Oct. 27, 1931. E. J. SMITH 1,829,244

SHEET FOLDING AND DELIVERING MECHANISM

Original Filed March 28, 1930 3 Sheets-Sheet 1

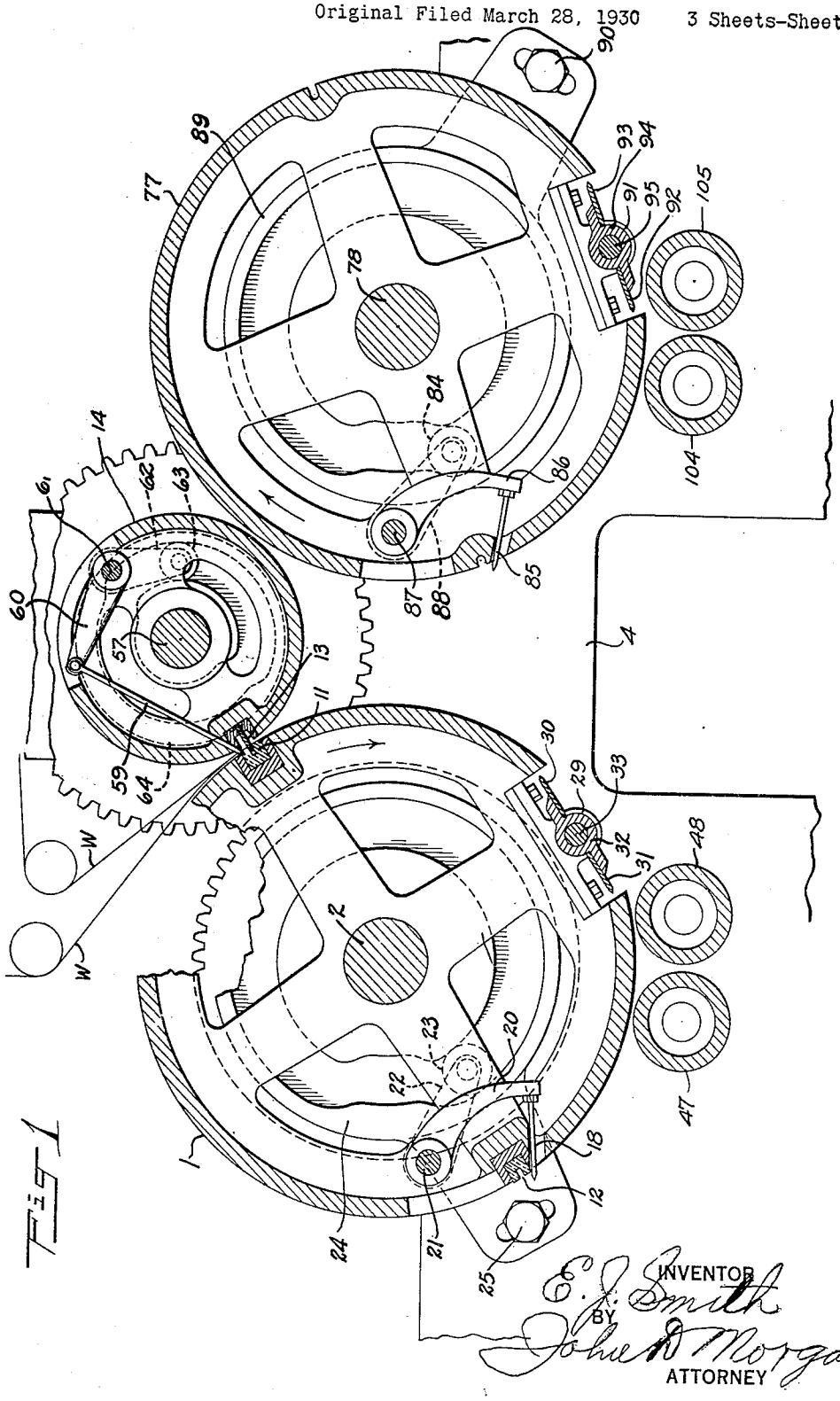


FIG. 1

INVENTOR
E. J. Smith
BY
John D. Morgan
ATTORNEY

Oct. 27, 1931. E. J. SMITH 1,829,244

SHEET FOLDING AND DELIVERING MECHANISM

Original Filed March 28, 1930 3 Sheets-Sheet 2

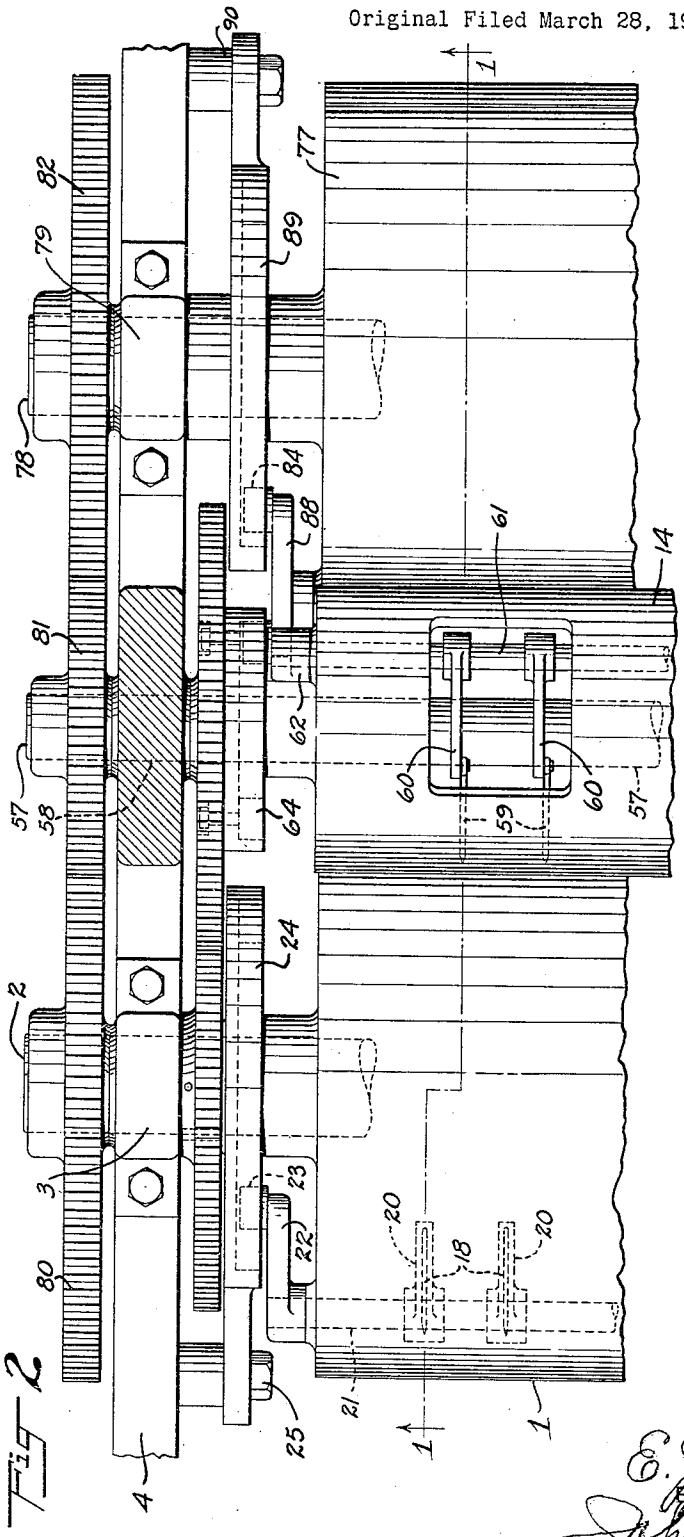


Fig 2

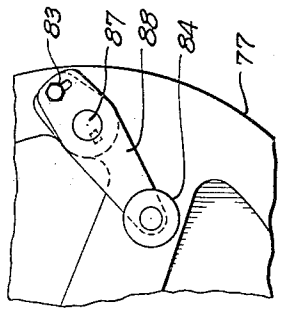


Fig 3

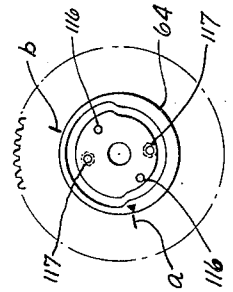


Fig 6

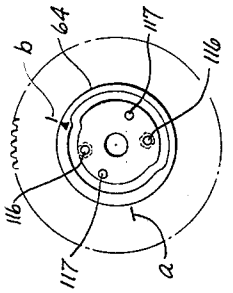


Fig 5

INVENTOR
E. J. Smith
BY
John D. Morgan
ATTORNEY

Oct. 27, 1931. E. J. SMITH 1,829,244

SHEET FOLDING AND DELIVERING MECHANISM

Original Filed March 28, 1930 3 Sheets-Sheet 3

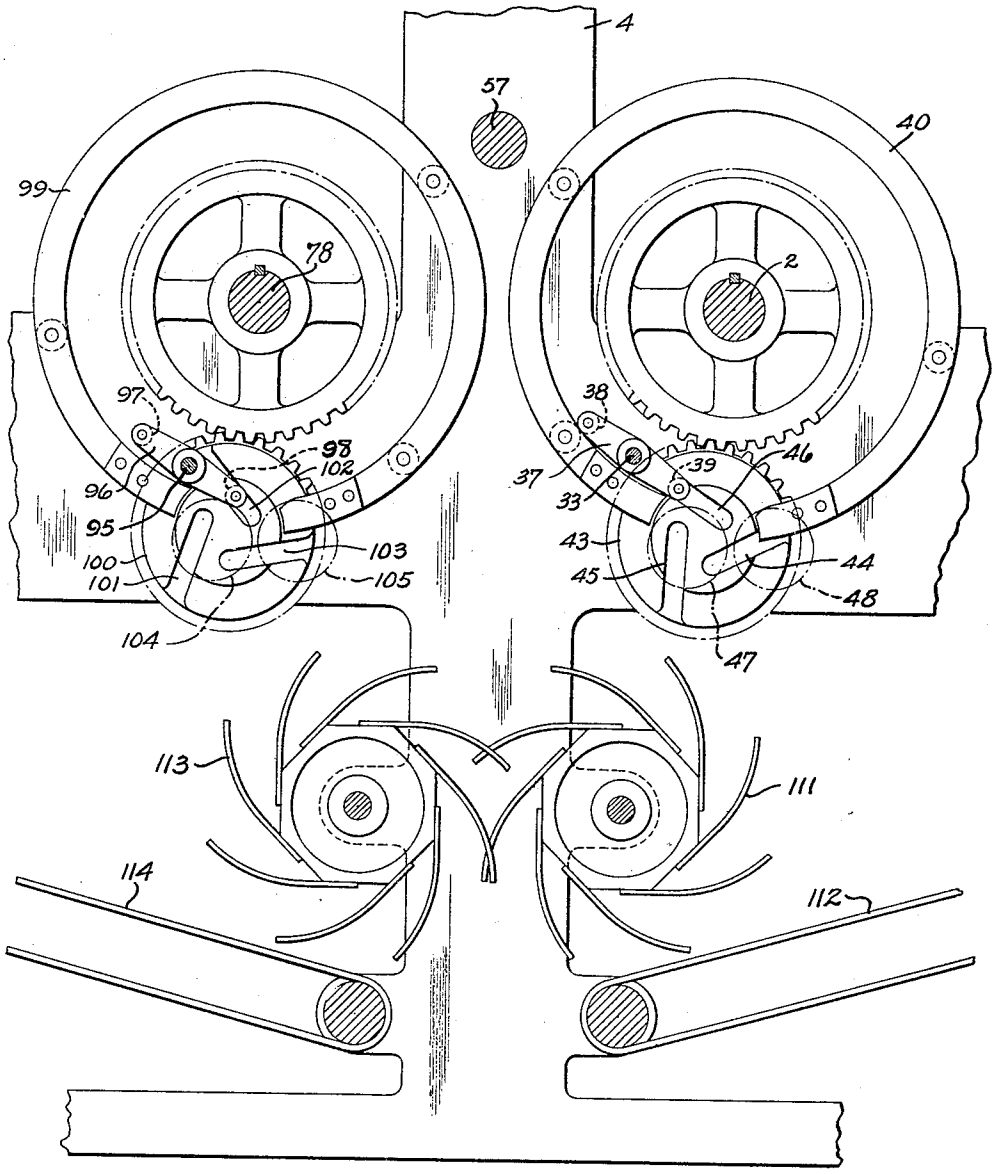


Fig 4

E. J. Smith INVENTOR

BY John S. Morgan

ATTORNEY

Patented Oct. 27, 1931 1,829,244

UNITED STATES PATENT OFFICE

ERNEST JAMES SMITH, OF LONDON, ENGLAND, ASSIGNOR TO THE GOSS PRINTING PRESS COMPANY, A CORPORATION OF ILLINOIS

SHEET FOLDING AND DELIVERING MECHANISM

Application filed March 28, 1930, Serial No. 439,629. Renewed September 5, 1931.

The invention relates to novel and useful improvements in sheet cutting, folding and delivery mechanisms, and in certain of its aspects, more particularly to such mechanisms especially capacitated for use with high speed rotary printing presses.

Objects and advantages of the invention will be set forth in part hereinafter and in part will be obvious herefrom, or may be learned by practice with the invention, the same being realized and attained by means of the instrumentalities and combinations pointed out in the appended claims.

The invention consists in the novel parts, construction, arrangements, combinations and improvements herein shown and described.

The accompanying drawings, referred to herein and constituting a part hereof, illustrate one embodiment of the invention, and together with the description, serve to explain the principles of the invention.

Of the drawings:—

Fig. 1 is a fragmentary, vertical, transverse section through a mechanism embodying the invention, taken on line 1—1 of Fig. 2;

Fig. 2 is a fragmentary top plan corresponding to Fig. 1;

Fig. 3 is a fragmentary detail of the impaling pin actuating mechanism;

Fig. 4 is a partial plan and vertical section of the mechanism showing also the delivery;

Figs. 5 and 6 are detail views of the pin actuating cam for the transfer and collecting cylinder.

The invention is directed generally to providing novel sheet cutting, folding and delivery mechanisms adapted to cooperate with very high speed web supplying machines, and in certain of its aspects to providing a relatively slow speed delivery as compared with the high speed web supply. A further object is to provide novel mechanism of the type described wherein either a collected or uncollected product may be delivered as desired, in either case realizing a relatively slow folding and delivering speed with respect to the speed of sheet supply.

In carrying out the foregoing, a plurality of folding cylinders are employed, with a cooperating cylinder which is capacitated to act as a cutting cylinder in cutting the sheets from the webs, and also to act alternatively as a collecting cylinder when a collected product is folded off from only one folding cylinder, or to act as a transfer cylinder when the machine is running "straight", that is, when one sheet or group is folded off from one folding cylinder, and the next sheet or group is folded off from the other folding cylinder. Each of the folding cylinders folds off to its own delivery mechanism, and in either case the speed of the delivery, or deliveries, being one half that of the web supply, thereby avoiding the conditions and difficulties of very fast folding and delivery while not in any wise interfering with high speed press operation. One advantage of the present embodiment is that all the sheets have the pin holes in the tails of the sheets.

The present embodiment, realizing the foregoing and other objects, comprises a folding and cutting cylinder with a circumference substantially equal to two sheet lengths, having two sheet cutting devices, a single set of impaling pins, and one cross folding mechanism, folding off to a suitable delivery. Cooperating with said cylinder is a half-size cylinder, having a single sheet cutting device, coacting with those on the first mentioned cylinder, and having a single set of impaling pins, the running webs associated in what degree or manner desired are fed between, and cut into sheets by, these cylinders. A third cylinder cooperates directly with the half-size cylinder, and this cylinder, like the first, is full size, has a single set of pins and a single cross folding device, and folds off to a separate delivery mechanism. As the sheets are cut from the web, one cut is taken by the half-size cylinder (acting as a transfer cylinder) and after a partial rotation is delivered to the third cylinder for folding off and delivery to its delivery mechanism. The next cut of sheets goes to the first cylinder for folding off and delivery to its folding mechanism. The alternative setting and operation is for the half-size cylinder (operating now as a col-

lecting cylinder) to carry its sheets a full revolution and deliver them onto the second cut of sheets on the first cylinder, which folds off all the sheets as a collected product.

It will be understood that the foregoing general description, and the following detail description as well, are illustrative and explanatory of the invention, but are not restrictive thereof.

There is thus provided a very simple and compact mechanism realizing the advantages pointed out, together with other advantages, and at the same time utilizing combinations of only tried and tested particular elements or devices, thereby insuring simplicity and durability of structure and ease and reliability of operation.

Referring now in detail to the embodiment of the invention illustrated by way of example in the accompanying drawings, the web supply is shown as two associated webs W, coming from any suitable source, such as a pair of side-by-side formers, over which is run the centrally longitudinally-slitted, perfected web from a four-plate wide rotary perfecting printing press, although webs may be supplied from other sources as well.

In said present preferred embodiment, a cylinder 1 is mounted on a shaft 2, journaled at 3 in the respective side frames 4 of the press. The cylinder 1 has a pair of female cutting members 11 and 12, mounted diametrically opposite, and these cooperate with a single male sheet cutting member 13, mounted on the cutting, collecting and transfer cylinder 14. The cylinders 1 and 14 are in a two-to-one ratio.

Cylinder 1 is provided with a single set of sheet-taking, folding and releasing devices, shown as a set of impaling pins 18, mounted in cooperative relation with the sheet cutting device 12. The pins 18 are mounted on arms 20, fixed on a shaft 21, which is journaled in the cylinder heads. One end of shaft 21 extends outside the cylinder, and fixed thereto is an arm 22, on which is mounted a cam roller 23, which runs in a cam 24. Cam 24 is supported upon a stud 25, fixed to and extending from the machine frame 4.

A folding mechanism 29 is mounted on cylinder 1 in cooperative relation with the impaling pins 18. This mechanism has folding blades 30 and 31, mounted on carrier 32, which is fixed on a shaft 33, journaled in the ends of the cylinder. One end of shaft 33 extends exteriorly of the cylinder, and fixed thereto is a cross bar 37, and mounted in the ends thereof, respectively, are cam rollers 38 and 39. The cam rollers run on the inside of a circular cam ring 40, suitably mounted on the machine frame. The folder actuating means embodied is of the standard Husby rotary cam type, and comprises a cam disc 43, rotatably mounted on the machine frame and having cam slots 44, 45 and 46, with which the cam rollers cooperate to give the folding device a semi-rotation in the usual manner. The product is folded off between folding rollers 47 and 48, which are shown conventionally and may be of any known or other suitable form.

The cutting, collecting and transfer cylinder 14 is fixed on the shaft 57, journaled at 58 in the side frames of the machine. This cylinder is provided with sheet-taking, folding and releasing means, embodied as a set of impaling pins 59, mounted on arms 60, fixed on a shaft 61, which is journaled in the cylinder heads. Fixed to a projecting end of shaft 61 is an arm 62 on which is mounted a cam roller 63 which runs in a cam 64, loosely mounted to rotate on the cylinder shaft 57 in a manner which will be later described. The impaling pins are operated so that cylinder 14 may be run either as a cutting and transfer cylinder, delivering sheets to cylinder 77, or as a cutting and collecting cylinder, delivering the sheets to cylinder 1 as part of a collected product.

Cylinder 77 is adapted to receive sheets from the cylinder 14 and to fold them off to a separate delivery. Cylinder 77 is mounted on a shaft 78, journaled at 79 in the side frames of the machine. The three cylinders 1, 14 and 77 are geared to run together by gears 80, 81 and 82.

The embodied form of sheet taking, holding and releasing means on cylinder 77 comprises a set of impaling pins 85, mounted on arms 86, fixed on a shaft 87, journaled in the cylinder heads, one end of the shaft extending exteriorly to the cylinder. Fixed thereon is an arm 88, on which is mounted a cam roller 84, running in a circular cam 89, supported on a stud 90, fixed to and extending from the side frame 4. When the machine is running "collect", the impaling pins 85 are silenced by a bolt and slot connection 83 (Fig. 3) which may be adjusted so that the pins 85 will not protrude from the cylinder although still actuated from cam 89. A folding device 91 is mounted in cooperative relation with the impaling pins 85, and comprises folding blades 92 and 93, fixed on a carrier 94, which is carried on a shaft 95, journaled on the cylinder. To the projecting end of the shaft 95 is fixed a cross bar 96, and mounted at either end thereof are cam rollers 97 and 98. These cam rollers run on the inside of a circular cam 99.

The actuating means for the folding mechanism is of the Husby type, and comprises a disc 100, rotatably mounted on the machine frame, and having slots 101, 102, 103, with which the cam rollers cooperate to give a half revolution to the folding device, in the usual manner. The folded products are folded off between folding rollers 104 and

105, which are shown only conventionally, and may be of any known or other suitable form.

The folding-off rollers 47 and 48 deliver to any suitable form of delivery mechanism shown, in Fig. 4 as a star wheel 111, delivering to a belt delivery 112. In like manner the folding rollers 104 and 105 deliver to the star wheel 113, which deposits the folded product on the belt delivery 114.

Referring to the operation of the machine, and considering the making of straight runs, the sheet, or group of sheets, are cut from the web between cylinders 1 and 14, and the first sheet is taken by impaling pins 18 on cylinder 1, and is folded off to the folding rollers 47 and 48. The next sheet, or group of sheets, cut off is taken by the impaling pins 59 on cylinder 14, and carried partly about the cylinder 14, and is then transferred to the impaling pins 85, is carried partly about cylinder 77, and is folded off between the folding rollers 104 and 105.

When the machine is running collected products, cylinder 77 is silenced, that is, the impaling pins 85 move entirely within the cylinder and thus cannot take the sheets. In this case the lead to the web is taken by the impaling pins 59, on cylinder 14, and is carried entirely around the cylinder 14, and as the sheet is cut from the web, the impaling pins 18 on cylinder 1 take the new lead of the web, and also the head of the sheet which has come around on cylinder 14, and the collected product is carried around on cylinder 1, and is folded off to the folding rollers 47 and 48.

The operation of the machine in the two ways described requires a different timing and actuation of the series of impaling pins 59. When running straight runs and alternate products are delivered to the two deliveries 111 and 113, impaling pins 59 take the web lead when in the position shown in Fig. 1, and retract and thereby release the web lead to cylinder 77, when the pins 85 take the head of the web just as the pins 59 are retracted, the sheet being cut off by the cutting members 12 and 13. The new head of the web is then taken by the pins 18 on cylinder 1, the sheet is cut off by cutting members 11 and 13, and the sheet is folded off to the rollers 47 and 48. When running collect, the impaling pins 59 take the head of the web and carry it completely about the cylinder 14, and are retracted just as the pins 18 in cylinder 1 take the new head of the web and the head of the cut-off sheets on cylinders 14, and the collected product is folded off to folding rollers 47 and 48.

In the present embodiment the changes between straight running and collecting running is effected by merely changing the angular setting of cam 64 (Figs. 1, 5 and 6). The cam 64 rotates in the same direction as cylinder 14, but at half the speed of the cylinder. Thus, a half revolution of the cam is made for one revolution of cylinder 14. The cam track is low for a semi-circumference and high for a semi-circumference, and consequently the pins 59 are projected for a complete rotation of cylinder 14 and are retracted during the next rotation of the cylinder. This period of operation of the pins answers for both the straight and collect runs, in both of which cylinder 1 takes every other sheet. The point of retraction of pins 59 must be changed, however, so that on "straight" runs the pins 59 will be retracted just as the pins on cylinder 77 takes the sheets. On "collect" runs, pins 59 must be retracted just as pins 18 on cylinder 1 take the sheets. Pins 59 are retracted just as the cam roller passes from the high to the low of the cam 64, and by moving the cam 64 relatively to its gear, through an angle equal to that between the impaling loci of pins 18 and of pins 85, as indicated at *a* and *b* the sheets will be delivered either to cylinder 1, for collection and folding, after a full revolution of cylinder 14, or will be delivered to cylinder 77 after only a partial rotation, to be folded and delivered by cylinder 77. In said embodiment, a bolt or bolts is passed through a hole in the gear which may be registered with either a pair of holes 116 or a pair of holes 117 in the cam, whereby the required difference in angular setting of the cam is effected.

The invention in its broader aspects is not limited to the specific mechanisms shown and described but departures may be made therefrom within the scope of the accompanying claims without departing from the principles of the invention and without sacrificing its chief advantages.

What I claim is:—

1. A sheet folding and delivering mechanism including in combination a plurality of folding cylinders, a cylinder cooperating alternatively with one folding cylinder as a collecting cylinder or with another folding cylinder as a transfer cylinder.

2. A sheet folding and delivering mechanism including in combination a plurality of folding cylinders, a cylinder cooperating alternatively directly with one folding cylinder as a collecting cylinder or with another folding cylinder as a transfer cylinder.

3. A sheet folding and delivering mechanism including in combination a plurality of folding cylinders, a cylinder cooperating alternatively with one folding cylinder as a collecting cylinder or directly with another folding cylinder as a transfer cylinder.

4. A sheet folding and delivering mechanism including in combination a plurality of folding cylinders, a cylinder cooperating alternatively directly with one folding cylinder as a collecting cylinder or directly with another folding cylinder as a transfer cylinder.

5. A sheet folding and delivering mechanism including in combination a plurality of folding cylinders, a cylinder cooperating with one folding cylinder as a cutting cylinder and alternatively with one folding cylinder as a collecting cylinder or with another folding cylinder as a transfer cylinder.

6. A sheet folding and delivering mechanism including in combination a plurality of folding cylinders, a cylinder cooperating with one folding cylinder as a cutting cylinder and alternatively with said folding cylinder as a collecting cylinder or with another folding cylinder as a transfer cylinder.

7. A sheet folding and delivering mechanism including in combination a plurality of folding cylinders, a cylinder cooperating with one folding cylinder as a cutting cylinder and alternatively directly with one folding cylinder as a collecting cylinder or with another folding cylinder as a transfer cylinder.

8. A sheet folding and delivering mechanism including in combination a plurality of folding cylinders, a cylinder cooperating with one folding cylinder as a cutting cylinder and alternatively with one folding cylinder as a collecting cylinder or directly with another folding cylinder as a transfer cylinder.

9. A sheet folding and delivering mechanism including in combination a plurality of folding cylinders, a cylinder always cooperating directly with a plurality of folding cylinders and cooperating alternatively as a collecting cylinder with one folding cylinder or as a transfer cylinder with another folding cylinder.

10. A sheet folding and delivering mechanism including in combination a plurality of folding cylinders, a cylinder always cooperating directly with a plurality of folding cylinders, cooperating always with a folding cylinder as a cutting cylinder, and cooperating alternatively as a collecting cylinder with one folding cylinder or as a transfer cylinder with another folding cylinder.

11. A sheet folding and delivering mechanism including in combination a plurality of folding cylinders, a cylinder always cooperating directly with a plurality of folding cylinders, cooperating always with a folding cylinder as a cutting cylinder, and cooperating alternatively as a collecting cylinder with said folding cylinder or as a transfer cylinder with another folding cylinder.

12. A sheet folding and delivering mechanism including in combination a plurality of folding cylinders, a cylinder cooperating alternatively with one folding cylinder as a collecting cylinder or with another folding cylinder as a transfer cylinder, means for taking a folded off product from one folding cylinder and means for taking a folded off product from another folding cylinder.

13. A sheet folding and delivering mechanism including in combination a plurality of folding cylinders, a cylinder cooperating with one folding cylinder as a cutting cylinder and alternatively with one folding cylinder as a collecting cylinder or with another folding cylinder as a transfer cylinder, means for taking a folded off product from one folding cylinder and means for taking a folded off product from another folding cylinder.

14. A sheet folding and delivering mechanism including in combination a plurality of folding cylinders, a cylinder always cooperating directly with a plurality of folding cylinders and cooperating alternatively as a collecting cylinder with one folding cylinder or as a transfer cylinder with another folding cylinder, means for taking a folded off product from one folding cylinder and means for taking a folded off product from another folding cylinder.

15. A sheet folding and delivering mechanism including in combination a plurality of folding cylinders, a cylinder always cooperating directly with a plurality of folding cylinders, cooperating always with a folding cylinder as a cutting cylinder, and cooperating alternatively as a collecting cylinder with one folding cylinder or as a transfer cylinder with another folding cylinder means for taking a folded off product from one folding cylinder and means for taking a folded off product from another folding cylinder.

16. A sheet folding and delivering mechanism including in combination a plurality of folding cylinders, a cylinder operating to cut off sheets for a plurality of cylinders and cooperating as a collecting cylinder for one folding cylinder and as a transfer cylinder for another folding cylinder.

17. A sheet folding and delivering mechanism including in combination a plurality of folding cylinders, a cylinder operating to cut off sheets for a plurality of cylinders and cooperating as a collecting cylinder for one folding cylinder and a transfer cylinder for another folding cylinder, means for taking a folded off product from one folding cylinder and means for taking a folded off product from another folding cylinder.

18. A sheet folding and delivering mechanism including in combination a plurality of folding cylinders, a cylinder operating to cut off sheets for a plurality of cylinders and alternatively cooperating as a collecting cylinder for one folding cylinder or as a transfer cylinder for another folding cylinder.

19. A sheet folding and delivering mechanism including in combination a plurality of folding cylinders, a cylinder operating to cut off sheets for a plurality of cylinders and alternatively cooperating as a collecting cylinder for one folding cylinder or as a transfer cylinder for another folding cylinder,

means for taking a folded off product from one folding cylinder and means for taking a folded off product from another folding other folding off cylinder.

20. A sheet folding and delivering mechanism including in combination two folding cylinders of equal diameter, and a third cylinder of half said diameter and cooperating with one folding cylinder as a collecting cylinder and with the other folding cylinder as a transfer cylinder.

21. A sheet folding and delivering mechanism including in combination two folding cylinders of equal diameter, and a third cylinder of half said diameter cooperating to cut sheets for both said folding cylinders, and cooperating with one folding cylinder as a collecting cylinder and with the other folding cylinder as a transfer cylinder.

22. A sheet folding and delivering mechanism including in combination two folding cylinders of equal diameter, and a third cylinder of half said diameter cooperating to cut sheets for both said folding cylinders, and cooperating with one folding cylinder as a collecting cylinder and with the other folding cylinder as a transfer cylinder.

23. A sheet folding and delivering mechanism including in combination two folding cylinders of equal diameter, and a third cylinder of half said diameter and cooperating with one folding cylinder as a sheet cutting and collecting cylinder and with the other folding cylinder as a transfer cylinder.

24. A sheet folding and delivering mechanism including in combination two folding cylinders of equal diameter, and a third cylinder of half said diameter and alternatively cooperating with one folding cylinder as a collecting cylinder or with the other folding cylinder as a transfer cylinder.

25. A sheet folding and delivering mechanism including in combination two folding cylinders of equal diameter, and a third cylinder of half said diameter cooperating to cut sheets from a running web, and alternatively cooperating with one folding cylinder as a collecting cylinder or with the other folding cylinder as a transfer cylinder.

26. A sheet folding and delivering mechanism including in combination two folding cylinders of equal diameter, and a third cylinder of half said diameter cooperating to cut sheets for both said folding cylinders, and alternatively cooperating with one folding cylinder as a collecting cylinder or with the other folding cylinder as a transfer cylinder.

27. A sheet folding and delivering mechanism including in combination two folding cylinders of equal diameter, and a third cylinder of half said diameter, and cooperating cylinder and with the other folding cylinder as a transfer cylinder means for taking a folded off product from one folding cylinder and means for taking a folded off product from the other folding off cylinder.

28. A sheet folding and delivering mechanism including in combination two folding cylinders of equal diameter, and a third cylinder of half said diameter cooperating to cut sheets for both said folding cylinders, and cooperating with one folding cylinder as a collecting cylinder and with the other folding cylinder as a transfer cylinder means for taking a folded off product from one folding cylinder and means for taking a folded off product from the other folding off cylinder.

29. A sheet folding and delivering mechanism including in combination two folding cylinders of equal diameter, and a third cylinder of half said diameter cooperating to cut sheets for both said folding cylinders, and cooperating with one folding cylinder as a collecting cylinder and with the other folding cylinder as a transfer cylinder means for taking a folded off product from one folding cylinder and means for taking a folded off product from the other folding off cylinder.

30. A sheet folding and delivering mechanism including in combination two folding cylinders of equal diameter, and a third cylinder of half said diameter and alternatively cooperating with one folding cylinder as a collecting cylinder or with the other folding cylinder as a transfer cylinder means for taking a folded off product from one folding cylinder and means for taking a folded off product from the other folding off cylinder.

31. A sheet folding and delivering mechanism including in combination two folding cylinders of equal diameter, and a third cylinder of half said diameter cooperating to cut sheets for both said folding cylinders and alternatively cooperating with one folding cylinder as a collecting cylinder or with the other folding cylinder as a transfer cylinder, means for taking a folded off product from one folding cylinder and means for taking a folded off product from the other folding off cylinder.

32. A sheet folding and delivering mechanism including in combination a folding off cylinder having sheet taking and releasing means and a folding blade and sheet cutting means, an intermediate cylinder cooperating therewith having sheet taking and releasing means, and a folding off cylinder cooperating with said intermediate cylinder and having sheet taking and releasing means and a folding blade.

33. A sheet folding and delivering mechanism including in combination a folding off cylinder having sheet taking and releasing means and a folding blade and sheet cutting means, an intermediate cylinder cooperating therewith having sheet taking and releasing means, and a folding off cylinder

cooperating with said intermediate cylinder and having taking and releasing means and a folding blade, means for taking a folded off product from one folding off cylinder and means for taking a folded product from the other folding off cylinder.

34. A sheet folding and delivering mechanism including in combination a folding off cylinder having sheet taking and releasing means and a double-edged folding blade and sheet cutting means, an intermediate cylinder cooperating therewith having sheet taking and releasing means, and a folding off cylinder cooperating with said intermediate cylinder and having sheet taking and releasing means and a folding blade.

35. A sheet folding and delivering mechanism including in combination a folding off cylinder having sheet taking and releasing means and a folding blade and sheet cutting means, an intermediate cylinder cooperating therewith having sheet taking and releasing means, and a folding off cylinder cooperating with said intermediate cylinder and having sheet taking and releasing means and a double-edged folding blade.

36. A sheet folding and delivering mechanism including in combination a folding off cylinder having sheet taking and releasing means and a double-edged folding blade and sheet cutting means, an intermediate cylinder cooperating therewith having sheet taking and releasing means, and a folding off cylinder cooperating with said intermediate cylinder and having sheet taking and releasing means and a double-edged folding blade.

37. A sheet folding and delivering mechanism including in combination a folding off cylinder having sheet taking and releasing means and a folding blade and sheet cutting means, an intermediate cylinder cooperating therewith having sheet taking and releasing means, and a folding off cylinder cooperating with said intermediate cylinder and having sheet taking and releasing means and a folding blade, the sheet taking and releasing means of the intermediate cylinder being operable alternatively to release sheets to both folding cylinders or to one folding cylinder only.

38. A sheet folding and delivering mechanism including in combination a folding off cylinder having sheet taking and releasing means and a folding blade and sheet cutting means, an intermediate cylinder cooperating therewith having sheet taking and releasing means, and a folding off cylinder cooperating with said intermediate cylinder and having sheet taking and releasing means and a folding blade, the sheet taking and releasing means of the intermediate cylinder being operable to release sheets alternately to said folding off cylinders.

39. A sheet folding and delivering mechanism including in combination a folding off cylinder having sheet taking and releasing means and a double-edged folding blade and sheet cutting means, an intermediate cylinder cooperating therewith having sheet taking and releasing means and folding off cylinder cooperating with said intermediate cylinder and having sheet taking and releasing means and a double-edged folding blade, the sheet taking and releasing means of the intermediate cylinder being operable alternatively to release sheets to both folding cylinders or to one folding cylinder only.

40. A sheet folding and delivering mechanism including in combination a folding off cylinder having sheet taking and releasing means and a double-edged folding blade and sheet cutting means, an intermediate cylinder cooperating therewith having sheet taking and releasing means, and a folding off cylinder cooperating with said intermediate cylinder and having sheet taking and releasing means and a double-edged folding blade, the sheet taking and releasing means of the intermediate cylinder being operable to release sheets alternately to said folding off cylinders.

41. A sheet folding and delivering mechanism including in combination a folding off cylinder having a sheet taking and releasing means and a folding blade and sheet cutting means, an intermediate cylinder cooperating therewith having sheet taking and releasing means, and a folding off cylinder cooperating with said intermediate cylinder and having sheet taking and releasing means and a folding blade, the sheet taking and releasing means of the intermediate cylinder being operable alternatively to release sheets to both folding cylinders or to one folding cylinder only, means for taking a folded off product from one folding off cylinder and means for taking a folded product from the other folding off cylinder.

42. A sheet folding and delivering mechanism including in combination a folding off cylinder having a circumference of substantially two sheet lengths, and having sheet taking and releasing means and a folding blade and sheet cutting means, an intermediate cylinder cooperating therewith having sheet taking and releasing means, and a folding off cylinder cooperating with said intermediate cylinder and having sheet taking and releasing means and a folding blade.

43. A sheet folding and delivering mechanism including in combination a folding off cylinder having a circumference of substantially two sheet lengths, and having sheet taking and releasing means and a folding blade and sheet cutting means, an intermediate cylinder cooperating therewith having sheet taking and releasing means, and a folding off cylinder cooperating with said intermediate cylinder and having sheet taking and releas-

ing means and a folding blade, the sheet taking and releasing means of the intermediate cylinder being operable alternatively to release sheets to both folding cylinders or to one folding cylinder only.

44. A sheet folding and delivering mechanism including in combination a folding off cylinder having sheet taking and releasing means and a folding blade and sheet cutting means, an intermediate cylinder cooperating therewith having a circumference of substantially one sheet length, and having sheet taking and releasing means, and a folding off cylinder cooperating with said intermediate cylinder and having sheet taking and releasing means and a folding blade.

45. A sheet folding and delivering mechanism including in combination a folding off cylinder having sheet taking and releasing means and a folding blade and sheet cutting means, an intermediate cylinder cooperating therewith having a circumference of substantially one sheet length, and having sheet taking and releasing means, and a folding off cylinder cooperating with said intermediate cylinder and having sheet taking and releasing means and a folding blade, the sheet taking and releasing means of the intermediate cylinder being operable alternatively to release sheets to both folding cylinders or to one folding cylinder only.

46. A sheet folding and delivering mechanism including in combination a folding off cylinder having a circumference of substantially two sheet lengths, and having sheet taking and releasing means and a folding blade and sheet cutting means, an intermediate cylinder cooperating therewith having a circumference of substantially one sheet length, and having sheet taking and releasing means, and a folding off cylinder cooperating with said intermediate cylinder and having sheet taking and releasing means and a folding blade.

47. A sheet folding and delivering mechanism including in combination a folding off cylinder having a circumference of substantially two sheet lengths, and having sheet taking and releasing means and a folding blade and sheet cutting means, an intermediate cylinder cooperating therewith having a circumference of substantially one sheet length, and having sheet taking and releasing means and a folding off cylinder cooperating with said intermediate cylinder and having sheet taking and releasing means and a folding blade the sheet taking and releasing means of the intermediate cylinder being operable alternatively to release sheets to both folding cylinders or to one folding cylinder only.

48. A sheet folding and delivering mechanism including in combination a folding off cylinder having a circumference of substantially two sheet lengths, and having sheet taking and releasing means and a folding blade and sheet cutting means, an intermediate cylinder cooperating therewith having a circumference of substantially one sheet length, and having sheet taking and releasing means, and a folding off cylinder and having a circumference of substantially two sheet lengths and having sheet taking and releasing means and a folding blade.

49. A sheet folding and delivering mechanism including in combination a folding off cylinder having a circumference of substantially two sheet lengths, and having sheet taking and releasing means and a folding blade and sheet cutting means, an intermediate cylinder cooperating therewith having a circumference of substantially one sheet length, and having sheet taking and releasing means, and a folding off cylinder cooperating with said intermediate cylinder and having a circumference of substantially two sheet lengths, and having sheet taking and releasing means and a folding blade, the sheet taking and releasing means of the intermediate cylinder being operable alternatively to release sheets to both folding cylinders or to one folding cylinder only.

In testimony whereof, I have signed my name to this specification.

ERNEST JAMES SMITH.