

May 31, 1938.

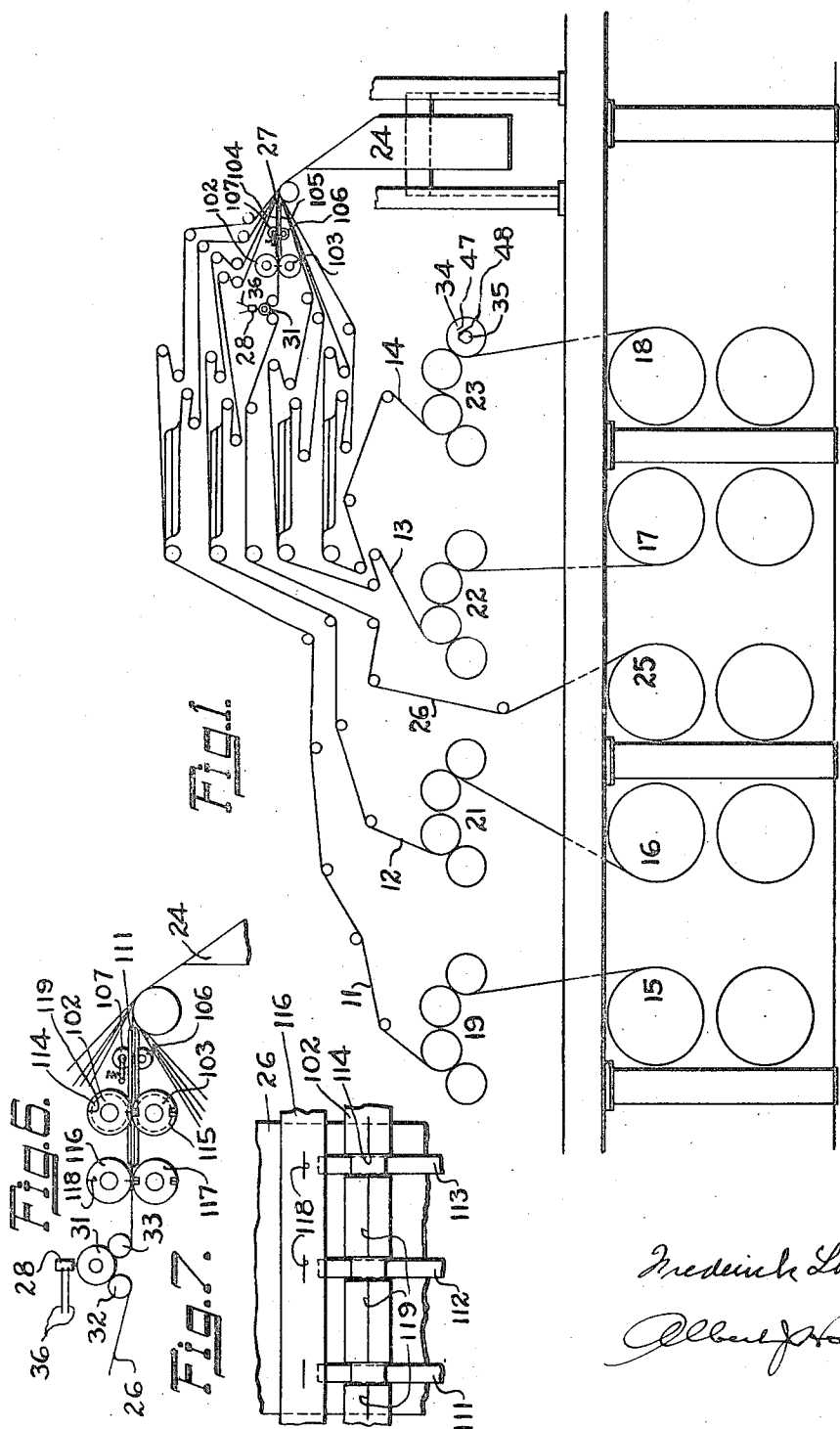
F. LAMATSCH ET AL

2,118,816

WEB ASSOCIATING MECHANISM FOR PRINTING MACHINES

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2 Sheets-Sheet 1



Inventors.
Friedrich Lamatsch
Albert Horton

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F. LAMATSCH ET AL

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2 Sheets-Sheet 2

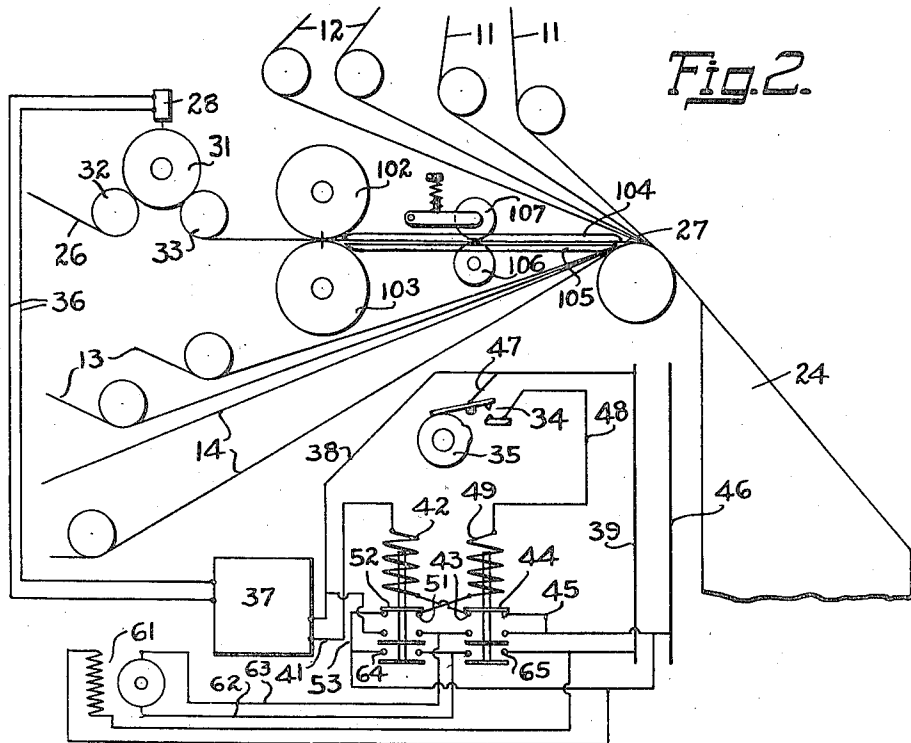


Fig. 2.

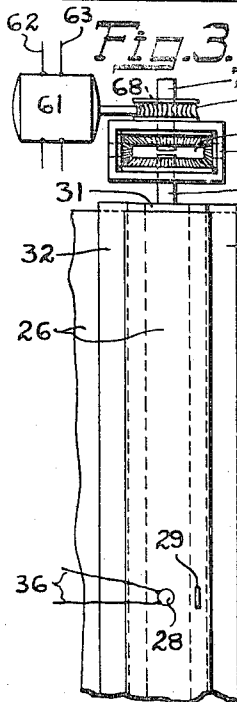
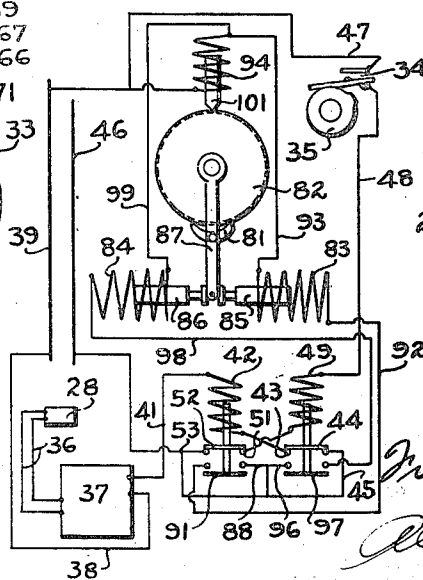


Fig. 3.

Fig. 4.

Fig. 5.



UNITED STATES PATENT OFFICE

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WEB ASSOCIATING MECHANISM FOR
PRINTING MACHINES

Frederick Lamatsch, Grantwood, N. J., and Albert
J. Horton, White Plains, N. Y., assignors to
R. Hoe & Co., Inc., New York, N. Y., a cor-
poration of New York

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This invention relates to printing machines of the high speed type, particularly those adapted for use in the production of newspapers having a plurality of pages formed from a multiplicity of webs, one or more of which is previously printed and is associated with those of the high speed printing machine during its operation thereon. This invention particularly relates to a method of, and means for, associating the above referred to, previously printed matter, with the webs being printed by the machine, in such a manner that it will be disposed in its proper position in the completed product, and to accomplish this result by inserting the same between the webs being operated upon by the machine, in proper registered relation.

The previously printed web is generally wound upon a roll, when printed, from which it is, at a later time unwound and fed into the printing machine. Due to atmospheric or other conditions which it is difficult or impossible to control, the printed web, even though timed to register the printed impressions thereon with those upon the webs being printed, while being unwound from its roll in many instances gradually becomes out of register when it is associated with or inset between the other webs. While the amount the pre-printed or inset web is out of register may be but slight, it is sufficient to cause considerable difficulty, especially if it is slightly ahead in register, whereupon the pull thereon of the combined webs, with which it is being associated, may tear it, requiring stopping of the machine and hence a loss in time and production. Lagging behind of register is also objectionable, and may result in sagging and loss of control of the inset web with consequent breakage of other webs with which it becomes fouled.

In apparatus of this general nature that has heretofore been used for inseting pre-printed webs with a product being printed on a machine, it has been necessary to keep the distances between like impressions on the pre-printed web substantially the same as the distances between like impressions on the webs being printed, only extremely slight variations being permissible. This accuracy has been found impossible to maintain because variations in atmospheric conditions will cause too great changes in the inset web. With the arrangement herein disclosed whereby the inset sheet is cut immediately before being associated with the other webs, it is practical to operate successfully even though the distances between like impressions on the inset web are

substantially longer or shorter than those on the webs with which it is associated.

This invention contemplates as one of its objects, the provision in a printing machine of a method of, and means for, associating previously printed matter with matter being printed, whereby the above objections will be obviated and high speed operation of the machine will not be interfered with. It is herein proposed to accomplish the desired results, above referred to, preferably, by varying the surface speed of the pre-printed web so as to insure register of the printed matter thereon with the printed matter on the webs being printed, by advancing or retarding the travel of the pre-printed web, cutting the pre-printed web into sheets, and feeding the sheets between the running webs being printed, all of which operations will be done at a position closely adjacent the point of association of the webs.

Another object is to provide mechanism to advance or retard the pre-printed web, and means to actuate said mechanism which is controlled by differences in synchronism between a timing switch operating in synchronism with the rotation of a printing cylinder of the machine, and a printed mark or impression on the pre-printed web.

A further object is to provide a rotatable feeding roller for the pre-printed web, and means to retard or advance the rotative movement of the roller, which is controlled by a device affected by a mark on the pre-printed web, and another device, moving in synchronism with the speed of a cylinder of the machine.

It is also an object of this invention to provide a method of, and means for, associating pre-printed webs with webs being printed in a printing machine, of generally improved construction, whereby the device will be simple, durable and inexpensive to construct, as well as convenient, practical, serviceable and efficient in its use.

With the foregoing and other objects in view, which will appear as the description proceeds, the invention resides in the combination and arrangement of parts, and in the details of construction hereinafter described and claimed.

The preferred embodiment of the invention is illustrated in the accompanying drawings, wherein:

Figure 1 is a schematic illustration of a printing machine embodying the features of this invention;

Figure 2 is an enlarged illustration of the part of the machine shown in Figure 1 whereat the features of this invention are applied, and show-

ing one form of pre-printed web speed controller;

Figure 3 is a view of parts used with the web speed controller shown in Figure 2;

Figure 4 is a schematic view of another form of pre-printed web speed controller;

Figure 5 is a view of parts used with the controller shown in Figure 4;

Figure 6 is an illustration of a somewhat modified arrangement; and

Figure 7 is a top plan view of certain parts shown in Figure 6.

The printing machine illustrated in Figure 1 is of the high speed type wherein a plurality of webs 11, 12, 13 and 14 are fed from supply rolls 15, 16, 17 and 18 respectively, through printing units 19, 21, 22 and 23 respectively, and then to a common folder 24, whereat they are assembled together in proper form and by which they are folded and cut in the usual manner. Instances occur, especially in the production of newspapers, where it is desirable to insert a pre-printed sheet or sheets such as a color section, which due to its nature must be printed earlier by a separate printing machine, which may operate at a slower speed than that of the high speed machine. The separately pre-printed web is generally wound up into a roll 25 after printing, and set aside to be later associated with the product of the high speed machine, as shown in Figure 1, and to have its web 26 threaded into the machine in position to have the printed matter thereon associated, as an inset, with the webs being printed by the machine.

It is understood that the webs being printed upon by the respective printing units are constantly maintained in register due to the gearing together of all driving and driven parts of the machine. The web 26, however, not being acted upon by any of the machine parts up to the point of association 27 with the webs passing through the machine, must be run in synchronism with the other webs, and have the printed matter thereon kept in register with that on their webs. It is proposed to accomplish this registration at a position as close to the point of association 27 as is practical, in order to obviate any chance of variation after such register has been attained.

For the purpose of registering the printed impressions on the web 26 with those on the other webs, either of the mechanisms shown, associated therewith, in Figure 2 or 4 may be used. In both instances, a photo-electric cell or electric eye 28 is used to detect the presence of a printed mark or the like 29 (Figure 3), provided on the pre-printed web 26. The eye 28 is disposed to focus upon mark 29 on the web 26 as the web runs over a roller 31, which is one of a set of nipping rollers 31, 32 and 33, the roller 31 being driven from the machine in synchronism with the other rotating parts thereof to cause the web 26 to constantly have a surface speed equal to that of the other webs. The rollers 31, 32 and 33 cooperate to pull the web 26 from the roll 25 into the machine. A timing switch 34 is provided and actuated by a cam 35, which rotates in timed relation with any one of the printing units, and is arranged to close the switch 34 once for every revolution of a printing cylinder of the machine. The marks 29 are arranged on the web 26 to be spaced apart lengthwise along the web an amount equal to the peripheral dimension of the printing cylinders, of the printing units of the machine.

The electric eye 28 is electrically connected by conductors 36 to an amplifying and relay unit 37, from which a conductor 38 is connected to a

power cable 39, and a conductor 41 is connected to a terminal of a solenoid 42, the other terminal of which is connected to a switch contact 43, which through a suitable blade 44 and a conductor 45 may be connected to the other power cable 46. One contact of the timing switch 3 is connected by a conductor 47 to the power cable 39, and the other contact thereof is connected by a conductor 48 to one terminal of a solenoid 49, the other terminal of which is connected to a switch contact 51, which through a switch blade 52 and a conductor 53, may be connected to the other power cable 46. The solenoid 42 is adapted to actuate the switch blade 52 and the solenoid 49 is adapted to actuate the switch blade 44 to open the respective circuits controlled thereby. Normally, the switch blades 44 and 52 are in circuit closing position.

In the form shown in Figures 2 and 3, the registering mechanism includes a reversible electric motor 61, the armature terminals of which are connected by conductors 62 and 63 to the contacts 64 and 65 of a pair of switches respectively. The switches may be actuated by the solenoids 42 and 49 respectively to close the proper circuit to cause operation of the motor 61 in the desired direction. The motor is drivingly connected to the rotatable casing 66 of a differential gear 67 by a worm 68 in mesh with a worm wheel 69, secured to the casing 66. A shaft 71 of the roller 31 is connected to one side of the differential gear 67 and, through it, is driven by a shaft 72 drivingly connected to the other side of the differential gear 67 and to a rotating part of the printing machine. By the above arrangement, the motor 61 may be operated by, for instance, the cam controlled switch 34 to rotate the differential casing 66 to retard the rotation of the roller 31, or by the electric eye 28 to rotate the casing 66 to increase the rotation of the roller 31, which will cause the roller to retard or advance the web 26 to bring the mark 29, in its movement past the eye 28, in synchronism with the actuation of the switch 34 by the cam 35, so that the printed impressions on the web 26 will be in register with those on the other webs. From the above, it is obvious that a mechanism has been provided to substantially automatically maintain the pre-printed web in register with the webs being printed and that this mechanism is arranged to act upon the pre-printed web closely adjacent to the point of its association, as at 27, with the other webs.

In the form of mechanism shown in Figures 4 and 5, a so-called inching device is provided in driving engagement with the differential casing 66 to effect the rotation of the roller 31 by retarding or increasing the same. In this form, a pawl 81 coacts with a toothed wheel 82 secured to the casing 66, to rotate it either in one direction or the other, depending upon which direction the pawl 81 is moved. The pawl 81 is moved in one direction by one, and in the other direction by the other, of a pair of solenoids 83 and 84, which, when energized, by the action of the electric eye 28 or the timing switch 34 respectively, through their respective cores 85 and 86, swings a link 87 upon which the pawl 81 is mounted. The solenoid 83 is controlled by the electric eye 28 by operation of a switch blade 91 by the solenoid 42, whereby a circuit is established through a conductor 88 connected to the power cable 46, the switch blade 91, a conductor 92, through the solenoid 83, from which a conductor 93 leads through a solenoid 94 to the other power cable 39. The

solenoid 84 is controlled by the switch 34 by operation of a switch blade 97 by the solenoid 49, whereby a circuit is established through a conductor 96, connected to the power cable 46, the switch blade 97, a conductor 98 to the solenoid 84, from which a conductor 99 leads through the solenoid 94 to the power cable 39. The solenoid 94 when energized with either solenoid 83 or 84, releases a locking catch 101 from the toothed wheel 82, permitting its actuation by the pawl 81. It will be understood that when the lever 87 is moved in one direction from the vertical, that one end of the pawl 81 engages the toothed wheel 82 and that the other end of the pawl is held from engagement with the wheel during the return stroke of the lever to vertical position by known means.

In the use of either of the above described forms of registering mechanisms with a folding mechanism as shown and for the purpose described, it will be understood that all of the various webs, when they are threaded through the machine are adjusted initially to register the printed impressions thereon, whereby the marks 29 will pass the eye 28 in timed register or synchronism with the cam 35. While being operated and due to various uncontrollable conditions, the webs 11, 12, 13 and 14 and the web 26 may work slightly out of register and to correct this non-register condition immediately, or substantially as soon as it occurs, the present disclosed mechanism was devised. In Figures 2 and 4, the switch 34 is inoperative to energize the solenoid 49 when the electric eye 28 is in operation causing the energization of the solenoid 42, due to the arrangement of the circuits thereof with these solenoids as illustrated. For instance, when the solenoid 42 is energized, the switch blade 52 is raised, thus opening the circuit through the solenoid 49 which is normally under control of the switch 34. The same is true of the solenoid 49 which by raising the switch blade 44 prevents energization of the solenoid 42 controlled by the electric eye 28. When both the eye 28 and the switch 34 attempt to actuate the respective solenoids simultaneously due to the mark 29 passing the eye 28 at the same time the cam 35 actuates the switch 34, no action will take place as each will neutralize or prevent the attempted action of the other. This condition will exist when the marks 29 on the web 26 are in timed register or synchronism with the cam 35 and therefore the printed impressions on the web 26 are in register with those on the other webs.

In order to obviate the possibility of the web 26 tearing between the nipping rollers 31, 32 and 33 and the point of association 27 with the other webs due to momentary retardation of the web 26 thereby causing a strain to be imposed thereon within this section of its length, it is herein proposed to provide a pair of coacting cutting cylinders 102 and 103 directly following the rollers 31, 32 and 33. By cutting the web 26 into sheets of required length before permitting them to be associated with the other webs, the tendency of the web 26 to tear or to bunch up in this section is prevented. After cutting the web 26 into sheets, the sheets are guided in between the other webs, by guides 104 and 105 and are forwarded at the proper speed by a feeding roller 106. The feeding roller is driven in synchronism with the machine operating parts and coacts with a spring pressed roller 107 to positively engage the sheets therebetween as they are cut, and to feed them,

one at a time, into association with the other webs.

The arrangement illustrated in Figures 6 and 7 may be preferred, due to the advantage resulting therefrom of positively insuring stripping of the sheets, as they are cut, from the cutting cylinders 102 and 103. In this arrangement, sheet or web guiding bars 111, 112 and 113 extend rearwardly of the cylinders 102 and 103 through grooves 114 and 115 respectively formed in the periphery of each cylinder. A pair of cutting cylinders 116 and 117 are provided and are disposed rearwardly of the cylinders 102 and 103 between the latter and the rollers 31, 32 and 33.

The cutting means or blades 118 of the cutting cylinders 116 and 117 cut the web 26 at a plurality of transversely spaced apart portions which correspond to the transverse disposition of the bars 111, 112 and 113. The cutting blades 119 of the cylinders 102 and 103 complete the cut transversely across the web and sever a sheet therefrom. Adjustments are readily made in timing, between the pairs of cylinders 102 and 103 and 116 and 117 whereby the line of cut of their respective cutting blades will be in alignment and cause a continuous cut to be made across the web. By extending the bars 111, 112 and 113 between and beyond the cylinders 102 and 103 as shown in Figures 6 and 7, the tendency of the web, or the sheets cut therefrom, to wrap about the cutting cylinders is positively prevented, thus insuring continuous high speed operation of the machine.

From the above, it is apparent that the invention provides a mechanism for maintaining the surface speed of an inset or pre-printed web in synchronism with the surface speed of the web or webs being printed, and with which it may be associated, whereby the printed impressions thereon will be automatically adjusted into and maintained in register with those on the web or webs when there is only a slight variation in the distances between like impressions on the inset web and the distances between like impressions on the webs being printed by the machine.

It is also to be noted that two separately operated controls are provided, each being inoperative when the other is in operation, and one of which is effected by the rotative movement of the printing cylinders and the other by the surface speed of the pre-printed web, and these cooperate in their control of the mechanism to effect the above results.

The invention also provides in combination with such a mechanism and the controls therefor, means to insure the association of pre-printed matter with the webs being printed without the possibility of interference of such an operation by the bunching up of such matter, or the tearing thereof, at the point of association with the webs.

It will be understood that the invention may be embodied in other specific forms without departing from the spirit or essential attributes thereof, and it is therefore desired that the present embodiment be considered in all respects as illustrative and not restrictive, and it will be further understood that each and every novel feature and combination present in or possessed by the mechanism herein disclosed forms a part of the invention included in this application.

What we claim is:

1. The method of forming a folded product having, as an inset, portions of a pre-printed web associated with the webs being led from a

printing machine, which includes leading the pre-printed web to a point adjacent to and between the webs from the machine, registering the printed impressions on the pre-printed web with corresponding printed impressions on the other webs, then cutting the pre-printed web into sheets and causing feeding means to engage them one at a time as cut, to urge each sheet into association with the other webs, and then folding the associated webs and sheet.

2. The method of forming a folded product having, as an inset, portions of a pre-printed web associated with the printed webs being led from a printing machine, which includes leading the pre-printed web to a point adjacent to and between the webs from the machine, registering the printed impressions on the pre-printed web with corresponding printed impressions on the other webs, then cutting the pre-printed web into sheets, then engaging each sheet as soon as it is cut and urging it into association with the other webs in timed relation thereto, and then folding the associated webs and sheet.

3. In a printing machine having a plurality of webs being printed and running toward and into a folding mechanism, a roller normally driven in synchronism with the printing cylinder of said machine and disposed adjacent said folding mechanism and between the webs running into the same, means acting on said roller to register the printed impressions on a pre-printed web being moved by said roller, with corresponding printed impressions on a web being printed, means to control said registering means, a pair of web cutting cylinders between the roller and the folding mechanism to receive and cut the pre-printed web lead from said roller, and means to guide the cut web portions into association with the webs being printed, at a point closely adjacent said folding mechanism.

4. In a printing machine having a plurality of webs being printed and running towards and into a folding mechanism, a roller normally driven in synchronism with the printing cylinder of said machine and disposed adjacent said folding mechanism, means acting on said roller to register the printed impressions on a pre-printed web being moved by said roller, with corresponding printed impressions on the webs being printed, means to control said registering means, said control means including a timing switch actuated in synchronism with a printing cylinder of said machine, and an electro-responsive device adapted to be effected by marks disposed along the pre-printed web and spaced apart thereon an amount equal to the spacing of like impressions on the web being printed by the printing cylinders of said machine.

5. In a printing machine having a multiplicity of webs being printed and running towards and into a folding mechanism, a roller normally driven in synchronism with the printing cylinder of said machine and disposed adjacent said folding mechanism, means acting on said roller to register the printed impressions on a pre-printed web being moved by said roller, with corresponding printed impressions on the webs being printed, means to control said registering means, said control means including a timing switch actuated in synchronism with a printing cylinder of said machine, a photo-electric device adapted to be effected by marks disposed along the pre-printed web and spaced apart an amount equal to the spacing of duplicate impressions on the web being printed by the printing cylinders of said ma-

chine, a pair of web cutting cylinders to receive and cut the pre-printed web lead from said roller, and means to guide the cut web portions into association with the webs being printed, at a point closely adjacent said folding mechanism.

6. In a printing machine having a multiplicity of webs being printed and running toward and into a folding mechanism, a roller normally driven in synchronism with the printing cylinder of said machine and disposed adjacent said folding mechanism, means acting upon said roller to retard or increase its normal rotating speed to register the printed impressions on a pre-printed web being moved thereby, with corresponding printed impressions on the webs being printed, means to control said registering means, said control means including a timing switch actuated in synchronism with a printing cylinder of said machine, and a photo-electric device adapted to be effected by marks disposed along the pre-printed web and spaced apart thereon an amount equal to the spacing of like impressions on the webs being printed by the printing cylinders.

7. In a printing machine, printing cylinders, a folding mechanism, said machine having a multiplicity of webs passing therethrough, being printed by said cylinders, and feeding toward and into said folding mechanism, a rotatable roller normally driven in synchronism with said printing cylinder and engaging a pre-printed web to move the same, means to affect the speed of rotation of said roller to register printed impressions thereon with corresponding impressions on the webs being printed, means to control said roller speed affecting means and operable to selectively retard or increase the speed of rotation of said roller, said roller being disposed adjacent said folding mechanism, means disposed between the roller and the folding mechanism to divide the printed web transversely into portions, means to receive and to guide the web portions toward said folding mechanism, and means driven in synchronism with said printing cylinders to urge the web portions through said guiding means and into said folding mechanism.

8. In a printing machine, the combination of printing cylinders, a web folding mechanism adapted to receive a plurality of webs being printed by said cylinders, a roller driven in synchronism with said cylinders and adapted to engage and drive a pre-printed web, said roller being disposed adjacent said folding mechanism between said cylinders and said folding mechanism, a web cutting device disposed between said roller and said folding mechanism to receive the web from said roller and divide it transversely into equal portions, web portion guiding means disposed between said cutting device and said folding mechanism, and a web portion engaging device disposed between said guiding means and said cutting device to urge the cut web portions through said guiding means and into said folding mechanism in timed relation with said printing cylinders and into association with the webs being printed as they are received by said folding mechanism.

9. The method of forming a folded product having, as an inset, a portion of a pre-printed web associated with the printed web from a printing machine which includes leading the pre-printed web to a point adjacent the other web, registering the printed impressions on the pre-printed web with a corresponding printed impression on the other web, partially cutting the

pre-printed web transversely across the same into sheets by cooperating cutting cylinders, then completing the cutting of the web into sheets by other cooperating cutting cylinders, then causing the severed sheets to be fed into association with the other web, and then folding the associated web and sheet.

10. In a printing machine, the combination of printing cylinders, a web folding mechanism adapted to receive a plurality of webs being printed by said cylinders, a roller driven in synchronism with said cylinders and adapted to engage and drive a pre-printed web, said roller being disposed adjacent said folding mechanism between said cylinders and the folding mechanism, a web cutting device adapted to cut the web transversely across the same at transversely spaced apart portions, another web cutting device adapted to connect the spaced apart cuts and complete the separation of a sheet from the web, said cutting devices being disposed between said roller and said folding mechanism, and sheet guiding means extending from said first web cutting device to said folding mechanism.

11. In a printing machine, the combination of printing cylinders, a web folding mechanism, adapted to receive a plurality of webs being printed by said cylinders, a roller driven in synchronism with said cylinders and adapted to engage and drive a pre-printed web, said roller being disposed adjacent said folding mechanism between said cylinders and the folding mechanism, a web cutting device adapted to cut the web transversely across the same at transversely spaced apart portions, another web cutting device adapted to connect the spaced apart cuts and complete the separation of a sheet from the web, said cutting devices being disposed between said roller and said folding mechanism, sheet guiding means extending from said first sheet cutting device to said folding mechanism, and means associated with said guiding means to engage the sheet therein and urge it in timed relation with said printing cylinders, into association with the webs being printed and as they are received by said folding mechanism.

12. In a printing machine, printing cylinders, a web folding mechanism, means to lead a printed web from said printing cylinders to the folding mechanism, means to feed a pre-printed web toward the folding mechanism, means following said web feeding means to partially cut the pre-printed web transversely into sheets, means following said partial web cutting means to complete the transverse cut to sever each sheet from the pre-printed web, and means to feed the severed sheet into said folding mechanism in synchronism with the printed web from said printing cylinders.

13. In a printing machine, printing cylinders, a web folding mechanism, means to lead a print-

ed web from said printing cylinders to the folding mechanism, means to feed a pre-printed web toward the folding mechanism, means to maintain the printed impressions on said pre-printed web with corresponding printed impressions on the web from said printing cylinders, means following said web feeding means to transversely and partially cut the pre-printed web into sheets, means following said partial web cutting means to complete the transverse cut to sever each sheet from the pre-printed web, and means to feed the severed sheet into said folding mechanism in synchronism with the printed web from said printing cylinders.

14. In a printing machine having web printing cylinders, a web folding mechanism to which the printed web is led to be folded thereby, a roller adapted to feed a pre-printed web toward said folding mechanism, cutters adapted to cut the pre-printed web into sheets directly before said folding mechanism, means adapted to act on said pre-printed web feeding roller to maintain corresponding printed impressions on the pre-printed web and on the web from the machine substantially in register, including control means effected by a mark on the pre-printed web to effect the web feeding movement of the roller, and control means actuated in synchronism with the printing cylinders to effect web feeding movement of the roller.

15. In a printing machine having web printing cylinders, a web folding mechanism to which the printed web is led to be folded thereby, a roller adapted to feed a pre-printed web toward said folding mechanism, cutters adapted to cut the pre-printed web into sheets directly before said folding mechanism, an electric motor drivingly connected to said roller, control means effected by a mark on the pre-printed web to actuate the motor to retard the roller, and control means operated in synchronism with the printing cylinders to actuate the motor to accelerate the roller.

16. In combination, a printing machine adapted to print upon a web running therethrough into a folding mechanism, web registering mechanism adapted to feed a pre-printed web toward said folding mechanism, a first pair of cooperating web cutting cylinders adapted to partially transversely cut the pre-printed web into sheets in advance of the folding mechanism, a second pair of cooperating web cutting cylinders disposed between the first web cutting cylinders and said folding mechanism to complete the partially transverse cut in the pre-printed web, and sheet gripping and feeding rollers following the second web cutting cylinders, to feed the cut sheet into the folding mechanism in synchronism with the printed web running into the same.

FREDERICK LAMATSCH.
ALBERT J. HORTON.