April 12, 1949. H. E. PEYREBRUNE ET AL 2,466,862

METHOD OF TRANSFERRING LAPPED SHEETS

Filed April 12, 1947 2 Sheets-Sheet 1

Fig. 1

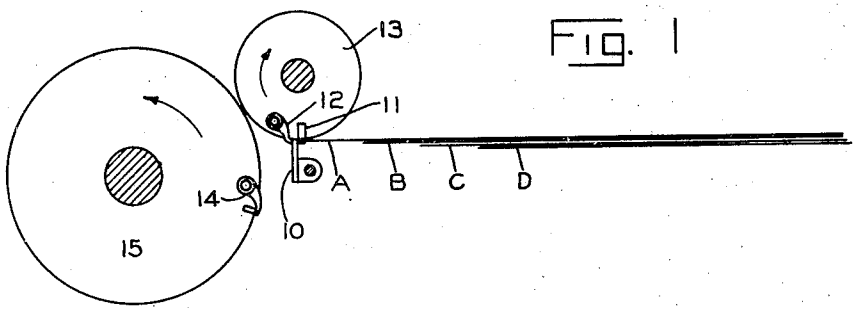


Fig. 2

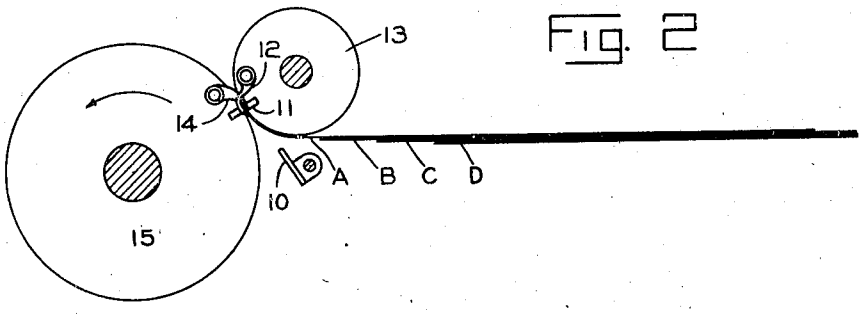


Fig. 3

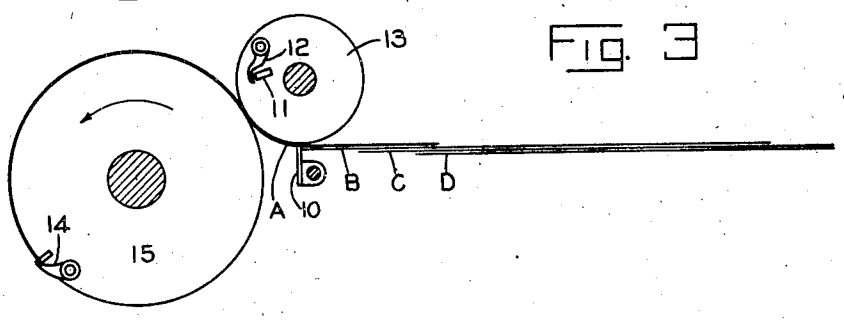
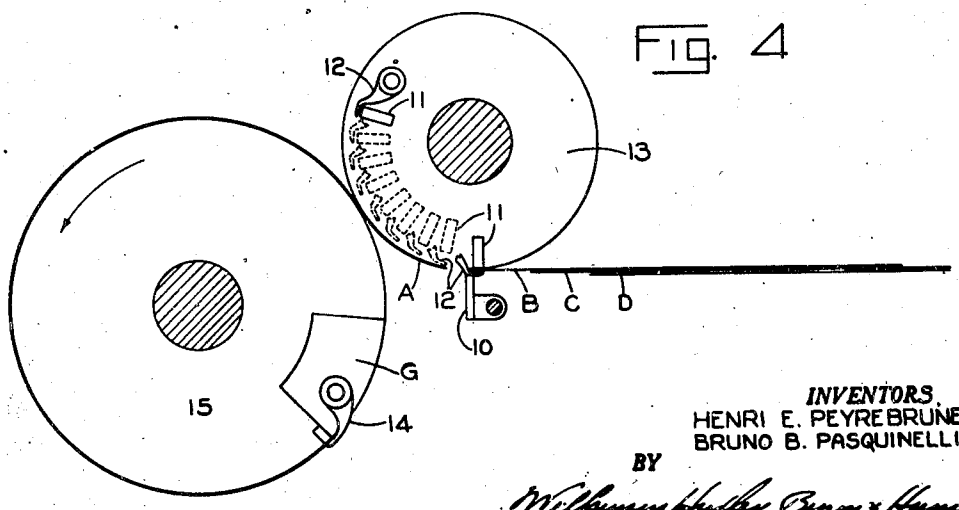


Fig. 4



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METHOD OF TRANSFERRING LAPPED SHEETS

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Fig. 5

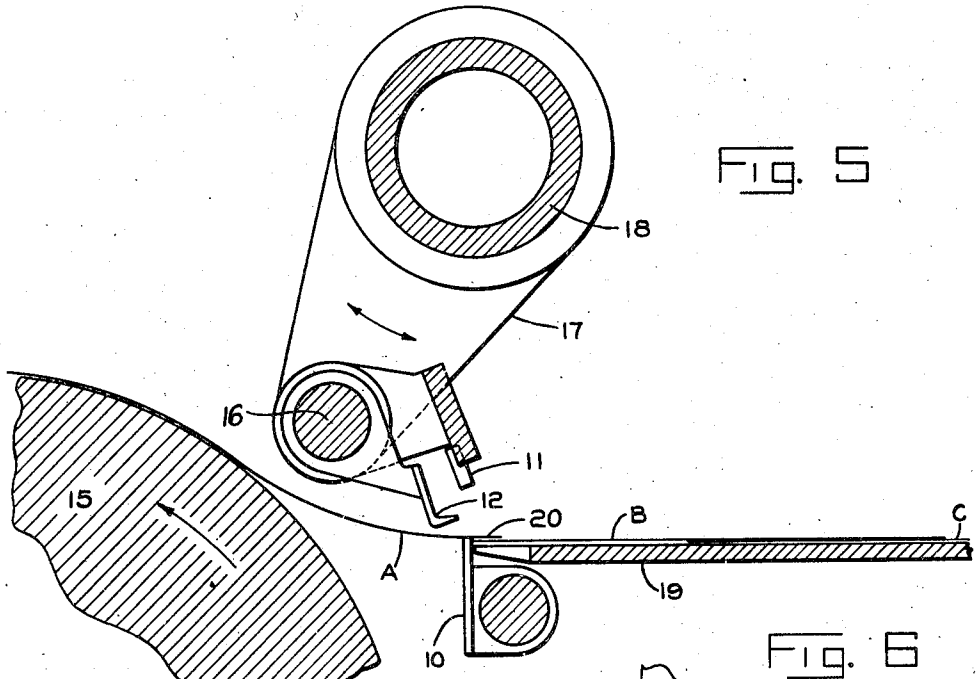


Fig. 6

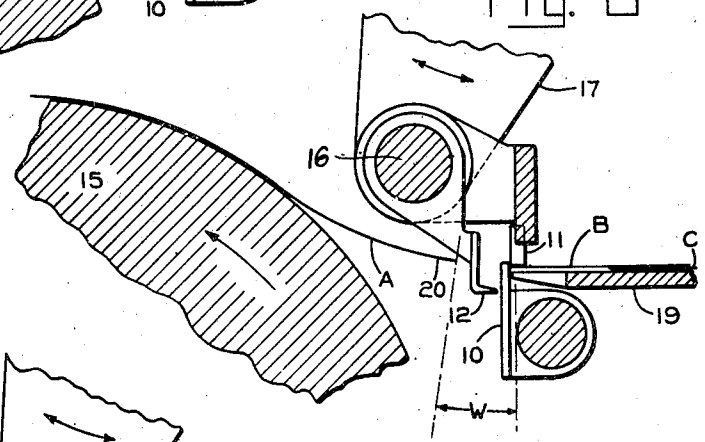
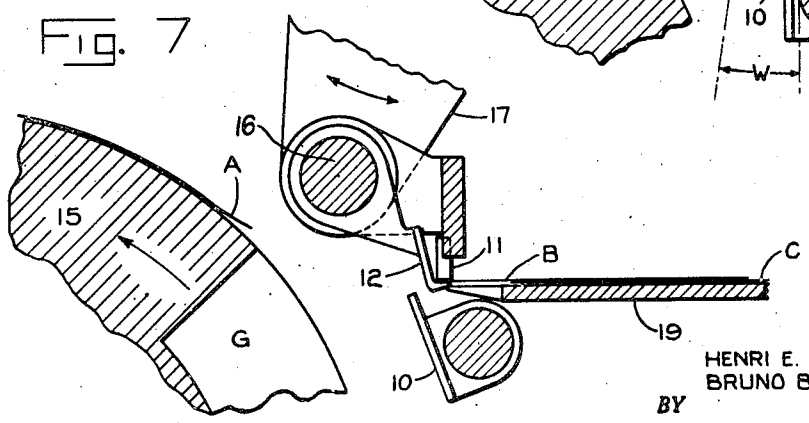


Fig. 7



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2,466,862

METHOD OF TRANSFERRING LAPPED SHEETS

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Application April 12, 1947, Serial No. 741,113

10 Claims. (Cl. 271—53)

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This invention relates in general to the art of feeding sheets, and its usefulness is found to have particular merit when applied to the method of feeding and registering sheets in lapped sequence and conveying a registered sheet from its support to a printing press or other sheet handling machine while a succeeding sheet in the process of being registered is still partially covered by it.

The invention more specifically pertains to an improvement in the method of transferring sheets by means of a moving sheet carrier operating either from above or from below a bank of fed sheets for the purpose of conveying registered sheets to an impression member of high speed cylinder printing presses of any class where perfect register of the sheets must be attained and maintained throughout the entire printing operation.

In more recent years the method of feeding sheets in lapped sequence has been adopted quite generally in connection with printing presses which are designed to operate at printing speeds much in excess of the average maximum speeds attained before.

One of the recognized advantages gained by feeding sheets in over-lapped or under-lapped sequence as compared with sheet-by-sheet feeding is that the speed at which the sheets travel towards the registering guides is reduced considerably. For example, if the number of such lapped sheets is five, then the speed at which the lapped sheets reach the front registering guides is substantially one-fifth of the speed at which a sheet, when fed individually, i. e. not in lapped relation, would reach the guides. This reduction in speed, however, merely facilitates the task of slowing down and stopping the sheets for the purpose of registering, but it does not provide any additional time for performing the actual registering operation on the sheets.

It is evident to anyone acquainted with the art of feeding sheets, that when sheets are being advanced to the registering guides in lapped relation but are not registered while in such sequence, or when sheets are fed to the guides individually, i. e. one by one, a registered sheet must be withdrawn completely from the guides before the latter can act on a subsequent sheet. This represents a loss of much valuable time.

In order to minimize such loss and to make additional time available for registering the sheets, the method of registering the sheets while lapped was developed. This method provides for further distinct advantages which include, for example, a decrease of the idle or non-printing period in the printing cycle.

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This non-printing period is represented by the circumferential dimension of the "gap" which is provided in the printing cylinders for purposes well known in the art. Consequently, the circumference of a cylinder becomes materially shortened while the effective printing area of the cylinder, however, remains the same. This, furthermore, results in an appreciable decrease in the cylinder diameter thereby materially reducing the cost of manufacturing the cylinders. Another advantage attributed to the decreased cylinder diameter is that the actual surface speed at which printing takes place is correspondingly reduced.

With the introduction of further improvements on high speed sheet fed printing presses, it becomes apparent that the above advantages gained by feeding sheets in lapped sequence and by registering the sheets while so lapped, are again subject to definite speed limitations. For instance, when sheets can be controlled at speeds not heretofore attained, the task of accurately registering the sheets at such increased speeds presents new problems, and again the primary requisite for solving such problems becomes that of gaining still more time for registering the sheets.

It is evident therefore, that the designers of sheet feeding and registering devices for such faster operating equipment are confronted with the problem of developing new means whereby additional time is made available for registering purpose. This we have successfully accomplished by the principle of our present invention.

The essentially new and basic principle of the invention resides in the provision of a novel procedure introduced into the method of registering and transferring lapped sheets to a sheet carrying member such as a printing cylinder or the like, according to which procedure, in addition to the registering time gained heretofore by lapped feeding and registering, still more time is made available.

We propose to accomplish this by an improvement which pertains more directly to the method and manner whereby the grippers of the sheet transfer mechanism, whether of the oscillating, rotary, or any other type, are actuated during that part of their motion when they move to engage a registered sheet prior to transferring it.

By the improved step we make available a certain time period in the cycle of transferring sheets, which heretofore remained idle, and to

utilize such period for the purpose of providing additional time to register the sheets.

While as stated, our invention is applicable to any type of sheet transfer mechanism, it is more particularly well adapted for use in connection with the oscillating type, which includes receding sheet grippers and associated grippers pads, the principle of which is disclosed for example in the prior Patent No. 1,790,457 issued to Joseph R. Blaine, January 27, 1931.

Some of the salient advantages gained by the introduction of our invention reside in:

Maximum possible utilization of the time available for registering, which results in maximum possible operating speeds for a given size sheet; simplification of the problem of clearing the tail end of a maximum size sheet, because the relative speed of the trailing portion of the withdrawn sheet and the returning grippers of the oscillating type of transfer mechanism is the sum of their respective speeds; in a transfer mechanism of the rotary type the condition would be somewhat less favorable because such relative speed is the difference of their respective speeds; greater convenience for adjusting the front registering guides and associated parts, and better visibility of and accessibility to all sheet registering and transferring elements.

One of the primary objects of our invention is to provide a novel step in the method of feeding and registering sheets in lapped sequence, whereby in addition to the time heretofore gained and explained herein, still more time is made available for that purpose.

A further object of our invention resides in the provision of a novel method which can be applied with particular advantage in connection with an oscillatng type of sheet transfer mechanism whereby during the return movement the sheet carrying elements, which transfer the registered sheets from their support to an impression member of a printing press, or to a sheet carrying member of any other sheet handling machine, are projected into and beyond the path described by a transferred sheet immediately after the trailing edge of such sheet has passed over and beyond the sheet registering means.

Still further objects and inherent advantages will become apparent from the following description and appended claims.

For the purpose of disclosing the basic principle of our invention, we have selected to illustrate it herein as applied to a sheet transfer mechanism of the oscillating type. It will become apparent to anyone acquainted with this art, however, that without departing from the fundamental concept the invention may be applied with advantage to sheet transfer mechanism of other types and designs.

In the accompanying drawings,

Figures 1, 2 and 3 show the general principle of feeding and registering a bank of lapped sheets and transferring individually registered sheets to a sheet receiving member such as an impression cylinder of a printing press;

Figure 4 illustrates schematically the path of the sheet gripping elements of the transfer mechanism which they follow during their return movement to the sheet engaging position where these elements again will grip and transfer a subsequent registered sheet to an impression cylinder or the like, having a gap G;

Figures 5, 6 and 7 illustrate at a larger scale the various positions assumed by the gripper elements of the sheet transfer mechanism immediately before and at the end of their return movement.

Referring now more specifically to Figures 1, 2 and 3, we have indicated schematically a bank of lapped sheets A, B, C and D, which may be of any predetermined length, advancing towards the front registering guides 10, and it will be seen that the leading edge of the uppermost sheet A of the lapped sheets is against said guides and already in the bite of the sheet gripping elements 11 and 12 provided on the transfer mechanism 13 which is about to move in the direction indicated by the arrow and thereby transfer the sheet to the open grippers 14 of the impression cylinder or the like 15.

Figure 2 depicts the position of sheet A while being transferred from the gripper elements 11 and 12 to the grippers 14 of the cylinder 15, the front guides 10 being about to return to their operative position as denoted in Figure 1.

In Figure 3 the sheet B has reached the front registering guides 10 and the leading portion of the sheet is still overlapped by the transferred sheet A while the latter is being withdrawn from its registering position. The gripper elements, namely the pads 11 and gripper fingers 12 are shown as having traveled beyond their sheet transferring position and are now receded from the path followed by the sheet A while it is being removed by the cylinder 15.

In the position indicated in Figure 4, which illustrates at a somewhat larger scale the path of the pads 11 and gripper fingers 12 followed during their return travel, the trailing edge of the transferred sheet A has just passed over and beyond the front guides 10, the gripper pads 11 have already moved down onto the leading edge of the now completely registered sheet B. The gripper fingers 12 which are shown as having projected into and beyond the path followed by the withdrawn sheet A, are about to close on the sheet B to thereupon transfer this sheet to the grippers 14 located within the gap G of the cylinder 15.

It will be understood that by the time the sheet B has been transferred to the cylinder grippers 14 and before the trailing edge of the sheet B has passed over and beyond the front guides 10, a position corresponding to that of the sheet A as illustrated in Figure 3, the succeeding lapped sheet C will have reached the registering guides 10. The same sequence of procedure applies of course to the lapped underlying sheet D and to any other subsequent lapped sheets that are fed towards the front guides 10.

Dealing now in more detail with the improvement which constitutes the basic principle of our invention, we refer more specifically to Figures 5, 6, and 7 of the drawings. The sheet gripping elements, namely the gripper supports or pads 11, and the gripper fingers 12 are preferably mounted on a common shaft 16 supported by an arm 17 to which oscillatory motion is imparted through the intermediary of a shaft 18 which forms part of the sheet transfer mechanism.

In Figure 5, the position of the sheet A which is being withdrawn from the registering table 19 is such that its trailing edge 20 is just about to pass over and beyond the front registering guides 10. The gripper pads 11 are about to move on to the leading edge of the next registered sheet B which still bears against said guides 10, and the gripper fingers 12 are ready to descend into the gap provided by the edge 20 of the sheet A and the guides 10 as soon as said edge has passed

a sufficient distance beyond the guides to provide a gap wide enough to clear the grippers. This position of the sheet A, guides 10, pads 11 and sheet gripper fingers 12 is indicated in Figure 6. The preferred angle, see W Figure 6, through which the trailing edge 20 of the sheet A should travel beyond the front guides 10 before the gripper fingers 12 are lowered into the position shown in Figure 6, is substantially 10°.

We find that under such conditions all of the additional time that can be made available in the process of transferring a registered sheet to the impression cylinder 15 or the like member and during the return travel of the sheet transferring members, is gained for the purpose of applying it to that period within which the sheets are to be registered.

In Figure 7 the gripper fingers 12 have moved up to close on the leading edge of the registered sheet B so that this sheet is now firmly held between the fingers 12 and associated gripper pads 11 and ready to be transferred to the cylinder 15. The front guides 10 are swung down to clear the sheet B as it is being withdrawn from the registering table 19 but these guides are returned to their operative position while the sheet B is still being withdrawn, in order to register the oncoming underlying sheet C during the withdrawal of sheet B.

It is of importance that the motion imparted to the gripper pads 11 and to the fingers 12 is preferably such that when these members are about to close on a sheet, they move in a substantially perpendicular direction to the top surface of the registering table 19 in such a manner that the position of the registered sheet shall not be disturbed. Furthermore, the direction of the motion should be parallel to the working i. e. registering surface of the front guides 10. This is accomplished by pivoting the fingers 12 and pads 11 about a common axis located substantially coincident to the path followed by the sheets as they are withdrawn.

A preferred mechanical means whereby the principle of our invention may be carried into effect is illustrated and described in the co-pending application for Letters Patent Serial No. 658,077, filed March 29, 1946, by Arthur G. Jacobson.

We are aware that the principle per se of transferring registered sheets to a printing press or the like by means of an oscillating transfer mechanism and that of withdrawing the sheet gripping elements from their operative path during their return travel is not new in the art. We make reference for example to the prior Patent No. 1,790,457 referred to herein. The mechanism disclosed in said patent, however, is not adapted for carrying out the principle of our improved method, because with the mechanism of the patent the grippers cannot be returned from their receded position until a transferred sheet is completely withdrawn beyond the operating zone of the sheet transfer mechanism.

It shall be understood that our invention is not restricted for use in connection with printing presses, or with any specific type of sheet transfer mechanism, since its basic principle may well be applied to any class of sheet handling machinery.

Furthermore, the application of our novel method is not to be limited in connection with any constructional details or arrangements of parts such as are illustrated and described herein merely by way of example, and therefore it is our aim to cover any method or modification thereof that will come within the scope and meaning of the appended claims.

We claim:

1. In the method of transferring registered sheets from a sheet support to a printing member or the like by means of a moving sheet carrier and including the steps of feeding sheets in lapped sequence over the support to registering guides, registering the foremost one of the lapped sheets, engaging the leading edge of the registered sheet by said carrier and transferring it to the printing member, receding the sheet engaging elements of said carrier from the path followed by the transferred sheet to clear it, advancing a succeeding lapped sheet against said guides and registering it while still lapped by the preceding sheet as it is being withdrawn, and moving the sheet carrier and said elements to assume the initial sheet engaging position, the provision of the novel step according to which during such movement said elements are projected into and beyond said path simultaneously with the passing of the trailing edge of the withdrawn sheet over and beyond said registering guides.

2. The method set forth in claim 1, in which the sheet engaging elements are closed on a registered sheet by imparting motion to said elements in substantially perpendicular direction to the sheet support.

3. In the method of transferring registered sheets from a sheet support to a printing member or the like by means of a moving sheet carrier and including the steps of feeding sheets in lapped sequence over the support to registering guides, registering the foremost one of the lapped sheets, engaging the leading edge of the registered sheet by said carrier and transferring it to the printing member, receding the sheet engaging elements of said carrier from the path followed by the transferred sheet to clear it, advancing a succeeding lapped sheet against said guides and registering it while still lapped by the preceding sheet as it is being withdrawn, and moving the sheet carrier and said elements to assume the initial sheet engaging position, the provision of the novel step according to which during such movement said elements are projected into and beyond said path simultaneously with the passing of the trailing edge of the withdrawn sheet through an angle of substantially ten degrees beyond said registering guides.

4. In the method of transferring registered sheets from a sheet support to a printing member or the like by means of a moving sheet carrier and including the steps of feeding sheets in lapped sequence over the support to registering guides, registering the foremost one of the lapped sheets, engaging the leading edge of the registered sheet by said carrier and transferring it to the printing member, receding the sheet engaging elements of said carrier from the path followed by the transferred sheet to clear it, advancing a succeeding lapped sheet against said guides and registering it while still lapped by the preceding sheet as it is being withdrawn, and moving the sheet carrier and said elements to assume the initial sheet engaging position, the provision of the novel steps according to which said elements during such movement are projected downwardly into and beyond said path simultaneously with the passing of the trailing edge of the withdrawn sheet over and beyond said registering guides, and are thereupon closed on a registered, lapped sheet by imparting motion to the elements in a substantially radial direction.

5. The method set forth in claim 4, in which the sheet engaging elements are closed on a registered, lapped sheet by imparting motion to said elements in substantially perpendicular direction to the sheet support.

6. The method set forth in claim 4, in which the sheet engaging elements are closed on a registered, lapped sheet by imparting motion to said elements in substantially perpendicular direction to the sheet support, and parallel to the working, i. e. registering surface of the registering guides.

7. The method of feeding sheets to a printing press or the like machine, which includes the steps of advancing a bank of sheets in lapped sequence to registering guides, registering the foremost sheet of said bank, engaging the leading edge of said sheet by means of oscillating sheet grippers or the like sheet carrier located above the path of the fed sheets to transfer the sheet to a receiving member, registering a succeeding sheet during the withdrawal of said foremost sheet and while still lapped thereby, receding said grippers from the path of the withdrawn sheet and after it has been transferred to said member, returning the grippers while so receded to their sheet engaging position, and at the end of such return movement projecting the grippers into and beyond the path followed by the transferred sheet simultaneously with the passing of the trailing edge of said sheet over and beyond the registering guides.

8. The method set forth in claim 7, in which the sheet grippers are returned to their sheet engaging position by imparting motion thereto substantially perpendicular to the registered sheet of the bank.

9. The method set forth in claim 7, in which the sheet grippers are returned to their sheet engaging position by imparting motion thereto substantially perpendicular to the registered sheet of the bank, and parallel to the working, i. e. registering surface of the registering guides.

10. The method of feeding sheets to a printing press or the like sheet processing machine, including the steps of registering the foremost one of a bank of lapped sheets, withdrawing the registered sheet from said bank and transferring it to a sheet carrier by means of an oscillating sheet transfer mechanism having gripper fingers and associated pads, said fingers and pads being pivoted about a common axis located substantially coincident to the path followed by the withdrawn sheet, receding said fingers and pads from said path, advancing a subsequent, lapped sheet for the purpose of registering it while still lapped by the preceding sheet, returning said fingers and pads to their sheet engaging position, projecting said gripper fingers downwardly beyond the path followed by a sheet while being withdrawn and simultaneously with the passing of the trailing edge of the withdrawn sheet beyond the leading edge of the subsequent registered sheet, and then moving said fingers and said pads relative to each other and in a direction substantially at right angles to said bank of lapped sheets to grasp the subsequent sheet while maintaining its register.

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