July 26, 1932. I. TORNBERG 1,868,779

COLLECTING AND FOLDING MECHANISM FOR WEB PRESSES

Filed Dec. 18, 1930 2 Sheets-Sheet 1

Fig. 1.

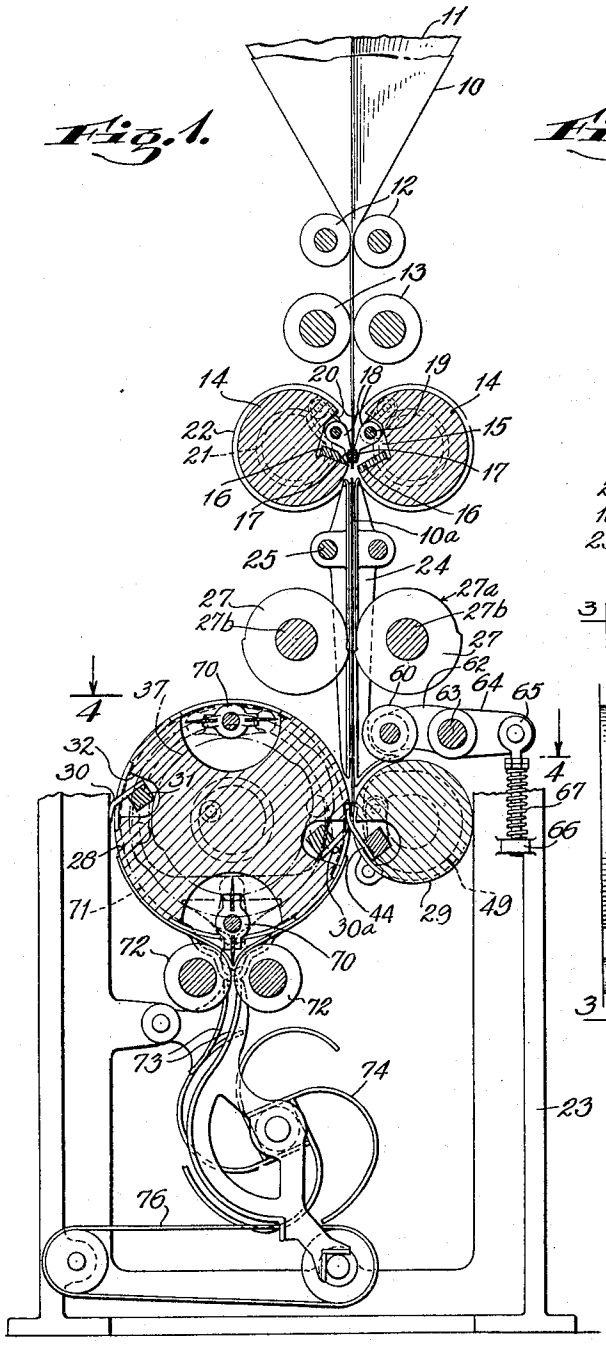
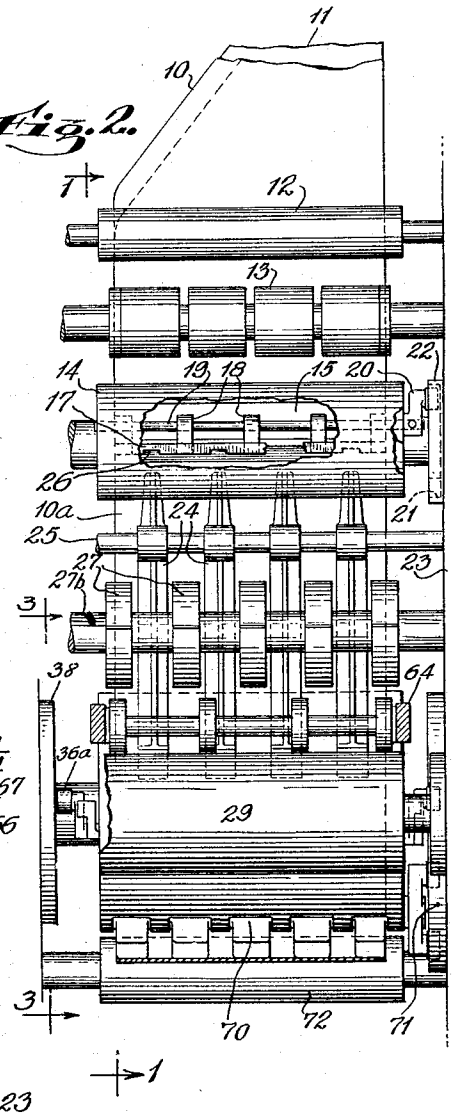


Fig. 2.



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Fig. 3.

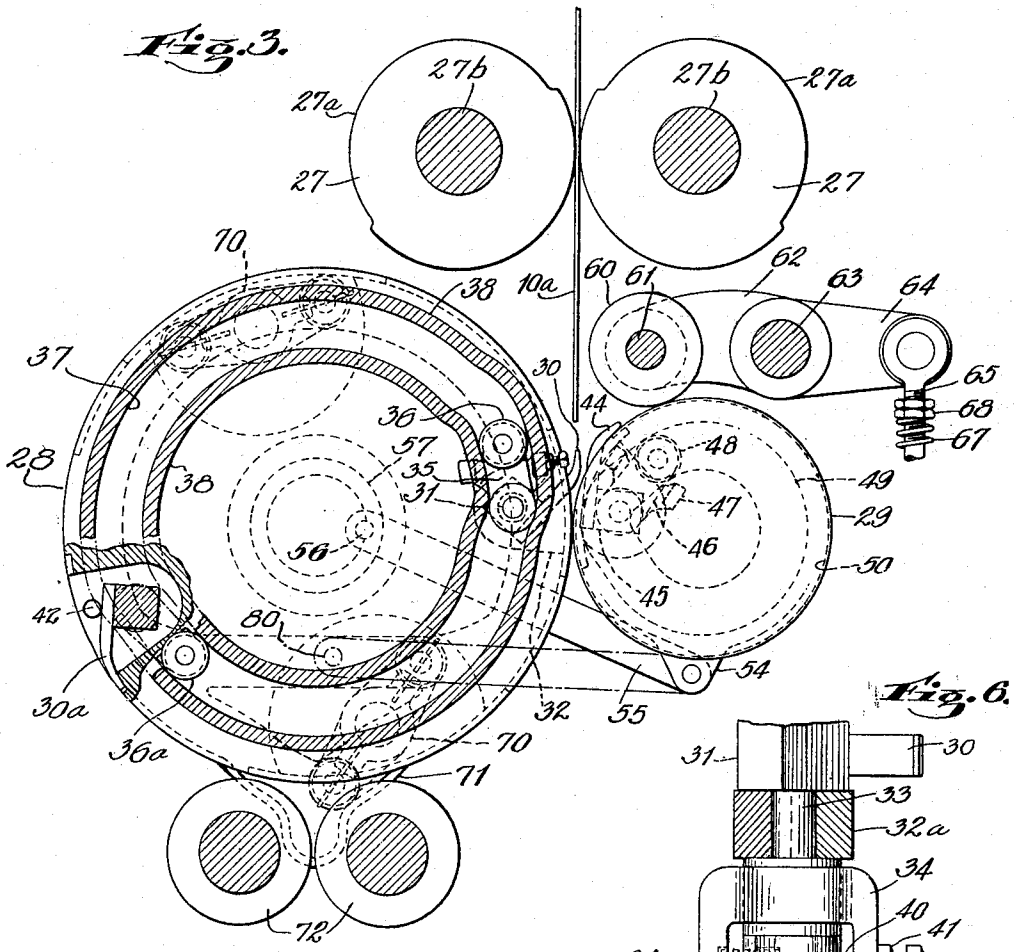


Fig. 6.

Fig. 4.

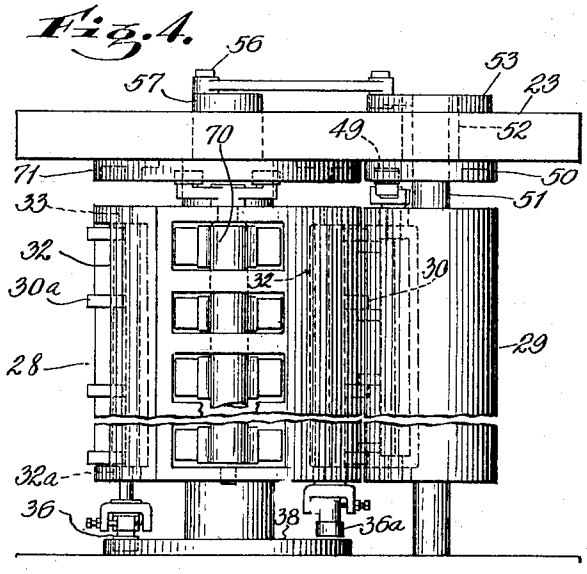
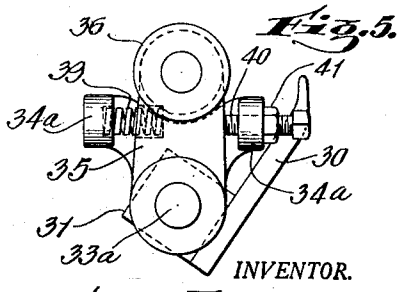


Fig. 5.



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UNITED STATES PATENT OFFICE

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COLLECTING AND FOLDING MECHANISM FOR WEB PRESSES

Application filed December 18, 1930. Serial No. 503,181.

The present invention relates to collecting and folding mechanism for web presses and has for an object to provide improvements therein which will overcome certain defects present in such mechanisms as heretofore constructed.

An object of the present invention is to provide means for more positively handling webs or sheets.

A specific object of the invention is to provide improved means for leading the webs from the cutting cylinders into the guides that direct them to the collecting and folding cylinders. Heretofore retaining fingers have been used for this purpose but since the fingers are spaced apart along the width of the web there is always the danger, particularly in high speed presses, that the edges of the sheets between the fingers will be spread or bellied by air currents to such an extent as to catch on the guides. In lieu of such spaced fingers, my invention provides stripping bars that extend across the full width of the sheets holding the latter against relative displacement up to the point at which they enter the guides.

Another object of the invention is to provide improvements in the mounting of the gripping fingers on the collecting and folding cylinders. Heretofore such fingers have been controlled by rollers spring-pressed against profile cams, so that while the fingers were positively swung open by the cams they were resiliently closed by the springs. The fingers must operate very quickly, particularly in a high speed press, and if they are closed by spring pressure they tend to rebound or chatter. It is, therefore, an object of the present invention to provide means for positively controlling the closing as well as opening of the fingers, so as to overcome any tendency to chatter.

Another object of the present invention is to provide sufficient yield of the fingers to allow for variations in thickness or number of the sheets gripped thereby.

Other objects and advantages will appear in the following description of a preferred embodiment of my invention and thereafter the novelty and scope of the invention will be pointed out in the claims.

In the accompanying drawings:

Figure 1 is a view in vertical section of the forming, cutting, collecting and folding mechanism of a web press in which my improvements are embodied, the section being taken substantially on the line 1—1 of Fig. 2;

Fig. 2 is a fragmental side elevation of the same with certain portions broken away to illustrate details of the invention;

Fig. 3 is an enlarged sectional view, the section being taken on the line 3—3 of Fig. 2, but showing the parts in a different position.

Fig. 4 is a view in transverse section taken on the line 4—4 of Fig. 1;

Fig. 5 is an end view of a gripper finger mounting; and

Fig. 6 is a fragmental plan view of the same.

Referring particularly to Figs. 1 and 2, I show a web 10 running off a former 11 between the customary guide rolls 12 and nipping rolls 13, to a pair of cutting cylinders 14. Each of the cylinders 14 is formed with a recess 15 in which is mounted a knife blade 16, the blades being so disposed that at each rotation of the cylinders they will cooperate to shear off a projecting portion 10*a* of the web.

Immediately back of the knives in the recesses 15 are two stripping bars 17 disposed respectively at opposite sides of the web 10. Each stripping bar is supported by arms 18 depending from a shaft 19 journaled in the end walls of the recess 15. Fixed to an extension of each shaft 19 is a crank arm 20 which carries a roller. The latter

engages a cam groove 21 in a box cam 22 fixed to the frame 23 of the press. The cam grooves 21 are of such form as to close the stripping bars upon the web 10 immediately after the knives have operated. The bars then move downward with the web to guide the sheared edge vertically into the fixed guides 24. Since the bars 17 serve merely as retaining members to hold the web sheets from spreading they do not need to grip the sheets tightly and no means are necessary to adapt them for variations of thickness or number of sheets handled.

The guides 24 consist of two opposed sets of vertical bars, each set being supported on a rod 25 carried by the frame 23. The stripping bars, after moving downward with the sheets, are spread apart under control of the cams 22, just in time to clear the upper ends of the guide bars. Obviously, the web cannot be gripped at the very sheared edge, but the stripping bars are located as close as possible to the knives, so that there will be a minimum margin of the web projecting beyond the stripping bars. In order that the stripping bars may engage the web until the edge thereof has actually entered between the guides each stripping bar is formed with notches 26 to clear the guide bars 24.

The sheets 10*a* are fed downward between the guides at a predetermined rate by timing rollers 27 mounted on shafts 27*b*. These rollers are located between the guides 24 and are of the conventional form, each roller being provided with a surface 27*a* of reduced diameter which will clear the sheets 10*a* after they have reached a predetermined point between a folding cylinder 28 and a collecting cylinder 29.

Referring now particularly to Fig. 3, the folding cylinder 28 carries two diametrically opposed sets of gripping fingers 30 and 30*a*. Detail views of the fingers 30 and their mounting are shown in Figs. 5 and 6. The fingers 30 are secured to a shaft 31 preferably square and of substantial cross section so that it will not flex or twist. The shaft is mounted in a recess 32 formed in the cylinder 28 and is turned to reduced diameter near each end, as indicated at 33, to enter bearings formed in the end walls of the recess 32. In order to permit of inserting the shaft ir the recess a pair of half bushings 32*a* are provided at one end, as indicated in Figs. 4 and 6.

Fixed to or integrally formed on the shaft 31 immediately outside of the bushings is a yoke 34 having a pair of outwardly directed arms 34*a*. Mounted on a continuation 33*a* of the shaft, immediately outside of the yoke, is a crank arm 35 which projects between the arms 34*a* of the yoke. This crank arm bears a roller 36, at its free end, which engages a cam groove 37 in a box cam 38 fixed to the frame 23. The arm 35 is loosely mounted on the part 33*a*, but is urged by a stiff spring 39 seated in one of the arms 34*a*, against a stop 40 carried by the opposite arm 34*a*. The stop 40 consists of a set screw which may be secured at any desired adjustment by means of a lock nut 41. By reason of the fact that the cam 38 is of the box type the roller 36 will be moved positively to oscillate the shaft 31. However, the spring 39 permits such slight yielding of the fingers as may be necessary to hold the sheets 10*a* against the folding cylinder 28 and at the same time to allow for variations in thickness or number of the sheets. Fingers 30*a* are similarly mounted and have a cam-engaging roller 36*a* adapted to enter the groove 37. However, the roller 36*a* is axially adjustable so that it may be withdrawn from the cam groove 37 whenever desired to prevent operation of the fingers 30*a*. A pin 42 may be inserted in an end wall of the recess 32 to engage one of the fingers 30*a* and prevent outward throw of the set of fingers 30*a* when they are not under control of the cam groove.

The collecting cylinder 29 is provided with gripping fingers 44 which are similar in construction to the gripping fingers 30 and are similarly mounted. Thus, the fingers 44 are fixed to a rectangular shaft 45 and the latter at one end (preferably the opposite end from that on which the cam 38 is fixed) carries a crank arm 46 embraced between the arms of a bifurcated yoke 47 fixed to or integral with the shaft 45. The crank 46 carries a roller 48 which engages a cam groove 49 in a box cam 50.

The cam 50 is adapted to be oscillated in timed relation to the rotation of the folding cylinder 28 and to this end it is journaled on the shaft 51 of the collecting cylinder 29, while a hub sleeve 52 of the cam 50 is journaled in a suitable bearing in the frame 23 of the press. Fixed to the outer end of the hub is a collar 53 which is formed with a radial lug 54. A connecting rod 55 is pivotally attached at one end to the lug 54 and at the other end to a pin 56 secured eccentrically in the end face of the shaft 57 of the cylinder 28. Thus, as the cylinder 28 and its shaft 57 revolve the cam 50 will be oscillated, owing to its eccentric connection with the shaft 57.

Mounted to bear upon the cylindrical surface of the cylinder 29 is a set of pressure wheels 60. These wheels are spaced to clear the guides 24 and are mounted on a shaft 61 carried by a pair of arms 62. The latter are journaled upon a shaft 63, mounted on the frame 23. The arms 62 are provided respectively with rearward extensions 64, to each of which is connected an eye-bolt 65. Each eye-bolt is movable vertically in a fixed guide or apertured lug 66 projecting from the frame 23, and a spring 67 surrounding the eye-bolt bears at one end against the lug 66 and at the

other against a nut 68 threaded upon the eyebolt. The nut may be secured at any desired adjustment by means of a lock nut to give the required pressure of the wheels 60 against the cylinder 29.

The cylinder 28 is provided with the customary folding mechanism 70 carried thereby and operated by a fixed cam 71 secured to the frame 23, so that the sheets picked up by the gripping fingers 30 or 30*a* will be tucked between a pair of spring pressed rollers 72 and thence be led by a pair of guides 73 into a fan 74 which deposits them upon a delivery belt 76.

The operation of the apparatus will now be clear. As the web or a set of webs is fed between the cutting cylinders 14 it is directed by the guides 24 and fed in proper timed relation by the timing rollers 27 down to a point at which its lower edge may be engaged either by the fingers 44 or the fingers 30 or 30*a*. Just before it reaches this point the knives 16 will sever the web and as the severed web portion is seized by one or the other of the set of gripping fingers, it is quickly drawn away from the main body of the web that is being fed between the cutting cylinders. The sheared edge of this web is engaged by the stripping bars as soon as the knives operate and is led by said bars into the guides 24. Since the stripping bars extend across the entire width of the web there is no danger of having the web or any portions thereof blown out of alignment by air currents, and consequently the web is led properly between the guides 24, being released by the stripping bars immediately after entering the guides 24.

When the collecting mechanism is not functioning the rod 55 is disconnected from the pin 56 and is attached instead to a stud 80 projecting from the frame 23 of the press. The rod then assumes the position shown in dotted-and-dash lines in Fig. 3. The cam 50 is thus held fixed in the position shown in said figure. The pin 42 is withdrawn and the roller 36*a* is moved into engagement with the cam slot 37 so that the fingers 30*a* will operate. Successive sets of sheets 10*a* are then gripped at each half revolution of the folding cylinder by the fingers thereof, operating alternately. In other words odd numbered sets of sheets are picked up by the fingers 30*a* and even numbered sets by the fingers 30. The box cam 38 swings the fingers outward just before the sheets reach the gripping position and then positively retracts the fingers to grip the sheets against the folding cylinder 28. The cam groove 37 is of such shape as to release the grip just as one of the folders 70 operates to tuck the fold of the sheets between the rollers 72. In the meantime, the fingers 44 on the collecting cylinder are opened and closed at each rotation of said cylinder which turns at twice the angular speed of the folding cylinder. However, the cam 50 occupies such a position that the fingers 44 do not move to gripping position until after the sheets have been gripped by the fingers of the folding cylinder.

When the collecting mechanism is to function the fingers 30*a* are operatively disconnected by withdrawing the roller 36*a* from cam groove 37 and inserting the locking pin 42. The rod 55 is then connected to the pin 56 so that the cam 50 will oscillate. When the cam is in the position shown in Fig. 3, sets of sheets are picked up by the fingers 44 and are carried around the collecting cylinder, but before the latter has made a complete rotation the cam 50 will have been swung to the position shown in Fig. 4 releasing the grip of the fingers 44 in time for the sheets carried thereby to join the next succeeding set of sheets and be gripped with them by the fingers 30. In other words, each odd numbered set of sheets is detained by passing it around the collecting cylinder and then with the next even numbered set is picked up by the fingers of the folding cylinder. The pressure wheels 60 insure proper feed of the sheets on the collector cylinder while the fingers 44 have released their grip.

It will be noted that gripping fingers of the collector and folding cylinders are mounted on solid shafts and are operated by box cams so that they are always under positive control and there is no opportunity for them to bounce or chatter. Although there may be a slight give in the grip due to the spring 39 in the case of the fingers 30 and corresponding springs in the case of the other gripping fingers, yet this yield is so slight that powerful springs may be used which will not permit chattering. When profile cams are used the springs employed to hold the operating rollers in engagement with the cam must allow the fingers to swing to open position consequently the springs must be much longer and less powerful, so that the closing of the fingers is uncertain.

While I have described a preferred embodiment of my invention, I wish it to be understood that this is to be taken as illustrative and not limitative of the invention and that I reserve the right to make such changes in form, construction and mode of operation as fall within the spirit and scope of the following claims.

I claim:

1. In a web press the combination with a guide for leading a web to a folding cylinder, of means for introducing the web into the guide, said means comprising a pair of retaining members disposed respectively on opposite sides of the web and extending continuously thereacross, and mechanism for moving said members into engagement with

the web and advancing the members with the web to said guide.

2. In a web press the combination with a guide for leading a web to a folding cylinder, of means for introducing the web into the guide, said means comprising a pair of stripping bars disposed respectively on opposite sides of the web and extending continuously there across, said bars being movable into and out of engagement with the web and being also movable with the web to the guide, and cam means for positively controlling the movements of said bars.

3. In a web press the combination with a guide for leading a web to a folding cylinder and cutters above the guide for severing the web, of means for introducing the sheared end of the web from the cutters into the guide, said means including a pair of bars extending the full width of the web and movable into and out of engagement therewith and also movable while in engagement with the web to the guide, and means for positively controlling the movements of said bars in timed relation to the cutters.

4. In a web press, a pair of opposed cutting cylinders cooperating to sever a web after a predetermined length thereof has passed therebetween, a guide leading from the cutting cylinders to a folding cylinder, a pair of stripping bars carried respectively by the cutting cylinders and extending the full width of the web, a pair of fixed box cams, and means operatively connecting the bars to the cams respectively, said cams being of such form as positively to move the bars into engagement with the web close to the severed end thereof and lead said severed end into the guide.

5. In a web press, a folding cylinder and a guide for leading webs to said cylinder, a pair of opposed rotary cutting cylinders between which the web is passed before entering the guide, each cutting cylinder having a recess therein and a knife mounted in the recess, the knives cooperating at each rotation of the cutting cylinders to sever the web, a stripping bar carried by each cylinder and oscillatable into and out of the recess immediately back of the knife, a crank connected to each stripper bar and a fixed box cam engaged by each crank, the cams serving to move the bars into engagement with the web close to the severed end thereof and lead said end into the guide.

6. In a web press, a rotary cylinder, a gripping member carried thereby, and means for moving said member positively toward and from the cylinder in timed relation to the rotation thereof.

7. In a web press, a rotary cylinder, a gripping member carried thereby, means for moving said member positively toward and from the cylinder in timed relation to the rotation thereof, and means for varying such timed relation.

8. In a web press, a rotary cylinder, gripping fingers carried thereby, and means for moving the fingers positively toward and from the cylinder in timed relation to the rotation thereof.

9. In a web press, a rotary cylinder, gripping fingers carried thereby, means for moving the fingers positively toward and from the cylinder in timed relation to the rotation thereof, and means for varying such timed relation.

10. In a web press, a box cam, a cylinder rotatable with respect to the cam, gripping fingers carried by the cylinder, and means operatively connecting the fingers to the cam whereby the fingers will be oscillated toward and from the cylinder in timed relation to the rotation thereof.

11. In a web press, a box cam, a cylinder rotatable with respect to the cam, gripping fingers carried by the cylinder, means operatively connecting the fingers to the cam whereby the fingers will be oscillated toward and from the cylinder in timed relation to the rotation thereof, and means for varying the position of the cam to vary said timed relation.

12. In a web press, a box cam, a cylinder rotatable with respect to the cam, gripping fingers carried by the cylinder, means operatively connecting the fingers to the cam whereby the fingers will be oscillated toward and from the cylinder in timed relation to the rotation thereof, and means for oscillating the cam in timed relation to the rotation of the cylinder.

13. In a web press, a box cam, a cylinder rotatable with respect to the cam, gripping fingers carried by the cylinder, means operatively connecting the fingers to the cam whereby the fingers will be oscillated toward and from the cylinder in timed relation to the rotation thereof, and means for adjusting the position of the fingers with respect to the cam.

14. In a web press, a box cam, a cylinder rotatable with respect to the cam, gripping fingers carried by the cylinder, and means operatively connecting the fingers to the cam whereby the fingers will be oscillated toward and from the cylinder in timed relation to the rotation thereof, said means including a spring portion permitting slight yield of the fingers with respect to the cam.

15. In a web press, a box cam, a cylinder rotatable with respect to the cam, gripping fingers carried by the cylinder, means operatively connecting the fingers to the cam whereby the fingers will be oscillated toward and from the cylinder in timed relation to the rotation thereof, the connecting means including a spring portion permitting slight yield of the fingers with respect to the cam,

and means for regulating the extent of yield of the fingers.

16. In a web press, a box cam, a cylinder rotatable with respect to the cam, the cylinder being formed with a peripheral recess, a shaft mounted in the recess, gripping fingers secured thereto, a bifurcated member fixed to the shaft, an arm journalled on the shaft and movable between the furcations of said member, a roller carried by the arm and engaging said cam, and means for limiting movement of the arm between said furcations.

17. In a web press, a box cam, a cylinder rotatable with respect to the cam, the cylinder being formed with a peripheral recess, a shaft mounted in the recess, gripping fingers secured thereto, a bifurcated member fixed to the shaft, an arm journalled on the shaft and movable between the furcations of said member, a roller carried by the arm and engaging said cam, and spring means for limiting movement of the arm between said furcations.

18. In a web press, a box cam, a cylinder rotatable with respect to the cam, the cylinder being formed with a peripheral recess, a shaft mounted in the recess, gripping fingers secured thereto, a bifurcated member fixed to the shaft, an arm journalled on the shaft and movable between the furcations of said member, a roller carried by the arm and engaging said cam, spring means for limiting movement of the arm between said furcations, and means for adjusting the extent of movement of the arm therebetween.

19. In a web press, a rotary folding cylinder, a rotary collecting cylinder, gripping fingers carried by each cylinder, a fixed box cam controlling the gripping fingers of the folding cylinder, an oscillatable box cam controlling the gripping fingers of the collecting cylinder, and means for oscillating the latter cam in timed relation to the rotation of the folding cylinder.

20. In a web press, a rotary folding cylinder, a rotary collecting cylinder, gripping fingers carried by each cylinder, a fixed box cam controlling the gripping fingers of the folding cylinder, an oscillatable box cam controlling the gripping fingers of the collecting cylinder, and means driven by the folding cylinder for oscillating the latter cam.

21. In a web press, a rotary folding cylinder, a rotary collecting cylinder, gripping fingers carried by each cylinder, a fixed box cam controlling the gripping fingers of the folding cylinder, an oscillatable box cam controlling the gripping fingers of the collecting cylinder, and means for securing the latter cam against rotation.

22. In a web press, a rotary folding cylinder, oscillatory gripping fingers carried thereby, a fixed box cam controlling oscillation of the fingers, means for disconnecting said fingers from the cam, and means for locking the fingers against oscillation.

23. In a web press, a rotary folding cylinder, two sets of oscillatory gripping fingers carried thereby, a box cam for controlling oscillation of both sets of fingers, means for disconnecting one set of fingers from the cam, and means for locking the latter set of fingers against oscillation.

In testimony whereof, I have signed this specification.

ISIDOR TORNBERG.