

[54] **WEB-FED ROTARY PRESS**
 [76] Inventors: **Leonid Pavlovich Grachev**, ulitsa Serafimovicha, 2, kv. 181, Moscow; **Nikolai Ivanovich Anikanov**, Moscow; **Susanna Pavlovna Anikanova**, Bolshaya Bronnaya ulitsa, 2/6, kv. 6, Moscow; **Grigory Tosifovich Zax**, ulitsa Mechnikova, 14a, kv. 24, Kiev; **Grigory Avramovich Radutsky**, 16 Parkovaya ulitsa, 49, korpus 2, kv. 68, Moscow; **Rafail Efimovich Kheifeis**, Brest-Litovsky prospekt, 162, kv. 30, Kiev, all of U.S.S.R.

2,668,483 2/1954 Sykes..... 93/93 DP
 1,266,737 5/1918 Wood et al. 271/64 UX
 1,985,547 12/1934 Quick et al. 271/80 X
 1,637,170 7/1927 Zuckerman..... 271/80 X

Primary Examiner—Wm. H. Grieb
 Assistant Examiner—L. R. Oremland
 Attorney, Agent, or Firm—Holman & Stern

[22] Filed: **June 5, 1972**

[21] Appl. No.: **259,843**

[30] **Foreign Application Priority Data**
 Sept. 10, 1971 U.S.S.R..... 1693457

[52] **U.S. Cl.** **270/6**

[51] **Int. Cl.**..... **B41f 13/58**

[58] **Field of Search** 270/6, 7, 10, 11, 41-44;
 271/52, 59, 80; 93/93 DP

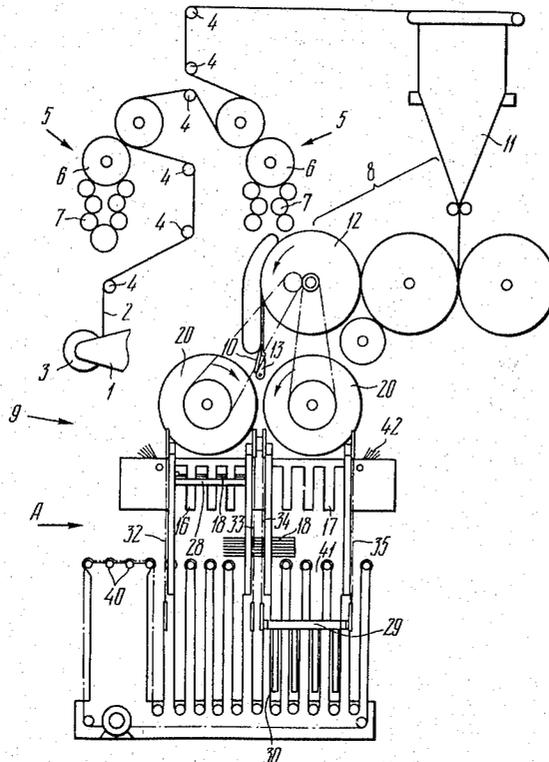
[56] **References Cited**
UNITED STATES PATENTS

3,702,186 11/1972 Dichinsky et al. 270/6
 3,547,430 12/1970 Assony..... 270/79
 1,232,776 7/1917 Dill 271/80

[57] **ABSTRACT**

A web-press fed rotary wherein the bottoms of the hoppers in which the newspapers are accumulated into piles are each formed by a pair of fork-like flaps with the teeth facing one another, mounted for reciprocation in a vertical plane from the drive of the fly-type delivery drum, the flaps transferring the accumulated piles of newspapers onto the delivery conveyor in the form of a rollerway. Mounted under each comb is a means for one-by-one compression of the folds of the newspapers being accumulated into the pile, driven from the drive of the fly-type delivery drum, the drive of the flaps including a mechanism for varying the speed of the motion of these fork-like flaps during an operation of accumulation of a pile of newspapers. The walls of the hopper have slots for the passage of the teeth of the fork-like flaps and of the working members of the newspaper fold compression means into the hopper and the limiting discs are provided with means for levelling out the newspapers carried in the successive pockets of the fly-type delivery drum.

5 Claims, 3 Drawing Figures



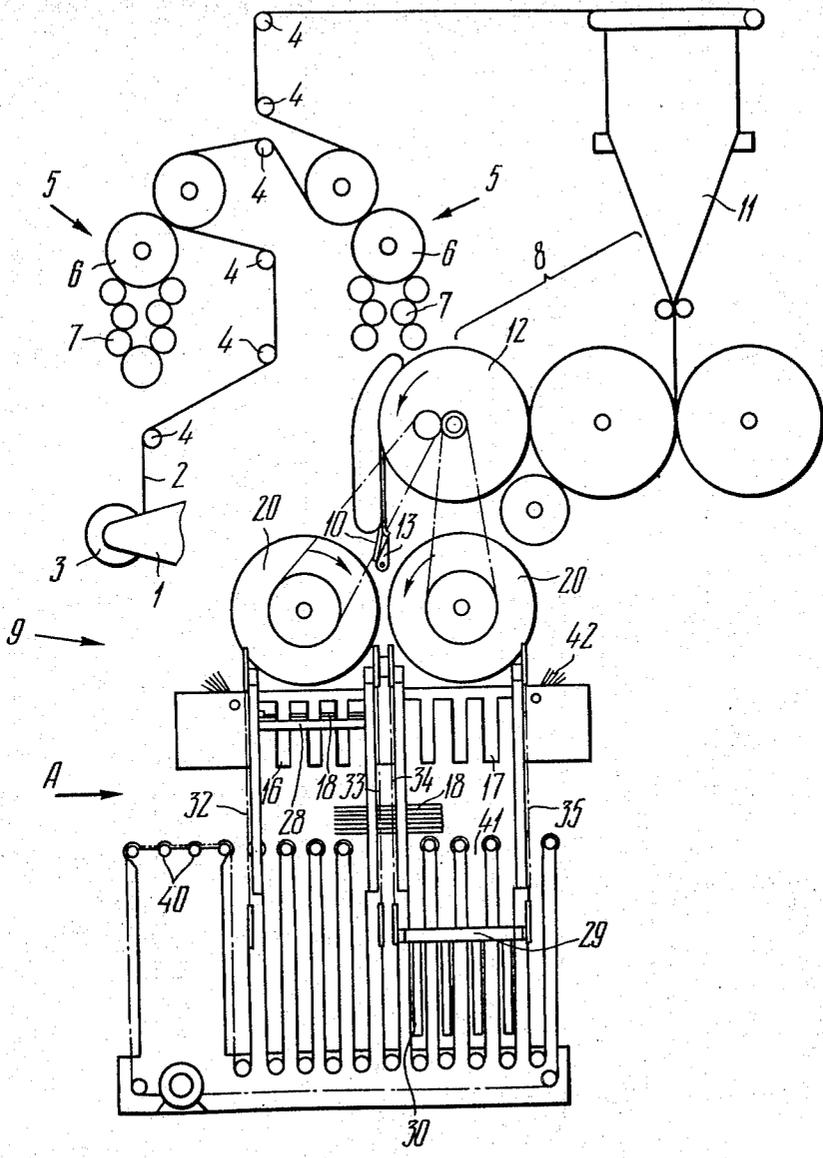


FIG. 1

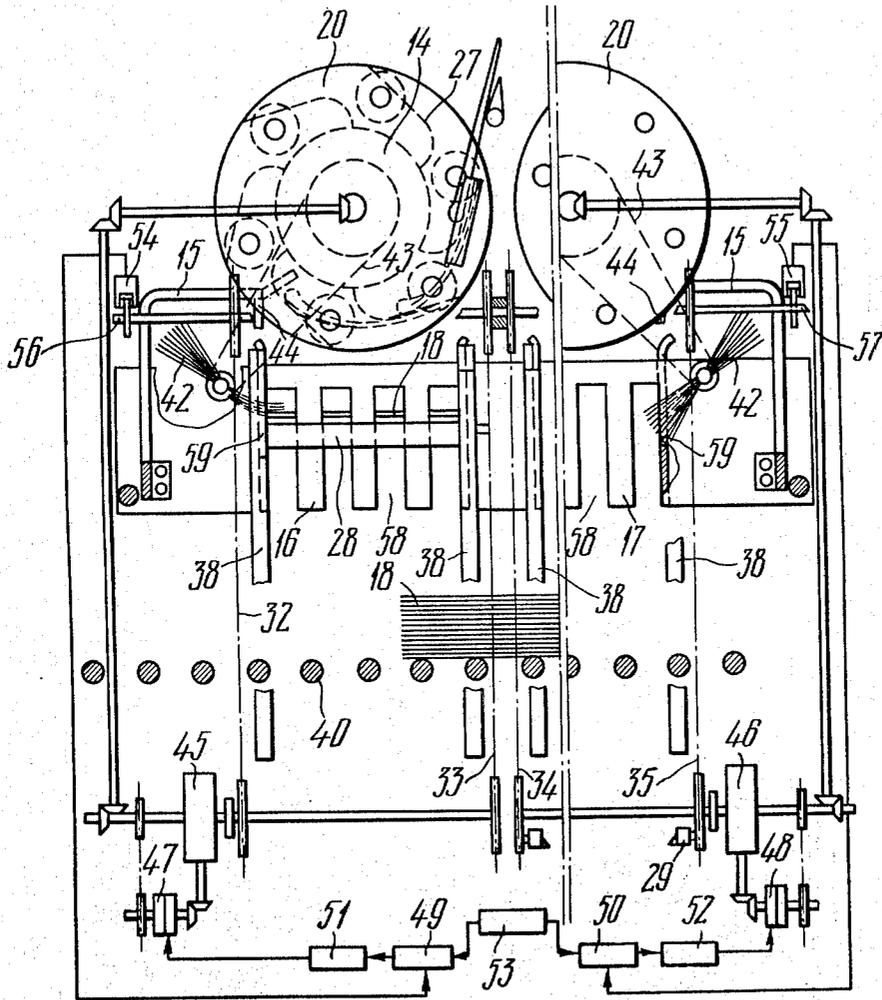


FIG. 3

WEB-FED ROTARY PRESS

BACKGROUND OF THE INVENTION

The invention relates to web-fed rotary presses for printing books, magazines, and, particularly, newspapers.

There is known a web-fed rotary press, comprising an apparatus for feeding a paper web into a system of guiding means forwarding the web through the press during a printing operation, a printing unit with printing plates inked in operation, means for slitting the imprinted web longitudinally and cutting it transversely, a folder for folding the severed sheets and a delivery carrying the folded newspapers from the press.

The delivery of the known press includes a deflector mounted at the outlet of the folder, for varying selectively the direction in which the newspapers are delivered from the folder, there being mounted in a side-by-side relationship downwardly of the deflector a pair of newspaper-receiving fly-type delivery drums associated with comb rests, and hoppers mounted downwardly of said comb rests for accumulating piles of the newspapers thereinside (see the Application filed by the same authors in the USA, No 116,547, dated Feb. 18, 1971).

The known press further includes a system of conveyors connecting the hoppers in which the piles of the newspapers are accumulated with hoppers wherein the piles are assembled into batches.

Besides, many known web-fed rotary presses include limiting discs mounted on the shaft of the fly-type delivery drum, at both sides of the latter, for guiding the newspapers into the successive pockets of this drum.

The above-described known web-fed rotary press, although offering delivery of the newspapers in the form of piles and batches, is, however, not free from certain disadvantages which decrease the efficiency of its performance.

Thus, as the newspapers are placed into the hoppers wherein the piles of the newspapers are being accumulated, the piles produced are uneven on the side of the folds, because a pile accumulation operation the level onto which the successive newspapers are placed continuously varies.

The incorporation in the known press of a system of conveyors of which the first two take the accumulated piles from the respective hoppers and transfer them onto the third conveyor, where the piles are assembled into batches, complicates the structure of the press.

The limiting discs, although assisting in guiding the newspapers into the pockets of the fly-type delivery drum, do not, however, ensure accurate and even placing of the newspapers, as the latter get into the hopper, whereby the lateral sides of the pile become uneven.

SUMMARY OF THE INVENTION

It is an object of the present invention to create a web-fed rotary press which is of a relatively simple structure and which ensures delivery of compressed piles of newspapers, the piles having their fold side and two lateral sides sufficiently even.

This object is attained in a web-fed rotary press comprising a folder and a system for delivering folded newspapers from the press, including a deflector for selectively varying the direction of the delivery of the news-

papers, the latter being received by fly-type delivery drums provided with limiting discs and comb rests guiding the newspapers into hoppers mounted under each one of the comb rests, and a system of conveyors for carrying the piles of the newspapers accumulated in the hoppers away from the hoppers, in which press, in accordance with the invention, the bottom of each hopper consists of a pair of fork-like flaps having the teeth facing one another, the flaps being mounted for reciprocation in a vertical plane under the influence of the drive of the fly-type delivery drums for transferring the accumulated piles of the newspapers upon the delivery conveyor in the form of a rollerway, there being mounted downwardly of each comb rest a means for one-by-one compression of the folds of the newspapers being accumulated in the pile, driven from the drive of the fly-type delivery drums. The drive of the fork-like flaps include a mechanism for varying the speed of the flaps during an operation of accumulation of a pile of the newspapers and the walls of the hoppers have slots for the passage of the teeth of the fork-like flaps and of the working members of the newspaper fold compressing means into the hoppers. The limiting discs are associated with means for levelling out the newspapers carried in the successive pockets of the fly-type delivery drums.

It is advisable that the fork-like flaps should be mounted pivotally on vertical chain conveyors, arranged for simultaneous rotation in the opposing directions, the flaps being provided with guiding rollers adapted for cooperation with cam means mounted adjacent to the downward runs of the conveyors.

Preferably, the means for one-by-one compression of the folds of the newspapers being accumulated in a pile includes a double-blade brush operatively connected with the respective one of the fly-type delivery drums through a drive transmitting means of which the transmission ratio is the ratio of the number of the rows of the flies of the drum to the number of the blades of the brush. Mounted under each comb rest is an additional guide for introducing the blades of the respective one of the brushes into the space between the successive rows of the flies of the fly-type delivery drum.

Also preferably, the mechanism for varying the speed of the motion of the fork-like flaps includes a differential gear having the carrier thereof associated with a clutch, and a counter for sensing control commands initiating engagement of the clutch, the counter being associated with a program control system and with a pickup means mounted on the shaft of the conveyor.

In a preferred embodiment of the present invention the means for levelling out the newspapers carried in the pockets of the fly-type delivery drums comprises a series of spring-biased rods uniformly spaced about the circumference of the respective limiting disc, the rods being mounted in slots for horizontal reciprocation under the influence of a cam mounted in a plane parallel to the limiting disc.

The essence of the present invention is, as follows.

With the bottoms of the hoppers made in the form of vertically reciprocable fork-like flaps, and with the means being provided for one-by-one compression of the newspapers in the piles, there is created a situation in which the newspapers are placed in succession into a pile at the same unvarying level, and the piles produced are compact and even on the side of the folds. On the other hand, the incorporation in the press of the

means for levelling out the newspapers coming from the folder into the pockets of the delivery drums ensures that the piles produced have their lateral sides also even, which fact, in combination with the above design features of the press, results in the delivery of piles having even sides, which, in its turn, yields reliable transportation of the piles and improves the quality of the further processing thereof (assembling into batches and packaging).

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will be further described in connection with an embodiment thereof, with reference being made to the accompanying drawings, wherein:

FIG. 1 is a general schematic view of a rotary web-fed newspaper printing press;

FIG. 2 shows the apparatus for delivering folded newspapers from the press, viewed along the arrow "A" in FIG. 1;

FIG. 3 is a cross-sectional view taken along line III-III of FIG. 2.

Referring now to the appended drawings, the web-fed rotary press includes an apparatus 1 (FIG. 1) for unwinding the paper web 2 from a supply reel 3 and supplying the web 2 into a system of guiding rollers 4 advancing the web through the press; a printing apparatus 4 with printing plates 6 impressing the web guided through the press; an inking apparatus 7 applying the printing ink onto the printing plates 6; sheeting devices (not shown in the drawings) severing the imprinted web 2 into separate sheets; a folder 8 performing folding operations on the severed sheets and a delivery 9 carrying the folded newspapers 10 from the press.

The folder 8 includes a former 11 over which the web 2 is folded longitudinally and a folder drum 12 completing the operation of folding the newspapers.

The delivery 9 includes a deflector 13 directing the folded newspapers 10 along two alternative paths, a pair of rotary fly-type delivery drums 14 (FIGS. 2 and 3) arranged side-by-side immediately below the deflector 13, stationary comb rests 15 adapted to remove the newspapers 10 off the flies of the delivery drums and a pair of hoppers 16 and 17 positioned under the respective ones of the comb rests 15 for accumulation of piles 18 of newspapers in these hoppers.

Mounted on the shaft 19 of each fly-type delivery drum 14 are a pair of limiting discs 20 associated with means 21 for effecting levelling out, or registration of the newspapers 10 carried in the pockets of the fly-type delivery drum.

The means 21 includes a series of rods 22 uniformly spaced about the circumference of the respective limiting disc 20, the rods 22 being mounted in the slots 23 for horizontal reciprocation and further being adapted for cooperation with a stationary cam 24 positioned in a plane which is parallel to the disc 20.

Each rod 22 is retained in the respective slot 23 by means of a washer 25 and a compression spring 26.

The respective axes of the rods 22 are located in the spaces between the rows of the flies 27 of the fly-type delivery drums 14.

The bottom of each one of the hoppers is formed by a pair of fork-like flaps 28 and 29, the teeth 30 of one flap facing the teeth of the other flap.

The fork-like flaps 28 and 29 are mounted for reciprocation in a vertical plane. This is attained by the flaps

28 of the hopper 16 being mounted by pivots 31 on the respective chains of two pairs of vertical conveyors of which only the conveyors 32 and 33 are shown in the appended drawings.

The fork-like flaps 29 of the hopper 17 are likewise pivotally mounted on the respective chains of the other two pairs of vertical conveyors of which only the conveyors 34 and 35 are shown in the drawings.

The two pairs of said conveyors of each one of said hoppers are arranged for synchronous rotation in opposition to each other, with the help of a driving chain transmission 36 and a toothed wheel transmission 37.

Mounted along the descending runs of the conveyors are stationary cams 38 engageable by guiding rollers (followers) 39 mounted on the respective flaps.

An outgoing rollerway 40 is arranged below the hoppers 16 and 17, the rollerway 40 being provided with gaps 41 in the area where the piles of newspapers are transferred thereupon from the flaps, for the passage of the teeth of the flaps through these gaps 41.

Mounted below each one of the comb rests 15 is a means for one-by-one compression of the folds of the newspapers that are being accumulated in the pile, each means including a double-balde brush 42 mounted downwardly from the respective comb rest 15 and driven for rotation from the fly-type delivery drums 14 with which the brushes are connected by a chain transmission 43 having the transmission ratio equal to the ratio of the number of the rows 27 of the flies of the delivery drums to the number of the blades of the brushes.

To guide the blades of each brush 42 into the space between the flies 27 of two adjacent rows of the flies of the respective delivery drum 14, there is mounted below the respective rest comb 15 a guide 44 which is in the path of the rotation of the blades of the brush.

The drive effecting motion of the fork-type flaps associated with each one of the hoppers incorporates a mechanism for varying the speed of the flaps during the operation of accumulation of a pile of newspapers, this mechanism including a differential gear 45 (46), the carrier (not shown in the drawings) of which receives rotation through a clutch 47 (48), and a counter 49 (50) sending control pulses through an amplifier 51 (52) to the respective clutch 47 (48).

The counter 49 (50) is associated with a program control unit 53 and with a pickup 54 (55) mounted on the shaft 56 (57) of the vertical conveyors 32-35. The walls of the hoppers 16 and 17 have slots 58 for the passage of the respective teeth of the fork-type flaps into the hoppers; the walls of the hoppers further have slots 59 through which the blades of the respective brushes 42 may enter the internal space of the hopper.

The herein disclosed web-fed rotary press operates, as follows.

The reel 3 (FIG. 1) with a supply of the paper web 2 is mounted into the apparatus 1 which unwinds the paper web 2 and feeds it into the system of the guiding rollers 4 advancing the web through the press in the process of printing. Printing is performed by the printing plates 6 of the printing unit 5. The plates 6 are inked in operation by the inking apparatus 7.

The impressed web is longitudinally slitted, is folded longitudinally by passing over the former 11 and then, while it is guided toward the folder drum 12, it is cut

transversely, whereafter it is folded into individual newspapers 10.

Upon leaving the folder 8, the newspapers 10 engage the deflector 13 which can occupy either one of two alternative positions, depending on which the newspapers are directed into either one of the fly-type delivery drums 14.

As the fly-type delivery drums 14 are rotating in operation, the newspapers held in the pockets between the rows of the flies 27 pass by the area where the stationary cams 24 are mounted, the latter engaging the rods 22 which, in their turn, effect precise registration of the edges of the newspapers 10 in respect of the side walls of the hoppers 16, 17.

Then the newspapers are carried toward the comb rests 15 which the newspapers engage from below, in which way the newspapers are removed from the pockets between the rows of the flies 27 and are directed into the respective one of the hoppers 16 and 17.

At the moment when the deflector 13 is operated to direct the newspapers, for instance, into the hopper 16, the conveyors 32 and 33 occupy a position in which the bottom of the hopper 16, formed by the pair of fork-like flaps 28, is lifted to underlie directly the respective delivery drum 14.

Starting from this moment, the fork-like flaps are lowered at a varying speed. During the first stage of the lowering, while the pile 18 of the newspapers 10 is being accumulated on the flaps, the clutch 47 is disengaged, and the conveyors 32, 33 are lowered at a slow speed, which is necessary for compressing individually each successive newspaper in the pile. The compressing operation is effected, as follows. The blade of the brush 42 makes one half of a revolution during the time in which the flies 27 of the delivery drum 14 are rotated in respect of the comb rest 15 through one step, i.e. through one angular spacing between the successive rows of the flies 27. As it meets the guide 44, the blade is bent and thus directed to underlie the newspaper that has not yet reached the comb rest 15. As the comb 42 is rotated further on, it presses the fold of the newspaper that has been dropped into the hopper to the moving bottom of the hopper. Then the other blade of the brush 42 performs the same operation with the successive newspaper. In this way, throughout the period during which a pile is being accumulated, not only the fold of each successive newspaper is individually compressed, but the pile itself is repeatedly compressed between the moving bottom of the hopper and the blades of the rotating brush.

After a pile containing the predetermined number of the newspapers has been accumulated, the deflector 13 is operated to direct the newspapers into the other hopper, the clutch 47 is engaged, and the conveyors 32 and 33 are driven at a higher speed. The fork-like flaps 28 are rapidly lowered by the conveyors 32 and 33 to lay the accumulated pile of the newspapers upon the outgoing rollerway 40, whereafter the flaps are spread apart and lifted into their initial position to support the next pile of the newspapers.

The control signals that vary the speed of the conveyors 32, 33 are sent, as follows. Simultaneously with introducing into the program control counter the information representing the program of accumulating a pile in the hopper (the program control counter is not shown in the drawings), there is introduced by the program control device 53 into the counter 49 the infor-

mation representing that portion of the path of the conveyors 32, 33, which should be passed at a high speed, so that the fork-like flaps should be brought into their initial position before the moment when the deflector 13 is operated to direct the newspapers into the hopper 16. The entire path that is passed by the flap during one revolution cycle of the conveyors is divided into a specific number of equal parts, the pickup 54 responding to the flap having passed each such part. Depending on the number of the newspapers in the pile that is to be accumulated in the hopper 17 after the deflector 13 is operated to direct the newspapers into the last-mentioned hopper, a corresponding number is introduced into the counter 49 (79), and the latter processes (counts down) this number in accordance with the signals coming from the pickup 54, the counter 49 sending control signals to the clutch 47 through the amplifier 51. The newspapers are accumulated in the hopper 17 in a manner similar to that described hereinabove.

The outgoing rollerway 40 carries the accumulated piles away for further processing, e.g. for assembling the piles into batches.

What we claim is:

1. In a web-fed rotary press, comprising in combination; a folder for folding newspapers and having an outlet; apparatus means for delivering folded newspapers from said press; deflector means disposed in said apparatus means, for varying the direction in which the newspapers are delivered therefrom, said deflector means being provided at the outlet of said folder; a pair of shafted fly-type delivery means, for the reception of the newspapers from said deflector means, said pair of fly-type delivery means having pockets and being disposed side by side underneath said deflector means and in close proximity thereto; driving means for driving said fly-type delivery means; comb rests of said fly-type delivery means; limiting discs which are mounted on the shafts of said fly-type delivery means; means for piecewise compression of the folds of the newspapers in a pile said means being in the form of bladed brushes that are driven by said drive means of the fly-type delivery means and provided underneath each of said comb rests and in close proximity thereto; two hoppers having bottoms and sides mounted underneath said comb nests and in close proximity thereto, wherein a pile of newspapers is to be formed; the improvements consisting in that the bottoms of said hoppers comprise two fork-shaped flaps having teeth and mounted so as to be able to reciprocate in a vertical plane under the effect of said drive means for driving said fly-type delivery means with said teeth facing each other; gearing means operatively associated with said drive means for varying the speed of motion of said flaps in the course of formation of newspaper piles, said hoppers being provided with slots in the sides thereof to allow passage of said teeth of said fork-shaped flaps and of the brushes of said means for the piecewise compression of newspapers inside said hoppers; a delivery conveyor comprising a roller table adapted to receive the piles of newspapers as formed in said hoppers, said limiting discs being provided with means for leveling out the newspapers found in the pockets of said fly-type delivery means.

2. A web-fed rotary press, as claimed in claim 1, wherein said fork-like flaps are mounted pivotally on vertical chain conveyors, arranged for simultaneous rotation in the opposing directions, said flaps being pro-

7

vided with guiding rollers adapted for cooperation with cam means mounted adjacent to the downward runs of said conveyors.

3. A web-fed rotary press, as claimed in claim 1, wherein an additional guide means is mounted underneath each said comb rest and in close proximity thereto for introducing said blades of the respective one of said brushes into the space between the successive rows of the flies of said fly-type delivery means.

4. A web-fed rotary press, as claimed in claim 1, wherein said gearing means for varying the speed of motion of said fork-like flaps includes a differential gear having the carrier thereof associated with a clutch

8

and a counter for sending control commands for engaging said clutch, said counter being associated with a program control system and with a pickup means mounted on the shaft of said conveyor.

5. A web-fed rotary press, as claimed in claim 1, wherein said means for levelling out the newspapers carried in the pockets of said fly-type delivery means comprises a series of spring-biased rods uniformly spaced about the circumference of each of said limiting, said rods being mounted in slots for horizontal reciprocation under the influence of a cam mounted in a plane parallel to said limiting discs.

* * * * *

15

20

25

30

35

40

45

50

55

60

65