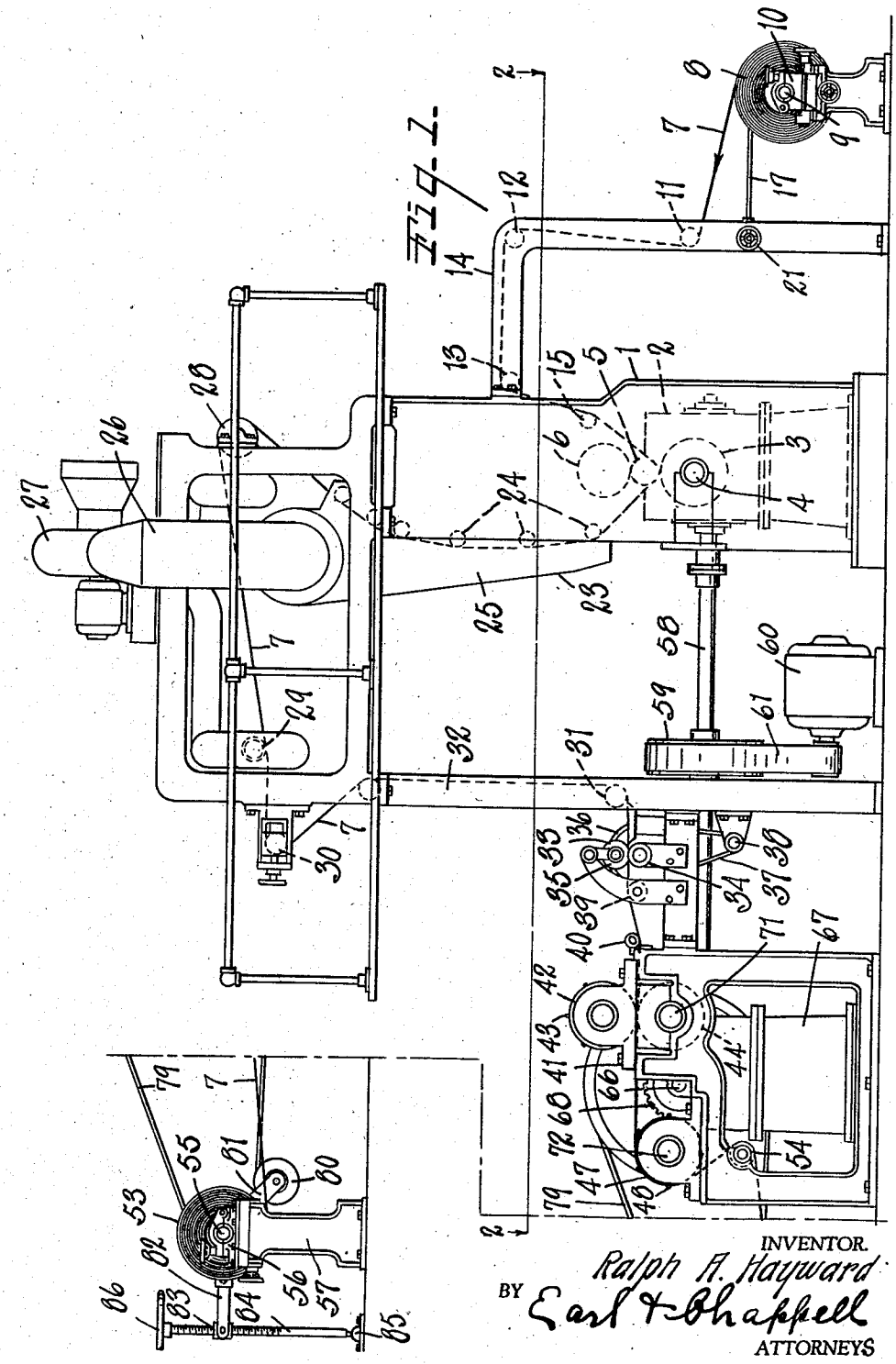
March 21, 1939. R. A. HAYWARD 2,151,028

PRINTING AND PUNCHING REGISTERING APPARATUS

Filed Sept. 27, 1937 3 Sheets-Sheet 1



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PRINTING AND PUNCHING REGISTERING APPARATUS

Filed Sept. 27, 1937 3 Sheets-Sheet 2

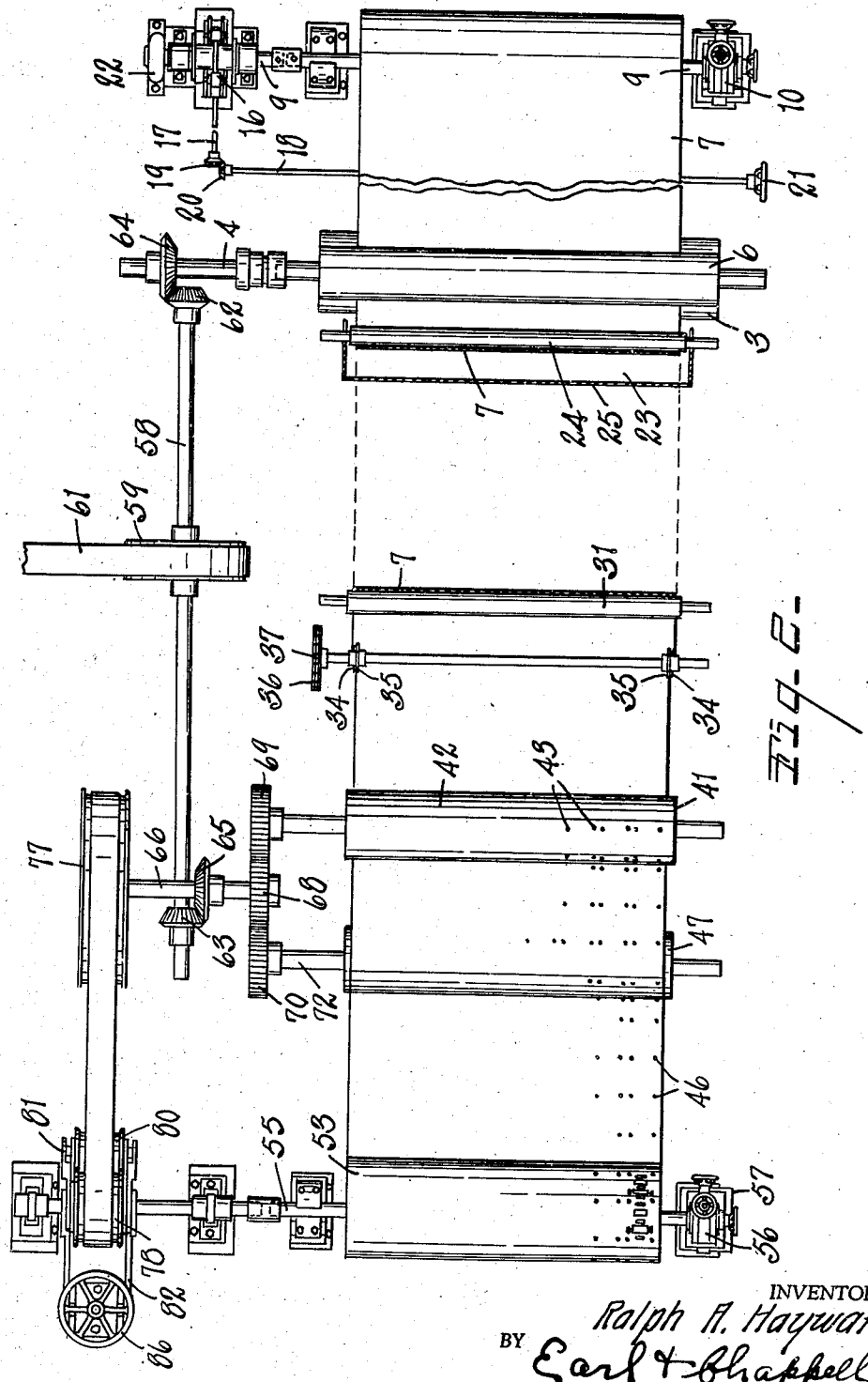


FIG. 2.

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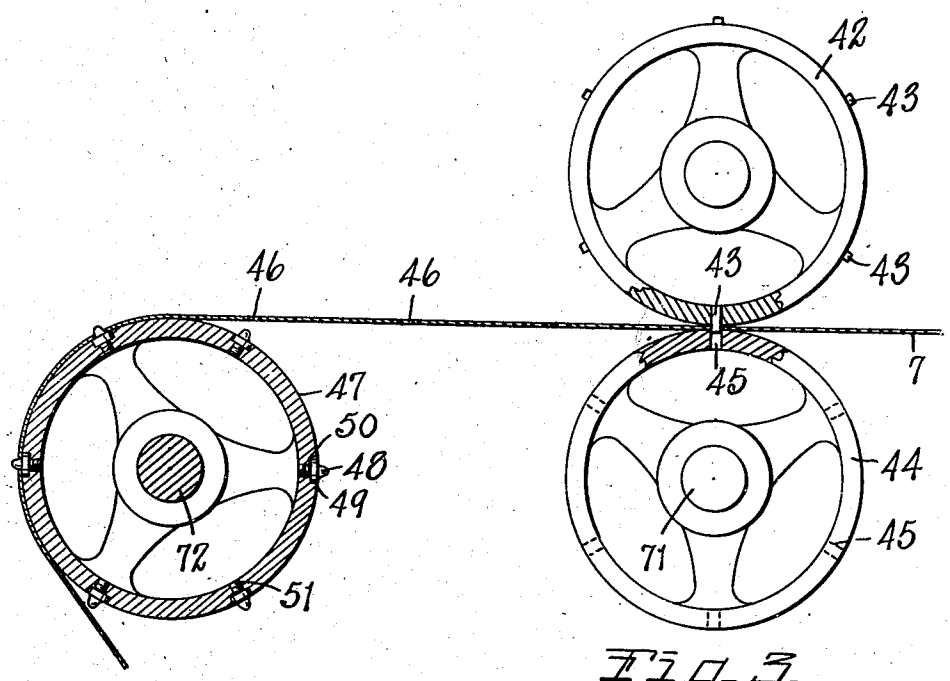


Fig. 3.

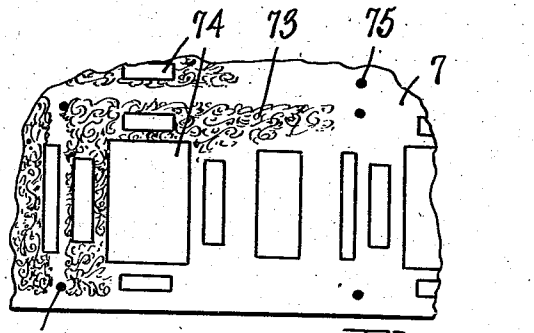


Fig. 5.



Fig. 4.

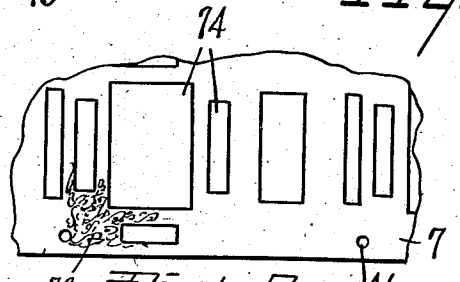


Fig. 6.

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Patented Mar. 21, 1939 2,151,028

UNITED STATES PATENT OFFICE

2,151,028

PRINTING AND PUNCHING REGISTERING APPARATUS

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Application September 27, 1937, Serial No. 165,881

29 Claims. (Cl. 101—226)

The main objects of my invention are:

First, to provide a machine for printing a web of paper in definite relation to perforations provided in the web, the machine likewise having provision for performing the perforating operation and having mechanism associated therewith for maintaining register of the printed impressions with the perforations.

Second, to provide a machine of the type described having means for maintaining the register of printed impressions on a web with holes therein, and for correcting lack of register in a novel and improved manner.

Third, to provide a machine of the type described having in combination printing and punching mechanism for printing and perforating a continuous web of paper and improved means for feeding the web to the printing and perforating mechanisms and from those mechanisms to a rewinding roll.

Fourth, to provide a machine of the type described having novel and improved provisions for maintaining proper tension in a web of paper being printed and punched.

Fifth, to provide a machine for maintaining register of printed areas with perforations in a continuous web wherein the said printed areas are produced by gravure printing.

Sixth, to provide a machine of the type described having printing and punching mechanisms and novel and improved means driven in timed relation to said mechanisms for reeling or rewinding the printed and punched web.

Seventh, to provide a printing and punching machine having a printing cylinder, punching cylinders, positively acting forwarding cylinder, and a rewind roll, all of which are driven in synchronism, there being a slip drive for the rewind roll from the punching and forwarding cylinders to insure the delivery of the web to the rewind roller under proper tension.

Eighth, to provide a machine of the type described wherein the feed of a web of paper from a supply roller to a printing cylinder and punching cylinder is regulated by varying the web tension in order to correct and maintain register.

Ninth, to provide a novel method for registering printed impressions on a web with reference to master or control registry holes therein.

Further objects relating to details and economies of my invention will definitely appear from the description to follow. The invention is defined in the claims.

A structure embodying the features of my invention is illustrated in the accompanying drawings, wherein:

Fig. 1 is a side elevation of the machine of my invention, certain parts thereof being shown conventionally.

Fig. 2 is a view of my machine on line 2—2 of Fig. 1, certain parts being omitted to clarify the disclosure.

Fig. 3 is an enlarged fragmentary view partially broken away and in section illustrating the punch and die cylinders of the perforating device and the take-off or forwarding device.

Fig. 4 is a perspective view illustrating one of the web engaging pins on the forwarding cylinder.

Fig. 5 is a fragmentary view of a web after passing the printing mechanism of the machine of my invention.

Fig. 6 is a view similar to Fig. 5, illustrating the web after the punching operation has been performed thereon.

In the preparation and printing of a large number of types of wrapping papers, which are to be subsequently used in wrapping machines in web form, it is often necessary to provide the webs with registry holes for the purpose of engaging registering means in the wrapping machine during the operation of the same. These holes are necessarily spaced on the web in predetermined relation. In the preliminary preparation of the web, including, for example, the waxing and printing of the same, and in which preparatory work the registry holes are generally punched, it follows that the said holes must be accurately placed with regard to the printed matter on the web, or, vice versa, the printed matter must be accurately impressed on the web with reference to the holes, in both longitudinal and transverse relation thereto. Otherwise, the printed areas or design on the wrapper will not fall at the proper locations with respect to the article wrapped therein.

The basis of the present invention is therefore the requirement that in a continuous web of paper wherein a series of registry holes are punched at predetermined non-varying distances from one another, the printed matter impressed on the web must at all times register accurately with the holes; and it is the primary object of the invention to obtain accurate registry and maintain the same once it is attained. Preferably,

this object is secured by regulating the tension or drag exerted on the web both by the supply roll from which it is drawn and the winding roll around which it is reeled after the printing and perforating steps have been performed, and by closely controlling the operation of the winding roll so that it draws the web uniformly relative to the speed of printing without regard to the diameter of the roll.

More particularly, it is the object of the present invention to secure register by regulating web tension in a press performing a rotogravure or intaglio type of printing as contrasted to one printing letterpress or relief, inasmuch as in the latter type of printing the spaces between plates or raised portions thereon allow a certain slippage which will in itself correct and compensate for the tendency of the plate cylinder and impression roller to cause the web to become out of registry by the driving action of the former. Where a rotogravure or intaglio cylinder is employed, it will be appreciated that a similar driving action exists between the plate and impression cylinders, but a similar compensating tendency, due to gaps between the printing areas, is not present. Therefore, some additional compensating provision must be made.

Broadly stated, the invention in the present case consists in sequentially operating on a web by means of a gravure or intaglio printing cylinder, a punching cylinder for the purpose of punching registry holes therein, and a forwarding or web control cylinder having pins spaced similarly to the punched holes, and in regulating the web feed and registry during the operations in a new manner. The web is initially supplied from a supply roll and finally rolled upon a rewind roll.

The printing cylinder, punching cylinder, and control cylinder are all of theoretically identical diameter and are so driven that they will move at the same rotative and surface speed. Such an arrangement would inevitably lead to lack of registry of the printed matter with the holes in the web due to the driving action at the printing couple as explained above, which in a gravure operation is compensated for by slippage relative to the surface of the roll or due to increasing pull on the web from the roll on which it is rewound. Furthermore, the printing cylinder may from time to time vary in diameter through a range of a few thousandths which is amply sufficient over a relatively short period to cause excessive web slack or excessive web tension between the printing couple and punching cylinder. Accordingly, my invention contemplates adjusting means for the supply roll whereby the initial tension on the web at that point may be released or increased according to the condition of registry existing. The need for alterations in web tension may be readily determined by the provision of inspection marks thereon during the printing operation with which the perforations formed by the punching cylinder coincide when the machine is in perfect registry.

My invention further contemplates a slip drive to the web rewind roll from positively driven web forwarding or control and punching cylinders, which are synchronized with the printing cylinder, said slip drive being an adjustable one whereby the rewind roll may be synchronized with the punching cylinders and the tension on the web between the rewind roll and the forwarding cylinder being likewise effectively governed to eliminate possibility of breakage.

Although the web regulation referred to above between the supply roller and the punching cylinder for the purpose of combating, neutralizing, or compensating for the driving tendency of the printing couple is accomplished in the preferred form by regulation of the drag on the web as it is taken from the supply roller, it is quite possible that other procedure may be followed to accomplish this purpose. For instance, the degree of nip between the rollers of the printing couple might be varied to minimize or accentuate the driving effect thereof on the web.

Referring to the drawings, the reference numeral 1 indicates the framework of a printing press between which is suitably mounted the bearing support 2 for the plate cylinder 3 of the printing couple, the said cylinder being in the present case a gravure or intaglio cylinder rotatable on a shaft 4. The impression roller is indicated by the reference numeral 5 and a back-up roller is designated 6. The web 7 passes to the printing couple from a supply roll 8 on a spindle 9 journaled in bearings 10. The web passes from roll 7 around idler rollers 11, 12, 13 which are mounted in an auxiliary frame 14 and around a further idler 15 journaled in the main frame, prior to reaching the printing couple.

Shaft 9 has a suitable brake, generally indicated by the reference numeral 16, associated therewith, the said brake being actuated by means of a pair of shafts 17, 18 at right angles to one another and having meshing bevel gears 19, 20 respectively. Shaft 18 is journaled in auxiliary frame 14 and has a hand wheel 21 adapted to be manipulated by an operator to increase or decrease braking action on shaft 9 in well-known manner and accordingly increase or decrease tension on web 7 between roll 8 and the printing couple. A water pump for the cooling mechanism is designated by the reference numeral 22, the same being in communication with the brake drum (not shown) or other portion of the brake to dissipate excessive heat generated by manipulation of the control brake mechanism.

After passing the printing couple, the web traverses a drying mechanism indicated by the reference numeral 23 around a series of idler rollers 24, the housing 25 of the drier being in communication with an air duct 26 supplied with air under pressure by a motor driven fan or blower 27. In certain wrapping material, the imprinted side of the web is provided with a wax coating. Leaving the drier, web 7 passes around rollers 28, 29 which are suitably cooled by circulating water or other means for the purpose of cooling the wax at the rear of the drier.

An adjustable take-up roller 30 is provided for the purpose of initially adjusting registry between the printing couple and punching apparatus to be hereinafter described. Thereafter, the web 7 passes around an idler 31 journaled in standards 32 and between a slitting or trimming couple generally designated 33, consisting of a die roller 34 and a knife roller 35, of which the die roller is positively driven by a sprocket 36 and chain 37 trained around a sprocket on a suitably driven shaft 38. The trimming couple merely trims the sides of the web to proper overall width and/or slits the same longitudinally in case the web is of sufficient width to form a plurality of individual wrapping webs.

Passing idlers 39 and 40, the web next enters the bight of a punching couple generally indicated 41, consisting of a male punching cylinder 42 having a plurality of punches 43 thereon spaced equally circumferentially of cylinder 42

and in desired number lengthwise of the cylinder. The female or die cylinder 44 carries dies 45 corresponding in number and arrangement to the punches 43.

From the punching couple, web 7 bearing spaced registry holes 46 passes to the forwarding or control cylinder 47. Cylinder 47 carries a number of removable pins 48 having enlarged shoulders 49 and threaded bodies 50 receivable in counterbored holes 51 in the cylinder 47. The circumferential spacing of pins 48 corresponds to the longitudinal spacing of web holes 46 and it will be observed that the web 7 in passing around cylinder 47 is engaged by a plurality of pins 48 so that a definite registry of the pins with the openings 46 is assured. Although control cylinder 47 is capable of exerting a positive driving effect on web 7, this driving action is not relied on to forward the web inasmuch as the web pulling function is performed by the rewind roll 53 to which the web passes after leaving the cylinder 47 and passing around an idler 54. It is the mechanical function of control cylinder 47 to relieve the punching couple of web tension between it and the rewinding roll, and by having pins 46 and cylinder 47 in engagement with a considerable area of the web the web tension between roll 53 and cylinder 47 is distributed to a number of pins, minimizing the chance of rupturing at holes 46 or of affecting the punching operation.

The web is rewound or reeled on a spindle 55 of the roll 53, the spindle being rotatable in a suitable bearing 56 on a standard 57.

The plate cylinder 3, punching couple 41, and control cylinder 47 are all driven synchronously through the agency of a drive shaft 58 having a pulley 59 thereon which is connected to a motor 60 by a belt 61. Drive shaft 58 is suitably journaled and carries adjacent the ends thereof bevel gears 62, 63 which are in mesh respectively with bevel gears 64 on shaft 4 of the plate cylinder and bevel gear 65 on a countershaft 66. The countershaft is suitably journaled on the same standard 67 wherein the punching couple and forwarding cylinder are journaled. At one end, shaft 66 carries a spur gear 68 meshing simultaneously with spur gears 69, 70 mounted respectively on shaft 71 of the die cylinder 44 and shaft 72 of the take-off or forwarding cylinder 47. The punch cylinder 42 of the punching couple is gear driven direct from die cylinder 44 by gear 69 so as to rotate therewith at the same angular and surface speed.

Provision is made either by proportioning the cylinder size as described or, if desired, by proportioning the gears driving the same so that plate cylinder 3, punch and die cylinders 42, 44, and control cylinder 47 are all driven at the same surface speed. Assuming that plate cylinder 3 produces an impression as illustrated in Fig. 5, namely, one having an allover background design 73, information bearing areas 74, and inspection marks 75 which are spaced longitudinally the same distance as are punches 43 and pins 48, and assuming that the printing couple and punching couple are operating in perfect register, then the latter will excise portions of paper exactly at the indicating marks 75 to form the registry holes 46. Any mis-register is perceivable by an operator who is immediately warned thereby to make appropriate adjustments by actuating brake 16 to increase or diminish the drag of supply roller 8, depending on the direction of mis-registry.

The position of holes 46 is controlling in the theory of operation of my machine and the printed impressions must register properly with relation thereto, or to the points at which the punching couple operates. Failure to register accurately means that the printing couple, due to variation in diameter of the plate cylinder 3, the nip pressure thereof, or to other considerations at that point is exerting an improper driving action on the web. This action is compensated for by adjustment of the web tension through manipulation of the brake. It is essentially important in my invention that regulation of registry is not relied on or is not accomplished by alteration of web or cylinder speed, so far as such a procedure calls for increasing or diminishing the rotative speed of a feeding or operating roller, as required in hitherto known constructions. The only mechanical change made is an alteration of the drag on the web as described.

Fundamentally, the method of my invention and the procedure followed by the mechanical embodiment thereof is based on the uniform advancing and winding of the web or rewind roll 53 exactly in accordance with the speed at which holes 46 are punched in the web, regardless of the diameter of roll 53. The rewind roll drive is a slip or yielding one so that this correspondence of operating speeds of the rewind roll, punching couple 41 and control cylinder 47 may be maintained at all times. Accordingly, since any tendency to pull the web past the printing couple at greater or less speed than the surface speed of plate cylinder 3 is eliminated, the final compensation to bring inspection marks 75 and holes 46 into perfect registry may be effected by the simple expedient of regulating the web drag exerted by the supply roll 8. The control cylinder 47 gives definite assurance that the web will not be forwarded to the rewind roller any faster than the printing couple operates thereon. If, because the rewind roller becomes larger in diameter, a greater tension is imposed on the web, this tension is absorbed by the control cylinder, the said rewind roller slipping in proportion to the increased tension, and the web continues to feed to the rewind roller at constant speed for this purpose.

Being assured that the speed on the rewind roller is in accordance with the speed of the printing couple, it is evident that any accumulation of the web, for example, between the printing and punching devices, is due entirely to a forward creep of the web at the printing cylinder. It is for the purpose of offsetting such creep that I provide for adjusting the brake and thus regulating the drag on the web. By adjusting the brake I can entirely negative the said forward creep or can cause a creep in the opposite direction to restore the printed impression and the perforations to registry. I believe that the concept of uniformly driving plate cylinder, punching couple, and forwarding device, providing that the web pull is always proportionate to the speed of the punching couple and forwarding device, and thereafter securing registry by regulating web tension at the supply roll, is broadly novel with me.

To compensate for increased drag on the web when it is evidenced at the rewinding roll 53 or reel-shaft 55 as the roll increases in diameter, I have provided a slip drive to that shaft from positively driven shaft 58, in the form of a large pulley 77 on countershaft 66 connected to a pulley 78 on reel shaft 55 by a belt 79. This pro-

vides a friction or slip drive for shaft 55. The degree of slip may be varied through the agency of a belt take-up pulley 80 on a frame 81 which is pivoted around shaft 55, the said frame having a rear extension 82 carrying a nut 83 adjustable along a threaded rod 84 by rotation of the rod. The rod is suitably swiveled or anchored at 85 and a hand wheel 86 is provided to rotatively manipulate the same.

By the construction just described, in the event that the web registering means is manipulated to bring the markings on the web back into registry with holes 76, and if this or some other condition causes excessive tension or slack in web 7 to the rear of take-off cylinder 47, the effect is remedied by increasing or decreasing the slip in the driving means for reel spindle 55, through manipulation of belt take-up or tensioning roller 80 as described.

It is emphasized that although punching couple 41 and forwarding or take-off cylinder 47, due to the construction thereof, are capable of exerting an appreciable driving action on the web, this action is not relied on to feed the web through the machine, but instead it is the yieldable pull exerted by rewind roll or reel 53 and also the drive of the printing couple 1 which actually advance the web. My invention furnishes an entirely novel manner of counteracting and compensating for mis-register of a printed impression, however produced, with a controlling series of spaced registry holes. I consider the method and apparatus to be novel with me. They are valuable because of the flexibility of adjustment obtainable thereby and the ease by which a highly improved and more accurate operation is attained.

I have illustrated and described my improvements in an embodiment which is very practical. I have not attempted to illustrate or describe other embodiments or adaptations as it is believed this disclosure will enable those skilled in the art to embody or adapt my improvements as may be desired.

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

1. A printing and punching machine comprising a printing plate cylinder, an impression roll therefor, a rotary punching device and a rotary forwarding device at the rear of said punching device, means for driving said cylinder and devices in synchronism at equal surface speeds, said punching device comprising a pair of cylinders having coacting punches and dies spaced peripherally thereof, said forwarding device comprising a cylinder having pins projecting therefrom and spaced in accordance with the spacing of the punches and dies of the punching device whereby the said pins enter holes formed in a continuous web by the punching device, a web supply roll in advance of the plate cylinder, and a web rewind roll at the rear of the forwarding cylinder, said supply roll having a manually adjustable brake associated therewith to vary the drag on the web as desired and thereby compensate for web creep at the printing cylinder and impression roll tending to destroy registry of the holes and the printed impression on the web, a slip friction drive from said driving means to said rewind roll whereby to synchronize said rewind roll with said devices comprising pulleys associated with said driving means and rewind roll, a belt passing therearound and a take-up roller, and manually controllable means for adjusting said take-up roller.

2. A printing and punching machine comprising a printing plate cylinder, an impression roll therefor, a punching device and a forwarding device at the rear of said punching device, means for driving said cylinder and said devices in synchronism, said forwardling devicé comprising a cylinder having pins projecting therefrom and spaced to enter holes formed in a continuous web by the punching device, a web supply roll in advance of the plate cylinder, and a web rewind roll at the rear of the forwarding cylinder, said supply roll having a manually adjustable brake associated therewith to vary the drag on the web as desired and thereby compensate for web creep at the printing cylinder and impression roll tending to destroy registry of the holes and the printed impression on the web, a slip friction drive from said driving means to said rewind roll whereby to synchronize said rewind roll with said devices comprising pulleys associated with said driving means and rewind roll, a belt passing therearound and a take-up roller, and manually controllable means for adjusting said take-up roller.

3. A printing and punching machine comprising a printing plate cylinder, an impression roll therefor, a punching device and a forwarding device at the rear of said punching device, means for driving said cylinder and devices in synchronism, said forwarding device comprising a cylinder having pins projecting therefrom and spaced to enter holes formed in a continuous web by the punching device, a web supply roll in advance of the plate cylinder, and a web rewind roll at the rear of the forwarding cylinder, said supply roll having means associated therewith to vary the drag on the web as desired and thereby compensate for web creep at the printing cylinder and impression roll tending to destroy registry of the holes and the printed impression on the web, a slip drive from said driving means to said rewind roll whereby to synchronize said rewind roll with said devices, and manually controllable means for controlling said slip drive.

4. A printing and punching machine comprising a printing plate cylinder, an impression roll therefor, a rotary punching device, and a rotary forwarding device at the rear of said punching device, means for driving said cylinders and devices in synchronism at equal surface speeds, a web supply roll in advance of the plate cylinder, and a web rewind roll at the rear of the forwarding device, said supply roll having a manually adjustable brake associated therewith to vary the drag on the web as desired and thereby compensate for web creep at the printing cylinder and impresion roll tending to destroy registry of the holes and the printed impression on the web, a slip friction drive from said driving means to said rewind roll whereby to synchronize said rewind roll with said punching device and forwarding device comprising pulleys associated with said driving means and rewind roll, a belt passing therearound and a take-up roller, and manually controllable means for adjusting said take-up roller.

5. A printing and punching machine comprising a printing plate cylinder, an impression roll therefor, a rotary punching device, means for driving said cylinder and punching device in synchronism, a web supply roll in advance of the plate cylinder and a web rewind roll at the rear of the punching device, said supply roll having a manually adjustable brake associated therewith

to vary the drag on the web as desired and thereby compensate for web creep at the printing cylinder and impression roll tending to destroy registry of the holes and the printed impression on the web, a slip friction drive from said driving means to said rewind roll whereby to synchronize said rewind roll with said punching device comprising pulleys associated with said driving means and rewind roll, a belt passing therearound and a take-up roller, and manually controllable means for adjusting said take-up roller.

6. A printing and punching machine comprising a printing plate cylinder, an impression roll therefor, a rotary punching device, means for driving said cylinder and punching device in synchronism, a web supply roll in advance of the plate cylinder and a web rewind roll at the rear of the punching device, said supply roll having a manually adjustable brake associated therewith to vary the drag on the web as desired and thereby compensate for web creep at the printing cylinder and impression roll tending to destroy registry of the holes and the printed impression on the web, a slip drive from said driving means to said rewind roll whereby to synchronize said rewind roll with said punching device, and manually controllable means for adjusting said drive.

7. A printing and punching machine comprising a printing plate cylinder, an impression roll therefor, a punching device, means for driving said cylinder and punching device in synchronism, a web supply roll in advance of the plate cylinder and a web rewind roll at the rear of the punching device, said supply roll having means associated therewith to vary the drag on the web as desired and thereby compensate for web creep at the printing cylinder and impression roll tending to destroy registry of the holes and the printed impression on the web, a slip drive from said driving means to said rewind roll whereby to synchronize said rewind roll with said punching device, and means for adjusting said drive.

8. A printing and punching machine comprising a printing plate cylinder, an impression roll therefor, a punching device, means for driving said cylinder and punching device in synchronism, a web supply roll in advance of the plate cylinder and a web rewind roll at the rear of the punching device, said supply roll having means associated therewith to vary the drag on the web as desired and thereby compensate for web creep at the printing cylinder and impression roll tending to destroy registry of the holes and the printed impression on the web, and an adjustable drive from said driving means to said rewind roll whereby to synchronize said rewind roll with said punching device.

9. In combination with web winding and supply means, rotary means for printing impressions including a series of equally spaced inspection marks on said web, rotary means for perforating the web at said marks, rotary means for forwarding the web to the winding means including projections engageable with the perforations formed by said perforating means, said printing, perforating, and forwarding means being driven in synchronism and at equal operating speeds, means for adjusting said winding means, and means for regulating the drag exerted on the web by said supply means in the event of mis-registry of said marks with said perforations in order to compensate for web creep at said printing means, said regulating means comprising a brake operative on said supply means, manually controllable means for actuating the brake, and cooling means for said brake.

10. In combination with web winding and supply means, rotary means for printing impressions including a series of equally spaced inspection marks on said web, rotary means for perforating the web at said marks, rotary means for forwarding the web to the winding means including projections engageable with the perforations formed by said perforating means, said printing, perforating, and forwarding means being driven in synchronism and at equal operating speeds, means for adjusting said winding means, and means for regulating the drag exerted on the web by said supply means in the event of mis-registry of said marks with said perforations in order to compensate for web creep at said printing means.

11. In combination with web winding and supply means, rotary means for printing impressions including a series of equally spaced inspection marks on said web, rotary means for perforating the web at said marks, rotary means for forwarding the web to the winding means including projections engageable with the perforations formed by said perforating means, said printing, perforating, and forwarding means being driven in synchronism and at equal operating speeds, and means for regulating the drag exerted on the web by said supply means in the event of mis-registry of said marks with said perforations in order to compensate for web creep during feeding of the web.

12. In combination with web feeding and supply means, rotary means for printing impressions including a series of equally spaced inspection marks on said web, rotary means for perforating the web at said marks, rotary means for forwarding the web including projections engageable with the perforations formed by said perforating means, said printing, perforating, and forwarding means being driven in synchronism and at equal operating speeds, means for regulating the drag on said supply means in the event of mis-registry of said marks with said perforations in order to compensate for web creep during feeding of the web, said regulating means comprising a brake operative on said supply means, manually controllable means for actuating the brake, and cooling means for said brake.

13. In combination with web feeding and supply means, rotary means for printing impressions including a series of equally spaced inspection marks on said web, rotary means for perforating the web at said marks, rotary means for forwarding the web including projections engageable with the perforations formed by said perforating means, said printing, perforating, and forwarding means being driven in synchronism and at equal operating speeds, means for driving said rewind means from said driving means comprising a belt and pulleys associated with said first named driving means and said rewind means whereby a slip drive is imparted to the latter, and means for varying the degree of slip to regulate the web tension between the forwarding and rewind means comprising a take-up roller engageable with said belt and manually operable means for adjusting the take-up roller relative to the belt.

14. In combination with web feeding and supply means, rotary means for printing impressions including a series of equally spaced inspection marks on said web, rotary means for perforating the web at said marks, said printing and perforating means being driven in synchronism, means

for driving said rewind means from said driving means comprising a belt and pulleys associated with said first named driving means and said rewind means whereby a slip drive is imparted to the latter, and means for varying the degree of slip to regulate the web tension between the punching and rewind means and to synchronize the same comprising a take-up roller engageable with said belt and manually operable means for adjusting the take-up roller relative to the belt.

15. The method of securing and maintaining register of printed impressions on a web with reference to a series of equally spaced registry holes in the web comprising the steps of punching the holes in the web, advancing and winding the web uniformly by reference only to the registry holes, printing inspection marks on the web at regular intervals in advance of the punching operation, and regulating the tension of the web prior to being printed by reference to mis-register of the holes and marks whereby to compensate for or combat such mis-register.

16. The method of securing and maintaining register of printed impressions on a web with reference to a series of registry holes in the web comprising the steps of punching the holes in the web, advancing and rewinding the web uniformly by reference only to the registry holes, printing inspection marks on the web in advance of the punching operation, and regulating the tension of the web by reference to mis-register of the holes and marks whereby to compensate for or combat such mis-register.

17. The method of securing and maintaining register of printed impressions on a web with reference to a series of registry holes in the web comprising the steps of advancing and rewinding the web uniformly by reference only to the registry holes, printing inspection marks on the web, and regulating the tension of the web by reference to mis-register of the holes and marks, whereby to compensate for or combat such mis-register.

18. The method of feeding a web and securing register of printed impressions on a web comprising the steps of advancing the web with a slip drive, punching predetermined invariably spaced registry holes in the web, regulating the degree of slip in the drive with reference to the speed of the punching operation, printing inspection marks on the web in advance of punching the same, and correcting mis-register of the marks and holes by altering the tension of the web in advance of the printing operation.

19. The method of securing register of printed impressions on a web with registry holes punched therein at predetermined unvarying spacings, comprising the steps of continuously advancing the web, punching spaced register holes in the web in predetermined exact synchronism with the speed of advance of the web, printing inspection marks on the web in advance of punching the same, and correcting mis-register of the marks and holes by altering the tension on the web in advance of the printing operation.

20. The method of securing register of printed impressions on a web with registry holes punched therein at predetermined unvarying spacings, comprising the steps of continuously advancing the web, punching spaced register holes in the web in predetermined exact synchronism with the speed of advance of the web, printing inspection marks on the web in advance of punching the same, and correcting mis-register of the marks and holes by altering the tension on the web.

21. The method of feeding webs and securing register of impressions on the webs comprising tensioning the delivery of the web, winding the web at the rear of the printing means, punching uniformly spaced registry holes in the web at the rear of the printing means, and controlling the feed of the web to the winding means at a point between the punching means and the winding means by means of the registry holes.

22. In a web printing and punching machine comprising web supply and rewind rolls and rotary printing and punching devices between said rolls, means for securing register of inspection marks printed by said printing device with control holes formed by said punching device, said means comprising a control cylinder having a plurality of projections contemporaneously engageable with the control holes, a belt drive from said control cylinder to said rewind roll, means for adjusting the tension of said belt drive whereby to maintain the speed of rewinding equal to the surface speed of the control cylinder, and means for adjusting the supply roller whereby to alter the tension on the web and thereby compensate for mis-register.

23. In a web printing and punching machine comprising web supply and rewind rolls and a rotary printing device between said rolls, means for securing register of inspection marks printed by said printing device with spaced control holes on said web, said means comprising a rewind control cylinder having a plurality of projections engageable with the control holes, a slip drive from the control cylinder to the rewind roll, means for adjusting said slip drive whereby to maintain the speed of rewinding equal to the surface speed of the control cylinder, and means for adjusting the supply roller whereby to alter the tension on the web and thereby compensate for mis-register.

24. In a web printing and punching machine comprising web supply and rewind rolls and a rotary printing device between said rolls, means for securing register of inspection marks printed by said printing device with spaced control holes on said web, said means comprising a rewind control cylinder having a plurality of projections engageable with the control holes, a slip drive from the control cylinder to the rewind roll, and means for adjusting said slip drive whereby to maintain the speed of rewinding equal to the surface speed of the control cylinder.

25. In a web printing and punching machine comprising web supply and rewind rolls and a rotary printing device between said rolls, means for securing register of inspection marks printed by said printing device with registry control indicia on said web, said means comprising a rewind control cylinder, a slip drive from the control cylinder to the rewind roll, means for adjusting said slip drive whereby to maintain the speed of rewinding equal to the surface speed of the control cylinder, and means for adjusting the supply roller whereby to alter the tension on the web and thereby compensate for mis-register.

26. In a web printing and punching machine comprising web supply and rewind rolls and a rotary printing device between said rolls, means for securing register of inspection marks printed by said printing device with registry control indicia on said web, said means comprising a rewind control cylinder, a slip drive from the control cylinder to the rewind roll, and means for

adjusting said slip drive whereby to maintain the speed of rewinding equal to the surface speed of the control cylinder.

27. In a web printing and punching machine comprising web supply and rewind rolls and rotary printing and punching devices between said rolls, means for securing register of inspection marks printed by said printing device with control indicia on a web fed from the supply roll, said means comprising a control cylinder having means engageable with the control indicia, means to maintain the speed of rewinding equal to the surface speed of the control cylinder, and means for adjusting the supply roller whereby to alter the tension on the web and thereby compensate for mis-register.

28. The combination with the printing unit of a cylinder web printing machine, of a tensioned web supply means, driven web winding means, rotary web perforatnig means disposed at the rear of the printing unit in advance of the web winding means, a control cylinder provided with pins spaced to coact with perforations formed by said web perforating means and in advance of the web winding means, means for driving said control cylinder and perforating means in synchronism, and driving connections for said web winding means and said perforating and control cylinder.

29. The combination with the printing unit of a cylinder web printing machine, of tensioned web supply means, driven web winding means, web perforating means disposed between the printing unit and the web winding means, a web control means disposed between the web perforating means and the web winding means and provided with pins spaced to coact with perforations formed by said web perforating means, means for driving said perforating means and web control means in synchronism, and driving connections for said web winding means and said perforating and control means.

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