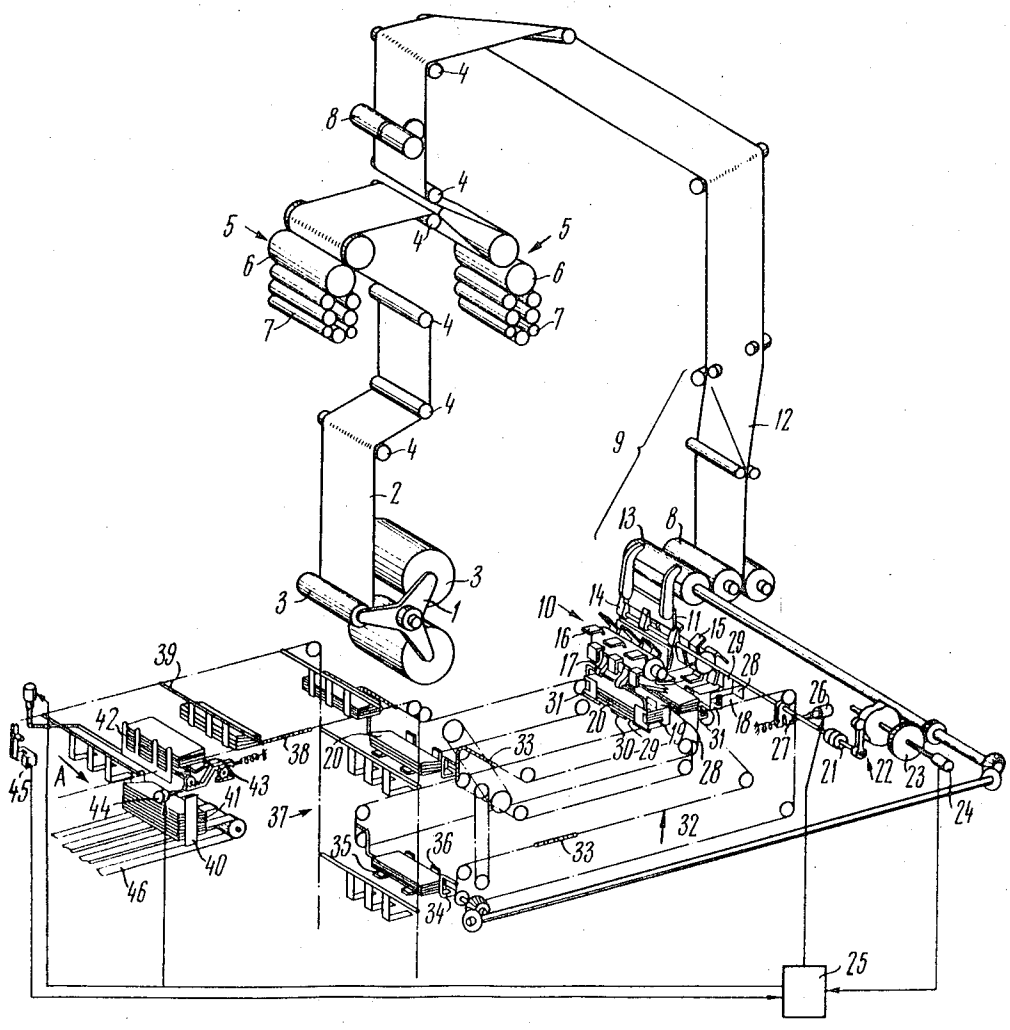
Nov. 7, 1972 Y. E. DICHINSKY ET AL 3,702,186

ROTARY WEB PRINTING MACHINE

Filed Feb. 18, 1971



United States Patent Office 3,702,186 Patented Nov. 7, 1972

3,702,186

ROTARY WEB PRINTING MACHINE

Yakov Efimovich Duchinsky, Kiev, Grigory Avramovich Radutsky, Moscow, Rafail Efimovich Kheifets and Grigory Iosilfovich Zax, Kiev, and Nikolai Ivanovich Anikanov, Leonid Pavlovich Grachev, and Mikhail Evseevich Frumkin, Moscow, U.S.S.R., assignors to Izdatelstvo "Izvestia," Moscow, U.S.S.R.

Filed Feb. 18, 1971, Ser. No. 116,547
Int. Cl. B41f 13/58
U.S. Cl. 270—6 5 Claims

ABSTRACT OF THE DISCLOSURE

A rotary web printing machine, such as a newspaper printing machine and the like is disclosed, of which the principal characteristic feature is that the delivering apparatus for delivering folded sheets, e.g. newspapers from said machine comprises a deflector for directing the folded sheets leaving the folder of the machine alternatingly along two different paths, into either one of two flyer drums disposed side-by-side under this deflector, each flyer drum being associated with a comb rest removing the folded sheets from the flyer drum and directing them into the respective bin disposed therebelow, in which a stack of folded sheets is formed.

The present invention relates to web printing machines, particularly, to newspaper printing machines.

The known rotary web printing machines usually comprise means for feeding a paper web into a system conveying this web through the machine in the course of a printing operation, a printing section with printing plates e.g. stereoplates, from which the web is imprinted, a unit for inking the printing plates, a sheeting device for longitudinally slitting and transverse cutting of the imprinted web into separate sheets, a folder for folding these sheets, and a delivery for delivering the folded sheets from the machine.

The folded sheet delivery of the known machines comprise a flyer drum mounted downwardly of the folder, the flyer drum being a continuously rotated drum with a plurality of pockets formed between thin bent plates (the flyer sticks), a comb rest disposed under the flyer drum for removing the folded sheets therefrom, and a conveyor system receiving the folded sheets from the comb rest and carrying them for subsequent piling into stacks and packs.

The abovedescribed known machine delivers the printed product in the form of a continuous train of partly overlapping folded sheets, e.g. to folded newspapers. In order to re-arrange these folded sheets into stacks and packs, either tape or chain conveyors are used which forward the folded sheets toward the piling operations.

The commonly used known apparatus for forming stacks and packs of folded sheets comprises a system of interconnected conveyors having different linear speeds, these conveyors being coupled with the conveyors delivering the train of folded sheets from the rotary printing machine; they receive the train, expand it longitudinally into a succession of longitudinally spaced folded sheets and forward this succession toward a deflector distributing the folded sheets into stacking bins. Each of the stacking bins has mounted thereabove an additional deflector which is alternatingly pivoted in opposite directions, whereby the folded sheets collected in the bin have their folds facing opposite directions and thus packs of folded sheets are formed (see, for example, the German Pat. No. 1,179,560).

The known machines delivering their product in the form of a continuous train of overlapping folded sheets, it becomes necessary to use special devices for transforming this train into a succession of spaced folded sheets, in order to collect the sheets into stacks and packs, these devices considerably complicating the equipment used and the technology of the process.

The known apparatus for forming stacks of folded sheets, e.g. of newspapers, include means for programming the operation of collection of stacks, and means for counting newspapers which are to be collected into stacks, and then—into packs. The general practice being that up to 70 percent of the daily run of newspapers are to be delivered in the form of standard packs, i.e. packs in which each stack has a standard predetermined number of newspapers, it becomes unnecessary to employ newspaper-counting programming devices for the purpose, it should be remembered that these devices complicate the equipment used.

As it has been already mentioned the known machines deliver their product in the form of a train of partly overlapping newspapers which are to be fed one-by-one and counted for the purpose of collection of stacks and packs; thus, it is necessary to employ newspaper-counting means mounted somewhere along the path of the progress of the train of newspapers, whereby not only the program control device becomes more complicated, but the reliability of the performance of the machine, as a whole, becomes affected.

The known apparatus is an all-purpose one: it collects both standard and non-standard packs and counts the number of newspapers in every stack, notwithstanding whether the stack will go into a standard pack or into a non-standard one. However, the amount of newspapers in every stack which is intended for a standard pack is the same. Thus, it is logical to employ a program control device to count newspapers only in those stacks which are to go into non-standard packs, otherwise the operation of the machine becomes unnecessarily complicated, and the service life of the program control device is shortened.

The known apparatus offers no possibility of separating individual stacks of newspapers and delivering them independently of others. However, in certain cases, e.g. when newspapers of different titles are to be combined within a common pack, this independent delivery of stacks becomes essential.

It is the main object of the present invention to provide a rotary web printing machine which should deliver the printed product in the form of stacks of folded sheets.

It is another object of the present invention to provide a rotary web printing machine, such as a newspaper printing machine and the like, which should incorporate simple means for obtaining uniform stacks of folded sheets without the necessity of using a program control device, i.e. a device effecting control according to a preset program, for the purpose.

It is yet another object of the present invention to provide a rotary web printing machine which should be capable of collecting and delivering non-standard packs of folded sheets and which should not necessitate the use of counter means mounted along the path of the progress of folded sheets and initiating the operation of the program control device.

It is a further object of the present invention to provide a rotary web printing machine which should be capable of collecting both standard and non-standard packs and which should incorporate simple means for effecting the control over collection of uniform stacks of folded sheets for standard packs, without the necessity of using the program control device for the purpose.

It is also an object of the present invention to provide a rotary web printing machine which should deliver the printed product in the form of multi-stack packs.

These and other objects are attained in a rotary web printing machine, such as a newspaper printing machine and the like, comprising means for feeding a paper web into the system of means conveying said web through the machine, a printing section with printing plates, e.g. stereoplates, for imprinting said paper web, means for inking said printing plates in operation, a device for sheeting said web into separate sheets, a folder for folding said sheets, and a delivery apparatus for delivering said folded sheets from said machine, including flyer drum means adapted to receive said folded sheets and a comb rest for removing said folded sheets from said flyer drum, in which machine, in accordance with the present invention, there is provided a deflector means for selectively varying the path of said folded sheets coming from said folder, said deflector means being mounted at the outlet of said folder, there being mounted downwardly of said deflector means a pair of said flyer drum means, arranged side-by-side and adapted to alternatingly receive said folded sheets directed into either of them by said deflector means, each said flyer drum means being associated with a comb rest; and a pair of folded sheet stacking bins positioned, respectively, below said comb rests associated with said two flyer drum means.

According to one embodiment of the present invention, said rotary web printing machine comprises mechanical coupling means between said deflector means and the drive of said folder, in order, to collect uniform amounts of said folded sheets in said stacking bins.

In a rotary web printing machine, constructed in accordance with the present invention, in order to collect said folded sheets into stacks having the number of said folded sheets therein varying according to a pre-set program, it is advisable for said deflector means to be operatively connected with an actuator controlled by a program control device including sensing means operatively connected with said drive of said folder.

Said deflector means can be connected with said drive of said folder through a selectively engageable clutch.

It is further advisable for said bins adapted to collect therein said stacks of said folded sheets to be connected through conveyor means with another bin for collecting there in side said stacks into multi-stack packs.

It is an essential feature of the present invention that it makes use of the inherent ability of a rotary web printing machine to deliver folded sheets one by one from the folder thereof, and thus the invention provides for doing without the equipment for arranging the folded sheets into a continuous train conveyed from the machine and then for re-arranging this continuous train into a succession of spaced folded sheets.

The present invention will be better understood from the following detailed description of a preferred embodiment thereof, with reference being had to the appended drawing showing schematically the general view of a rotary web printing machine constructed in accordance with the invention.

In the drawing, a rotary web printing machine comprises a unit **1** for unwinding paper web **2** from a supply reel **3** and feeding the web into a system of forwarding rollers **4** adapted to advance the web **2** through the machine in the course of printing; a printing section **5** where the web **2** is imprinted from printing plates, or former **6**, e.g. stereoplates; an inking unit **7** applying printing ink onto the printing plates **6**, a sheeting unit **8** where the imprinted web **2** is severed into separate sheets; a folder **9** folding the sheets severed by the unit **8**, and a delivery **10** delivering folded sheets **11**, e.g. newspapers from the machine.

The folder **9** includes a former **12** on which the passing web **2** receives a longitudinal fold and a folder drum **13** which completes the operation of folding the newspapers.

The delivery **10** includes a pivotable deflector **14** for selectively directing the flow of folded newspapers **11** along either of two alternative paths; a pair of flyer drums **15** and **16** arranged side-by-side below the deflector **14**, a pair of comb rests **17** adapted to remove the newspapers **11** from the respective flyer drums **15** and **16**, and a pair of stacking bins **18** and **19** positioned directly below the respective comb rests **17** and adapted to collect stacks **20** of newspapers **11** therein.

The pivotable deflector **14** is operatively connected with the drive (not shown) of the folder drum **13** through a clutch **21**, a cam-and-follower mechanism **22** and a train of gears **23**.

Also connected to the drive of the folder drum **13** is a sensor **24** which sends electric pulses to a program control device **25** in response to successive revolutions of the folder drum **13**.

The deflector **14** is also operatively connected with an electromagnet **26** actuating the deflector through a spring-biased arm **27**.

The electromagnet **26** is selectively energized by the program control device **25**.

The bins **18** and **19** are of an identical structure, each of them having a longitudinal wall **28** with a plurality of parallel vertical slits **29** cut therein, the slits **29** merging with similar slits cut in the bottom **30** of the bin, the longitudinal wall of each bin, opposite to the wall **28**, being made up by a pair of spring-biased flaps **31** pivotable each about a vertical axis.

A pair of conveyors **32** underlie, respectively, the bins **18** and **19**, each conveyor including two parallel endless roller chain **33** arranged vertically and supporting therebetween a plurality of carriages **34**.

The carriages **34** are pivotably connected to their supporting chains **33**, each carriage including a series of parallel angle members **35** of which the vertical legs **36** are adapted to pass through the slits **29** of the respective bins **18** and **19**, as the carriages **34** are driven past these bins.

The delivery, or unloading end portions of the two conveyors **32** are positioned, respectively, one above the other and are arranged to operate in conjunction with the vertical run of a secondary conveyor **37** having a pair of vertically arranged endless chains **38** supporting therebetween a succession of carriages **39**, the latter being similar in structure to the carriages **34** and likewise including parallel angle pieces of which the horizontal legs are adapted to pass through the spaces between the adjacent horizontal legs of the carriages **34** of the conveyors **32**, as the carriages **39** are driven past the carriages **34**.

The conveyors **32** and **37** are actuated from the drive system of the folder drum **13**, and thus their operation is synchronized.

Positioned below the horizontal run of the conveyor **37** is a bin **40** where the stacks **20** of newspapers **11** are piled into packs **41**. Positioned above the bin **40**, adjacent to the downflow (in the direction of the progress of the carriages **39**) wall thereof is a comb rest **42** associated with means for selectively actuating the rest **42** in a vertical plane.

The bin **40** is covered from above with a pair of pivotable spring-biased flaps **43** openable into the bin **40**, the flaps being actuated by an electromagnet **44**.

Mounted adjacent to the conveyor **37**, directly behind the bin **40** in the direction of the progress of the conveyor, is a transducer **45**, e.g. a limit switch, responsive to the passage therealong of the successive carriages **39** and wired into the energization circuit of the electromagnet **44**, whereby the transducer participates in energization of the last-mentioned electromagnet, so as to open the flaps **43**.

The bottom of the bin **40** is formed by the tapes of tape conveyor **46** adapted to carry away the packs **41** of newspapers **11** for subsequent treatment.

The herein disclosed rotary web printing machine operates, as follows.

A supply reel **3** with the paper web **2** thereon is mounted in the web feeding unit **1** where the web is unwound from the reel and fed into the system of the forwarding

rollers 4 advancing the web through the machine. The web is printed upon by the printing plates 6 of the printing section 5. The plates are inked by the operation of the inking unit 7.

The imprinted web is longitudinally folded by the former 12 and is slitted and severed into separate sheets by the sheeting device 8 in interaction with the folder drum 13 which turns out folded newspapers 11.

Let us now consider the mode of operation of the herein disclosed machine, according to which the machine delivers folded sheets, e.g. newspapers, in separate stacks, with the folds of newspapers in two adjacent stacks facing opposite directions. Within this mode of operation the clutch 21 is engaged, providing operative coupling of the deflector 14 with the drive of the folder drum 13 through the gear train 23 and the cam-and-follower mechanism 22, whereas the electromagnet 26 adapted to actuate the deflector 14 is deenergized.

The ratio of the gear train 23 and the cam-and-follower mechanism 22 are selected to actuate the deflector 14 between two alternative operating positions after each predetermined number of full revolutions of the folder drum 13.

With the deflector 14 having been actuated into its operating position shown in the appended drawing, successive folded newspapers leaving the folder drum 13 are directed by the deflector 14 into the pockets of the rotating flyer drum 15. As the latter rotates, the flyer sticks thereof pass through the gaps between the teeth of the comb rest 17 which stacks the newspapers in the bin 18, in which manner a stack containing a predetermined amount of newspapers is collected in the bin 18 prior to the next successive actuation of the deflector 14.

Upon the deflector 14 having been actuated into its other operating position, a similar stack of newspapers is likewise collected in the other bin 19, the folds of newspapers in the respective stacks in the two bins facing opposite directions.

The drive of the conveyors 32 is synchronized, as it has been mentioned hereinabove, with that of the folder drum 13 and is so calculated that when the predetermined stack 20 of newspapers is collected in either of the two bins 18 and 19, the carriage 34 of the respective one of the two conveyors 32 is driven past this bin, the vertical legs 36 of the carriage passing through the slits 29 in the longitudinal wall and the bottom of the bin and thus snatching the stack 20 of newspapers and carrying it toward the conveyor 37, the stack opening the spring-biased flaps 43 as it passes by them.

The respective lengths of the two conveyors 32 and the respective numbers of the carriages 34 supported thereby are so selected that two respective carriages 34 of the two conveyors 32 enter simultaneously the zone of interaction thereof with the carriages 39 of the conveyor 37.

Transfer of the stacks 20 from the carriages 34 onto the rising carriages 39 is effected by the horizontal legs of the latter passing between the horizontal legs 35 of the carriages 34.

The spacing between each adjacent pair of the carriages 39 of the conveyor 37 is so related to the vertical spacing between the two conveyors 32, that two adjacent carriages 39 simultaneously remove the stacks from the two respective carriages of the conveyors 32 which have entered the zone of interaction therebetween.

The conveyor 37 carries the stacks 20 away for subsequent treatment, e.g. for combining them with stacks of newspapers of different titles, or else for collecting the stacks 20 into packs 41 in the bin 40.

In the last-mentioned case, the movable comb rest 42 is advanced into the path of the progress of the carriages 39, the teeth of the comb 42 passing between the legs of the carriages 39 and arresting the stacks of newspapers carried thereby to rest on the flaps 43. When the successive carriage 39 passes beyond the bin 40, it actuates the transducer 45, whereby the electromagnet 44 is energized to open the flaps 43 into the bin 40, and the pack of newspapers falls into the bin, either upon the floor thereof made up by the conveyor tapes 46, or on top of the stack already there.

The electromagnet 44 is then deenergized, and the flaps 43 are spring-returned into their closed position, until the next successive carriage 39 interacts first with the rest 42 and then with the transducer 45, whereby the successive stack falls into the bin 40, the folds of the newspapers in this stack facing the direction opposite to that faced by the folds of the newspapers in the previous stack.

Successive stacks are piled in the bin 40 in the above-described manner, until a predetermined amount of them is collected therein.

A program control system of any known structure can be provided to preset the number of stacks to be collected into a pack in the bin 40, this system being associated, e.g. with the trandsucer 45.

After a predetermined pack 41 has been collected in the bin 40, the conveyor 46 is actuated to carry the pack away, e.g. for packaging.

In order to collect non-standard packs of newspapers, wherein the stacks should contain different amounts of newspapers, the clutch 21 is disengaged, whereby the deflector 14 becomes disconnected from the drive of the folder drum 13, and the electromagnet 26 is operated to actuate the deflector 14.

In this case actuation of the deflector 14 is controlled by commands sent by the program control device 25 operating along a preset program, in response to signal pulses coming from the transducer 24 connected with the drive of the folder drum 13.

As it can be seen from the above description, the herein disclosed rotary web printing machine delivers printed matter in packs collected at a maximal running speed of the printing machine proper, whereby not only there is eliminated the necessity of employing specific equipment for collecting such packs outside the machine and means for conveying newspapers to this equipment, but there is also provided a possibility of reducing the number of printing machines engaged in the printing of the daily run of newspapers.

What is claimed is:

1. A rotary web printing machine, such as a newspaper printing machine and the like, comprising:

a system of conveying means for conveying a paper web through said machine, means for feeding said paper web to said conveying means, a printing section, printing plates in said printing section for imprinting said web therefrom, means for inking said printing plates, a device for sheeting said web into sheets, a folder for folding said sheets, said folder having an outlet portion, a drive of said folder, and apparatus for delivering folded sheets from said machine, deflector means for selectively varying the paths of said folded sheets in said delivering apparatus, said deflector means being positioned adjacent to said outlet portion of said folder, a pair of flyer drums in said delivering apparatus, adapted to receive alternatively said folded sheets directed by said deflector means, said pair of flyer drums being positioned in a side-by-side relationship below said deflector means, each said flyer drum being associated with a comb rest, and a pair of bins positioned, respectively, below said comb rests of said pair of flyer drums, said bins being adapted to collect stacks of said folded sheets therein side.

2. A rotary web printing machine, as set forth in claim 1, wherein said deflector means is operatively connected with said drive of said folder, whereby said stacks collected in said bins contain the same amount of said folded sheets therein.

3. A rotary web printing machine, as set forth in claim 1, wherein said deflector means is associated with an actuator controlled by a program control device includ-

ing sensing means operatively associated with said drive of said folder, whereby said stacks collected in said bins can contain therein different pre-set amounts of said folded sheets.

4. A rotary web printing machine, as set forth in claim 2, comprising a selectively disengageable clutch included into said operative connection between said deflector means and said drive of said folder.

5. A rotary web printing machine, as set forth in claim 1, comprising a further bin for combining therein side said stacks of said folded sheets collected in said previously mentioned bins into multi-stack packs, and conveyor means for conveying said stacks from said bins to said further bin.

References Cited

UNITED STATES PATENTS

1,856,912	5/1932	Sherman et al.	270—52.5
2,904,332	9/1959	Metzner	271—2.1
3,596,899	8/1971	Fulk	270—52.5

LOUIS G. MANCENE, Primary Examiner

G. E. McNEILL, Assistant Examiner