounted, with the result that the rod h is moved longitudinally. Thus, the disc h^1 or contact member upon the rod h now contacts with one only of the slides j , j^1 with the result that the clutch lever k is operated and causes engagement of the clutch f^5 with the corresponding bevel pinion f^2 or f^3 .

The control spindle f^1 thus drives the shaft g^1 in the corresponding direction and through the chain gear n , n^1 , n^2 and the worm p^4 , the worm wheel p^3 upon the brake adjusting spindle p^2 is rotated to effect the corresponding adjustment of the brake shoes o^1 . In the event that the tension of the web d is insufficient, the elements of the mechanism become so disposed that the rod h is given a movement in the opposite direction, and thus the second bevel wheel f^3 or f^2 upon the control spindle f^1 is engaged by the clutch f^5 , and rotation of the worm wheel p^3 on the brake adjusting spindle p^2 is effected in the opposite direction, to increase the pressure of the brake shoes o^1 . If it becomes necessary to increase the tension of the web d while the machine is running, the screw-threaded rod m is rotated so that the collar l^2 is moved in the direction away from the swivelling fitting l^4 and the spring m^1 thus exerts a greater pressure upon the latter, whereby the weighted levers l^1 are caused to exert increased pressure upon the bearing blocks a^1 . Should the tension of the web d require to be decreased during the running of the machine, the screw-threaded rod m is rotated in the opposite direction.

It will be understood that the invention is not limited to the details of construction hereinbefore described. Thus the disposition of the several parts of the mechanism may be varied, for example, the control spindle and the mechanism co-operating therewith may be disposed in a position in proximity to, and may receive the drive from, the reel spindle.

I claim:—

1. In a device for regulating and maintaining substantially constant the tension of webs in printing presses, the combination of a web reel brake, adjusting means for said brake, and automatic control means for said brake adjusting means comprising, a continuously operated drive shaft, differential gear elements operatively connected to said brake adjusting means, a shiftable clutch for operatively connecting said differential gear elements with said drive shaft, spring pressed means mounted to move in response to variations in the tension of the web, and a clutch shifting selector mechanism positively and continuously actuated with said drive shaft and operatively connected to said spring pressed means to shift said selector mechanism to operate said clutch in response to variations in web tension.

2. In a device for regulating and maintaining substantially constant the tension of webs in printing presses, the combination of a web reel brake, adjusting means for said brake, and automatic control means for said brake adjusting means comprising, dif-

ferential gear elements operatively connected to said brake adjusting means, a positively driven reversing clutch mounted to engage with said differential gear elements, a pivoted control lever for said clutch, a pair of independently movable actuators for said lever, a power driven selector mounted to normally engage both of said actuators to hold said clutch in an inoperative position, and means mounted to move in response to variations in tension of the web operatively connected to said selector to shift said selector to operatively engage one of said actuators, whereby the clutch is moved to engage said reversible gear elements to adjust said web reel brake in response to variations in web tension.

3. In a device for regulating and maintaining substantially constant the tension of webs in printing presses, the combination of a web reel brake, adjusting means for said brake, an automatic control means for said brake adjusting means comprising, a continuously rotated drive shaft, a reversible gear element mounted with its axis at right angles to said drive shaft and operatively connected to said brake adjusting means, two gear elements freely rotatable on said drive shaft and engaging with said reversible gear element, a clutch rotatable with said drive shaft and movable thereon to engage either of said freely rotatable gear elements, a pivoted control lever for said clutch, a pair of independently movable actuators for said lever, a selector operatively connected to said drive shaft and mounted to normally engage both of said actuators to hold said clutch in an inoperative position, and means mounted to move in response to variations in tension of the web, adapted to shift said selector to operatively engage one of said actuators, whereby the clutch is moved to engage one of said freely rotatable gear elements to effect adjustment of said web reel brake in response to variations in web tension.

4. In a device for regulating and maintaining substantially constant the tension of webs in printing presses, the combination of a web reel brake, adjusting means for said brake, an automatic control means for said brake adjusting means comprising, a continuously rotated drive shaft, a reversible gear element mounted with its axis at right

angles to said drive shaft and operatively connected to said brake adjusting means, two gear elements freely rotatable on said drive shaft and engaging with said reversible gear element, a clutch rotatable with said drive shaft and movable thereon to engage either of said freely rotatable gear elements, a pivoted control lever for said clutch, a pair of independently movable actuators for said lever, a selector mounted to normally engage both of said actuators to hold said clutch in an inoperative position, a cam rotatable with said drive shaft and operatively connected with said selector to oscillate said selector relative to said actuators, and adjustable spring pressed means mounted to move in response to variations in tension of the web operatively connected to said selector to shift said selector to operatively engage one of said actuators, whereby the clutch is moved to engage one of said freely rotatable gear elements to effect adjustment of said web reel brake in response to variations in web tension.

5. In a device for regulating and maintaining substantially constant the tension of webs in printing presses, the combination of a web reel brake comprising a pair of pivoted levers carrying brake shoes adjacent one end of said levers, adjusting means for said brake interposed between the other ends of said pivoted levers and comprising, a gear casing in definite relation to one of said levers, a nut journaled within said gear casing, a spindle in threaded engagement with said nut passing through said casing and operatively engaging the other of said levers, and automatic control means for said brake adjusting means comprising, a continuously operated drive shaft, differential gear elements operatively connected to rotate said nut, a shifting clutch for operatively connecting said differential gear elements with said drive shaft, spring pressed means mounted to move in response to variations in the tension of the web, and a clutch shifting selector mechanism positively and continuously actuated with said drive shaft and operatively connected to said spring pressed means to shift said selector mechanism to operate said clutch in response to variations in web tension.

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