G. W. BEADLE.

RE-SLIP ROLL AND RE-SLIPPING MACHINE.

APPLICATION FILED FEB. 14, 1919.

1,306,094.

Patented June 10, 1919.

3 SHEETS—SHEET 1.

Fig. I

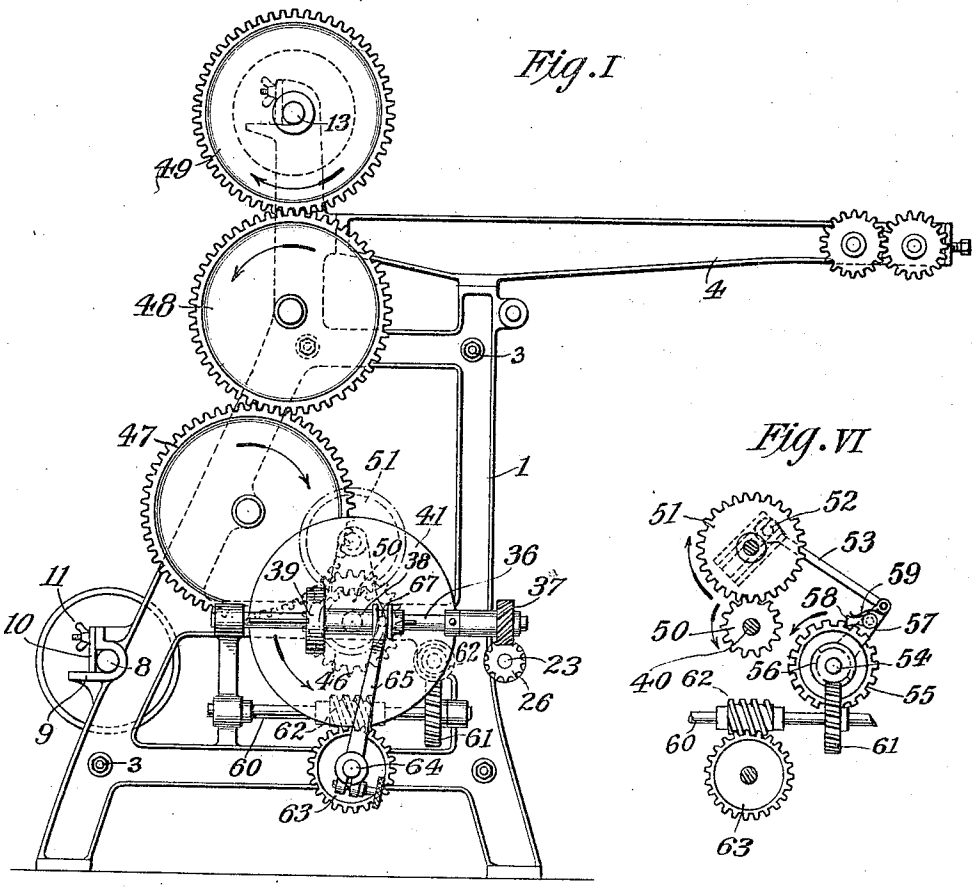


Fig. VI

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3 SHEETS—SHEET 2.

Fig. II

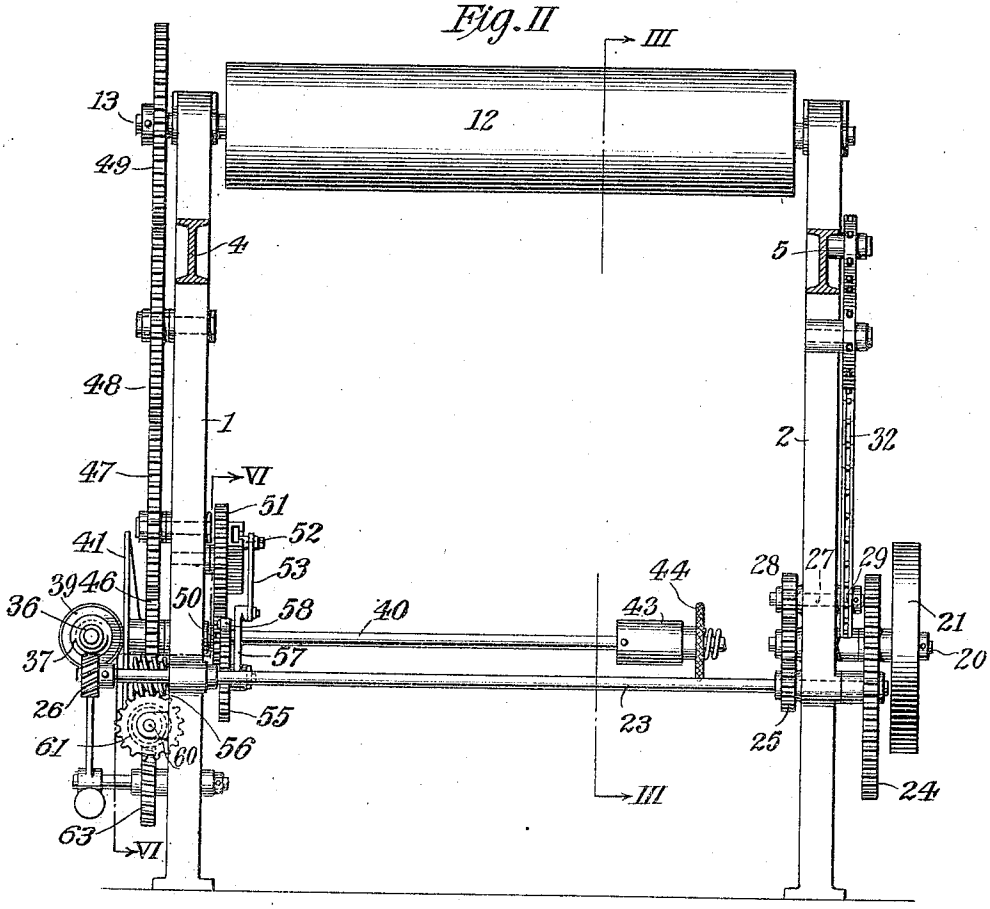
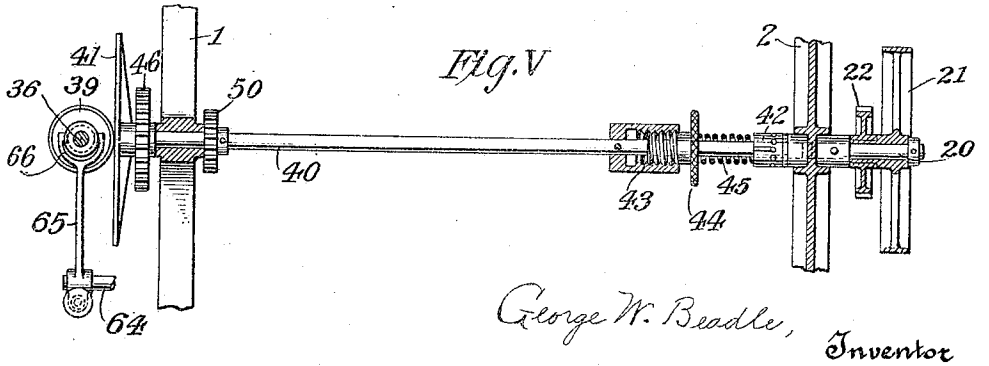


Fig. V



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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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3 SHEETS—SHEET 3.

Fig. III

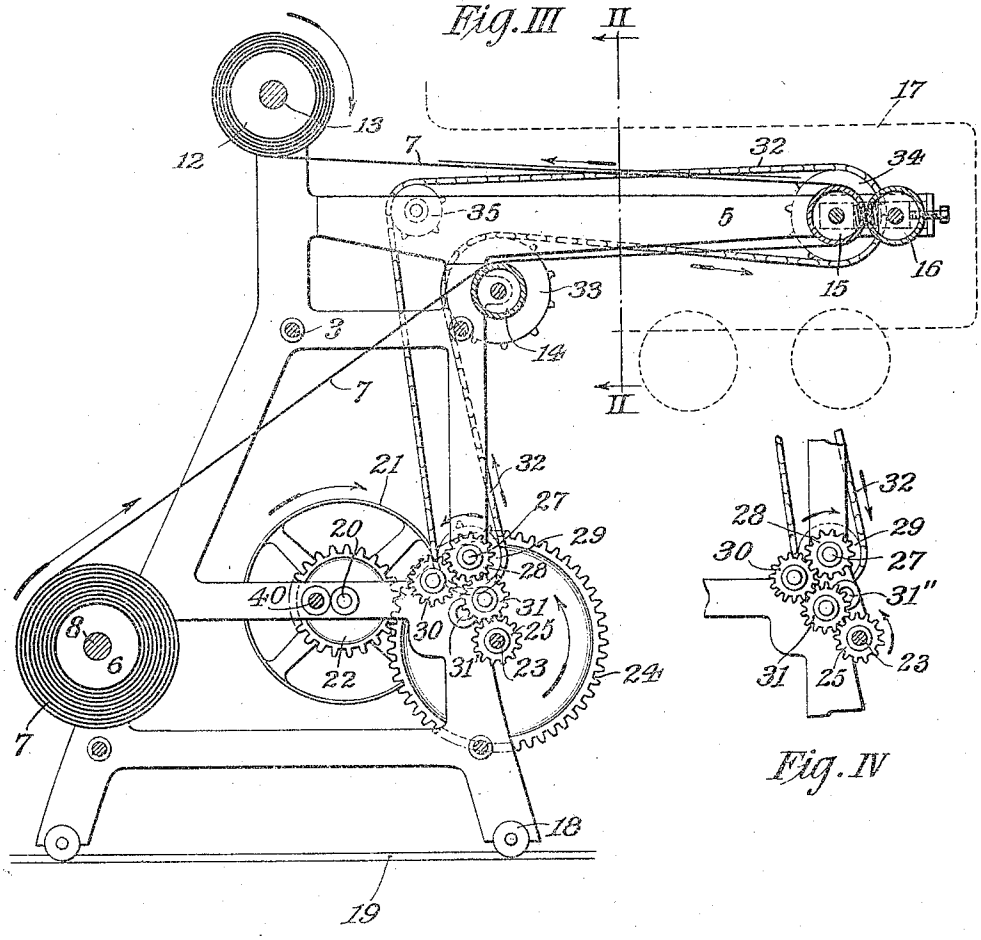


Fig. IV

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UNITED STATES PATENT OFFICE.

GEORGE W. BEADLE, OF STAMFORD, CONNECTICUT.

RE-SLIP ROLL AND RE-SLIPPING MACHINE.

1,306,094. Specification of Letters Patent. **Patented June 10, 1919.**

Application filed February 14, 1919. Serial No. 277,011.

To all whom it may concern:

Be it known that I, GEORGE W. BEADLE, of Shippan Point, Stamford, Conn., (whose post-office address is Shippan Point, Stamford, Connecticut,) have invented a new and useful Improvement in Re-Slip Rolls and Re-Slipping Machines, which invention is fully set forth in the following specification.

This invention is intended primarily for "re-slipping" the sheets printed in colors, but is applicable to other similar service. In high-class printing, particularly in color-printing, the paper is usually of high quality and glazed with very smooth and highly-finished surface; and, immediately after the ink or color has just be applied, it is liable to become smeared by contact with the under surface of the next succeeding sheet. Therefore it has been the practice to place over each sheet, as soon as ejected from the press, a sheet of comparatively rough texture and surface, such as ordinary plain newsprint-paper so called, which will not slip along the smooth surface of the printed sheet; and the next printed sheet is dropped on top of that, and then a second plain sheet, and so on,—resulting in a pile of alternating printed sheets and plain sheets. This procedure is known as "re-slipping"; and the plain (and comparatively-rough) sheets thus interposed, as "re-slips".

Heretofore it has been the practice to do this re-slipping by hand; and, no matter how high the speed at which the printing-press could be run, its actual speed in practical operation (and its actual output) has to be limited to the speed at which the re-slip operators can handle the re-slips. Color-printing presses, for example, can be run at a speed to produce, say, about eighteen-hundred color-printed sheets per hour; but, because of the limitation imposed by the requirements of re-slipping by hand, the practical output is not more than about four hundred re-slipped color-prints per hour.

Various automatic re-slipping machines, or "offset presses" so-called, have been proposed. But, so far as the present inventor is aware, they are very cumbersome and expensive, and are not dependable; and they have met with no general and substantial success, because of their prohibitive cost or for other reasons. The object of the present invention is to carry out the necessary re-slipping automatically, especially for color-printing, and as rapidly as the printing-press can produce its successive prints, and to produce a roll of re-slipped prints which can be readily handled and subsequently unwound to deliver the prints.

The invention comprises primarily an automatic re-slipping machine, for producing such roll in the first instance, and for thereafter unwinding it and delivering the prints. The invention further comprises certain features and details hereinafter set forth and claimed.

The invention will be best understood by reference to the following description and the accompanying drawings, which set forth one preferred embodiment of the new re-slipping machine, adapted for use with any convenient or desired printing-press, for producing the new re-slip roll. In said drawings:

Figure I is an end elevation of one preferred embodiment of the new re-slipping machine, viewed from the left of Fig. II;

Fig. II is a side elevation, partly in vertical section through the line II—II of Fig. III, and viewed from the right thereof;

Fig. III is a transverse vertical section, through the line III of Fig. II, viewed from the left thereof, and indicating by dotted lines the adjacent portions of the printing-press;

Fig. IV is a detail of certain sprocket-driving gears shown in Fig. III, but in another position of adjustment;

Fig. V shows the friction-driven shaft and adjacent parts, as in Fig. II, but in greater detail; and

Fig. VI is a detail of the speed-reducing train, viewed (from the left) through the sectional-line VI—VI in Fig. II.

The framework of the new machine consists of the two upright skeleton standards 1 and 2, secured together by suitable cross-rods omitted from Fig. II for the sake of clearness, but indicated in Fig. III as 3, 3, etc. From the upper portions of these standards extend the horizontal parallel arms 4 and 5. Upon the lower part of these standards is detachably mounted the supply-drum 6, having rolled thereon a web 7, as of news-print-paper. The spindle 8 of this drum journals freely in open journal-bearings 9,

and may be secured in place, as by a latch 10 and thumb-screw 11. Upon the top of the framework is mounted the positively-rotated winding-drum 12, whose spindle 13 is in like manner detachably journaled upon the two standards. From said supply-drum 6, the web 7 is drawn upward and over a guide-roller 14 (journaled at about the inner ends of said arms 4 and 5), and thence outward along said arms, to pass between two feed-rolls 15 and 16 (the latter preferably adjustable, and spring-pressed, toward the former), and thence back, in substantially horizontal plane, to the under side of said winding-drum 12. Suitable operating-connections, of course, are provided.

It will be noted that the projecting parallel arms 4 and 5 present said substantially-horizontal portion of the web within the space beneath the delivery portion 17 of the printing-press (see dotted lines in Fig. III), without interference between the press and the re-slipping machine. If desired, the standards may be provided with casters 18, to run upon rails or tracks 19, as indicated in Fig. III, so that the re-slipping machine can be readily withdrawn from the press 17, when not in use.

The web 7 is propelled and wound-up on winding-drum 12 at a predetermined speed, proportionate to the speed of delivery of the prints from the press 17; and, as the prints are successively dropped from the press onto said horizontal portion of the traveling web, they are carried along and wound-up between the successive convolutions of the web as it rolls up on the winding-drum. According to the present state of the art, a color-printing press can deliver at the rate of say about eighteen-hundred color-prints per hour. The web 7 should, therefore, be of sufficient length to carry the (color-print) output for say an hour, half-hour, or the like, or any predetermined number of prints. When the predetermined or desired output of prints (whether color-printed or not) has been wound up, then the re-slip roll thus produced—comprising a succession of prints wound-up between the successive convolutions of a web of newsprint-paper or the like—is allowed to remain until the prints have become thoroughly dry and set (say three or four hours, in case of color-printing). Or said supply-drum and said winding-drum with its roll can be removed from the machine, and a second pair of drums with the web carried thereby will be then journaled in their place, to wind up a further output of prints, while the first output is drying. After the first-named output of prints has thus become thoroughly set, the drum and roll can be again mounted upon the machine; and the web 7 unwound, by driving the machine in the opposite direction by means of suitable reversing-devices, and the successive prints can be collected or be again delivered to the press for receiving imprints of another color.

Any suitable mechanism could be employed for propelling the web and winding-up the re-slip roll. But, preferably, not only is the winding-drum driven by power, but so also are the feed-rolls 15 and 16, and the guide-roller 14 as well. The employment of a positive drive for the feed-rolls (and of a positive drive for the guide-roll or rolls), and the location of the same to function in intermediate position between the two drums, very greatly reduce any tendency to tear the web. And also preferably the winding-drum is initially driven (through an interposed friction-drive) at a potential speed slightly-higher than that of the feed-rolls, in order to hold flat and taut the horizontal portion of the web (between the feed-rolls and the winding-drum); and also preferably the speed of rotation of said winding-drum is very gradually and imperceptibly decreased, at a predetermined rate, to maintain uniform surface-speed of the web by compensating for the uniformly-increasing diameter of the re-slip roll being wound thereon.

More specifically (referring particularly to Fig. II), 20 is a stub-axle extending from the outer side of the lower portion of right-hand standard 2. Upon this axle journals the driving-pulley 21, which receives power, as by belting, from any suitable source. Fast on the hub of said pulley is a driving-gear 22. A shaft 23, hereinafter called the power-shaft, is journaled through the two standards, and carries fast on its (right-hand) end a driven-gear 24, in mesh with said driving-gear 22. Also fast on said power-shaft 23, are a driving-gear 25 (adjacent the inner face of said standard 2, for actuating a sprocket-train), and a helical gear 26 (at the other end of said power-shaft, for actuating a friction-drive), as below set forth. Somewhat above said power-shaft is a stub-shaft 27, journaled through said standard 2, and carrying on its inner end a driven-gear 28, and on its outer end a sprocket-wheel 29. An idler-gear 30, in mesh with said driven gear 28, is journaled on a stub-axle mounted upon the inner face of said standard. A transmission-gear 31 is journaled upon a stub-axle which can be mounted in either of two sockets 31′ and 31″ (in the inner face of said standard), and in either position will be in mesh with said driving-gear 25 (on the power-shaft); in the normal position (of Fig. III), this transmission-gear 31 meshes with said driven-gear 28 (on the sprocket-shaft); while, in the other position (of Fig. IV), it is in mesh with said idler 30, thereby rotating said sprocket-shaft and gear in the reverse direction. An endless sprocket-chain 32 passes

around the above-named sprocket-wheel 29 (see Fig. III), thence upward over a sprocket-wheel 33 (fast upon the journal of the guide-roller 14 aforesaid), thence out and around a sprocket-wheel 34 (fast on the journal of the inner feed-roll 15, aforesaid), and thence back and around an idle sprocket-wheel 35, and back to the beginning. As shown in Fig. I, upon one end of the journals of the two feed-rolls, 15 and 16, are fast two gears in mesh with one another.

Said sprocket-chain thus drives not only the two feed-rolls at the outer end of the horizontal arms, but likewise propels at the same speed said guide-roller 14. For driving the sprocket-system in the opposite direction, in order to unwind the re-slip roll, said transmission-gear 31 and its stub-axle are removed from the position indicated in Fig. III, and said axle is inserted into the socket 31′, to occupy the position indicated in Fig. IV.

To drive the winding-drum 12, it is preferable to employ a train which will decrease its speed of rotation commensurately with the constantly-increasing diameter of the re-slip roll being wound thereon; and it is also preferable to employ, in this train, a friction-drive (to prevent tearing the web 7, between the feed-rolls and the drum). In the present embodiment, this train comprises a driving friction-wheel and a driven friction-disk. More specifically, a transverse shaft 36 (see Figs. I and V) is journaled, at right angles to the above-named power-shaft 23, along the outer face of the left-hand standard 1; and upon the right-hand end of said transverse shaft is fast a driven helical gear 37, in mesh with and driven by the helical gear 26 (heretofore mentioned as fast upon said power-shaft). A sleeve 38, carrying the driving-wheel 39 (a friction-wheel), is splined upon this transverse shaft, so as to rotate therewith but be movable lengthwise thereof. A shaft 40 is journaled through the left-hand standard 1, and carries at its outer end the friction-disk 41, in position to be acted upon and rotated by the friction-wheel 39 aforesaid. (This disk-carrying shaft 40 carries also two gears, one for transmitting its rotation to the winding drum, and the other for actuating a speed-reduction train, both as hereinafter described.) Preferably this disk-carrying shaft has an adjustable spring-pressed thrust-bearing against the other standard 2 (see Fig. V). More specifically, said shaft 40 carries a fixed collar 42, a fixed internally-threaded socket 43, a screw-threaded collar 44 (adjustably engaging said socket), and a helical expansion-spring 45 interposed between the two collars aforesaid. By means of such arrangement, the friction-disk carried on said shaft is held, under constant pressure, in engagement with the friction-wheel 39 which rotates it; and the degree of this pressure can be adjusted at will, by rotating said screw-threaded collar 44. Fast on said disk-carrying shaft 40, and adjacent the outer face of said standard 1, is the driving-gear 46, already mentioned as transmitting motion to the winding-drum. 47 and 48 are two transmission-gears, journaled on stub-axles (on the outer face of standard 1), in mesh with each other, and also in mesh respectively with said driving-gear 46 and with a gear 49, which latter is detachably secured upon the spindle 13 of the winding-drum.

Preferably, as stated, the winding-drum 12 is to be rotated at a constantly-decreasing speed. The train for accomplishing this decrease is driven from the gear 50 (already mentioned as fast on said disk-carrying shaft 40). See Figs. VI and III. Above said gear 50, and in mesh with it, is a driven-gear 51, journaled upon a stub-axle supported on the inner side of the standard 1. This driven-gear carries the radially-adjustable crank-pin 52. Upon this crank-pin is pivoted the pitman 53, for actuating (step by step) the following pawl-and-ratchet arrangement. A stub-shaft 54 is journaled through the standard 1, adjacent the parts just named; and carries at its inner end the radial ratchet 55, and upon its other end the driving-worm 56. Also upon said shaft 54 is pivoted an arm or lever 57, whose outer end is pivoted to the outer end of the pitman 53 aforesaid. This arm carries a pawl 58, in operative relation to said ratchet 55, and also a pawl-controlling spring 59. A second transverse-shaft 60 (see Figs. I and VI) is journaled upon the outer face of standard 1, parallel to and below the above-named transverse shaft 36. This second transverse shaft carries at its right end a driven worm-gear 61, in mesh with worm 56 aforesaid; and also carries a driving-worm 62, in mesh with a worm-gear 63, which latter is journaled upon a rock-shaft 64 that is mounted upon said standard. A radial arm 65 is adjustably clamped upon said rock-shaft, and its forked outer end engages a groove 67 in the sleeve 38 (that carries the friction-wheel 39 aforesaid).

From the foregoing, and referring to Fig. VI (and Fig. I), it will be seen that the rotation of said disk-carrying shaft 40 (in either direction) actuates the pitman and the pawl-and-ratchet device; that the latter gradually rotates the (lower) transverse shaft (the worm-shaft 60); that said shaft very gradually shifts the rock-shaft and its radial arm 65; that said arm forces the friction-wheel 39 toward the outer periphery of the friction-disk, at an almost imperceptible rate; that this radial shifting correspondingly reduces the speed of rotation of the driven disk aforesaid; and that,

by such or similar reducing-train, the speed of rotation of the re-slip roll is being gradually reduced, at the desired imperceptible rate which corresponds to the equally-imperceptible increase of its diameter (caused by the successive windings of the web and interposed prints).

It will be understood that all the various parts are so dimensioned as to decrease the speed of rotation of the re-slip roll at a predetermined rate corresponding to the rate of diameter-increase (due to the combined thickness of web and printed paper added at each rotation; and that, by adjusting the crank-pin away from (or toward) the center of the gear 51 which carries it, each throw of the pitman 53 will traverse a greater (or less) number of ratchet-teeth on wheel 55, and thereby will entail a more rapid (or less rapid) decrease in the speed of rotation of the winding-drum. It will also be understood that the parts are so proportioned that, before said speed-varying radial arm 65 can have propelled the friction-wheel 39 beyond the verge of the friction-disk, a suitable length of web will have wound up the predetermined or desired number of prints. When the predetermined quantity of prints has been wound up into the re-slip roll, and the friction-wheel shall have arrived at the margin of the friction-disk (or, if necessary, at any other time), then said radial arm 65 is unclamped from the rock-shaft 63 which carries it, and moved back to its initial position and reclamped there; and thereafter the operation of the machine can continue as before.

For unwinding the roll, in order to deliver the color-prints, three adjustments are requisite. The stub-axle which carries the transmission-gear 31 is removed from the position indicated in Fig. III, and inserted into the adjacent socket 31′ (to occupy the sprocket-reversing position shown by Fig. IV); gear 50 is detached from the spindle of the winding-drum 12, and made fast upon the spindle of the supply-drum 6, in mesh with the transmission-gear 47; and the crank-pin 52 is shifted toward the center of the gear which carries it (to shorten the throw of its pitman). As the result, the feed-rolls 15—16 (and guide-roller 14) are driven in reverse direction, and so is the supply-drum 6 (now a re-winding drum); and they draw the web 7 from the winding-drum 12 (which now rotates freely). The prints can be gathered up as they successively appear along the horizontal portion of said web. The above-mentioned adjustment of the pitman-crank is made, because the diameter of the roll (of web only), now winding upon drum 6, is not increasing at the same rate as when web and prints also were being wound upon drum 12.

The invention has thus been described fully in all its features and details. But it is obvious that it can be embodied in other forms, parts transposed or inverted, parts modified, and some features and parts used to the exclusion of others, without in any case departing from the spirit of the invention.

The invention having thus been fully described, what is claimed is:

1. A re-slipping machine, comprising a frame-work, a supply-drum and a winding-drum journaled thereon, a continuous web of re-slip material whose ends are connected respectively to said drums, two horizontal arms projecting freely from said frame-work, and web-feeding devices located at the end of said arms whereby an unobstructed horizontal length of said web is presented along substantially the plane of said arms.

2. A re-slipping machine, comprising a frame-work, a supply-drum and a winding-drum journaled thereon, a continuous web of re-slip material passing from one drum to the other, two horizontal arms projecting freely from said framework, web-feeding devices located at the end of said arms, and reversible means for positively driving said feeding-devices.

3. A re-slipping machine comprising a frame-work, a supply-drum and a winding-drum journaled thereon, a continuous web of re-slip material passing from the former to the latter drum, and positively-driven web-feeding devices located intermediate said drums.

4. The combination, with the structure set forth by claim 3, of means for positively rotating the winding-drum.

5. The combination, with the structure set forth by claim 3, of slip-drive means for causing the winding-drum to be rotated at a speed potentially-higher than that of the intermediate feeding-devices.

6. The combination, with the structure set forth by claim 3, of means for causing the speed of rotation of the winding-drum to decrease at a predetermined rate.

7. The combination, with the structure set forth by claim 3, of means for causing the speed of rotation of the winding-drum to decrease at a predetermined rate, and means for adjusting at will such rate of decrease.

8. The combination, with the structure set forth by claim 3, of means for at will driving the intermediate feeding-devices in reverse direction and driving the former supply-drum positively as a winding-drum while leaving the former winding-drum to rotate freely as a supply drum.

9. The combination, with the structure set forth by claim 3, of means for at will driving the intermediate feeding-devices in

reverse direction while leaving the former winding-drum free to rotate as a supply-drum and simultaneously driving the former supply-drum with a gradually-decreasing rate which is predetermined yet variable at will.

10. A re-slipping machine, comprising a frame-work, a supply-drum and a winding-drum journaled thereon with a continuous web of re-slip material extending from the former to the latter drum, positively-driven web-feeding means functioning intermediate said drums, and a positive winding-drum train which comprises a friction-disk and a friction-wheel engaging the flat face of said disk to rotate the same.

11. The combination, with the structure set forth by claim 10, of means for varying the pressure between the two friction-members there mentioned.

12. The combination, with the structure set forth by claim 10, of means for shifting the friction-wheel radially of the friction-disk.

13. The combination, with the structure set forth by claim 10, of means for at will driving the intermediate feeding-means in reverse direction and driving the former supply-drum positively as now a winding-drum, while leaving the former winding-drum to rotate freely.

In testimony whereof I have signed this specification.

GEORGE W. BEADLE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."