Oct. 6, 1931. C. S. CRAFTS 1,826,652

SHEET CUTTING, COLLECTING, AND FOLDING MECHANISM

Filed Dec. 24, 1929 4 Sheets-Sheet 1

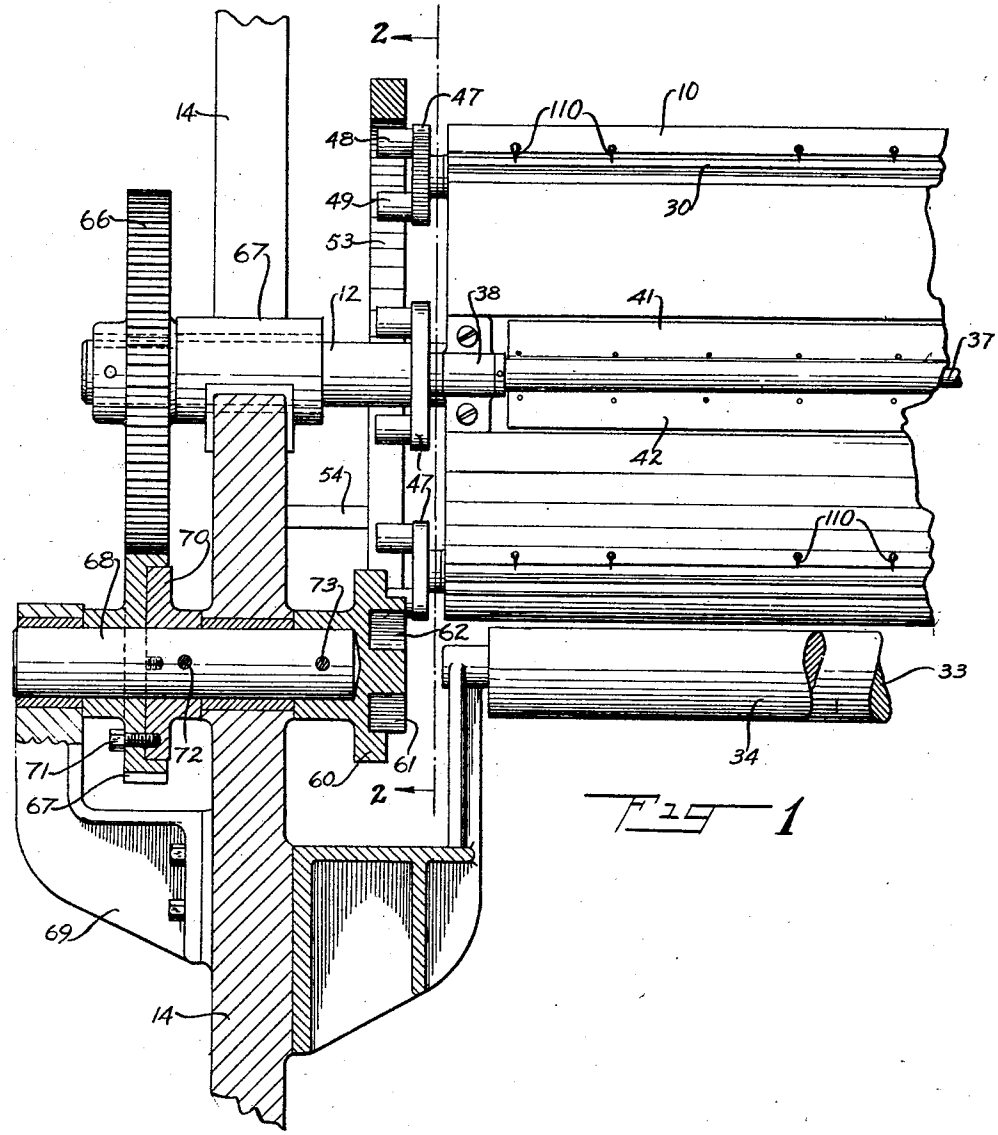


Fig 1

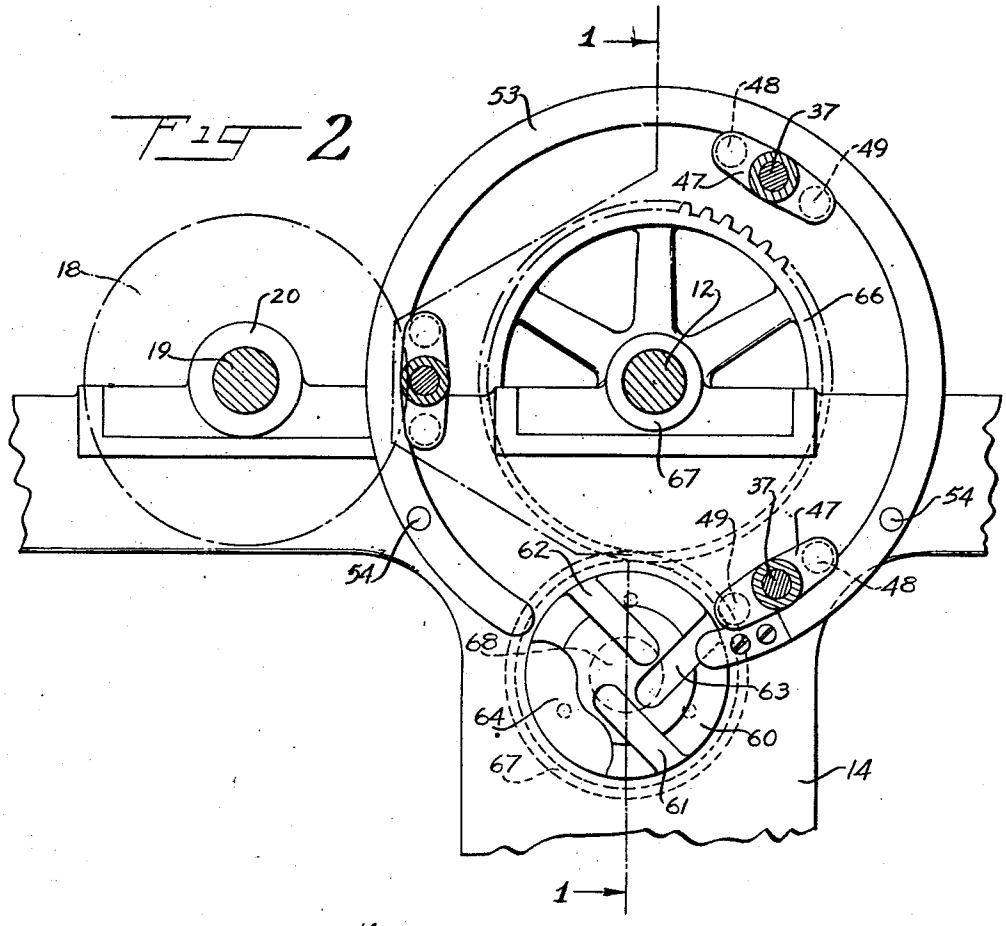
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SHEET CUTTING, COLLECTING, AND FOLDING MECHANISM

Filed Dec. 24, 1929 4 Sheets-Sheet 2

Fig 2



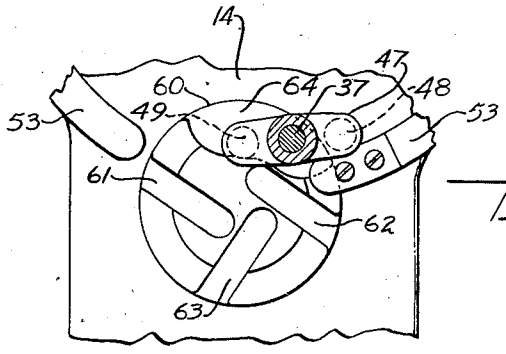


Fig 3

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SHEET CUTTING, COLLECTING, AND FOLDING MECHANISM

Filed Dec. 24, 1929 4 Sheets-Sheet 3

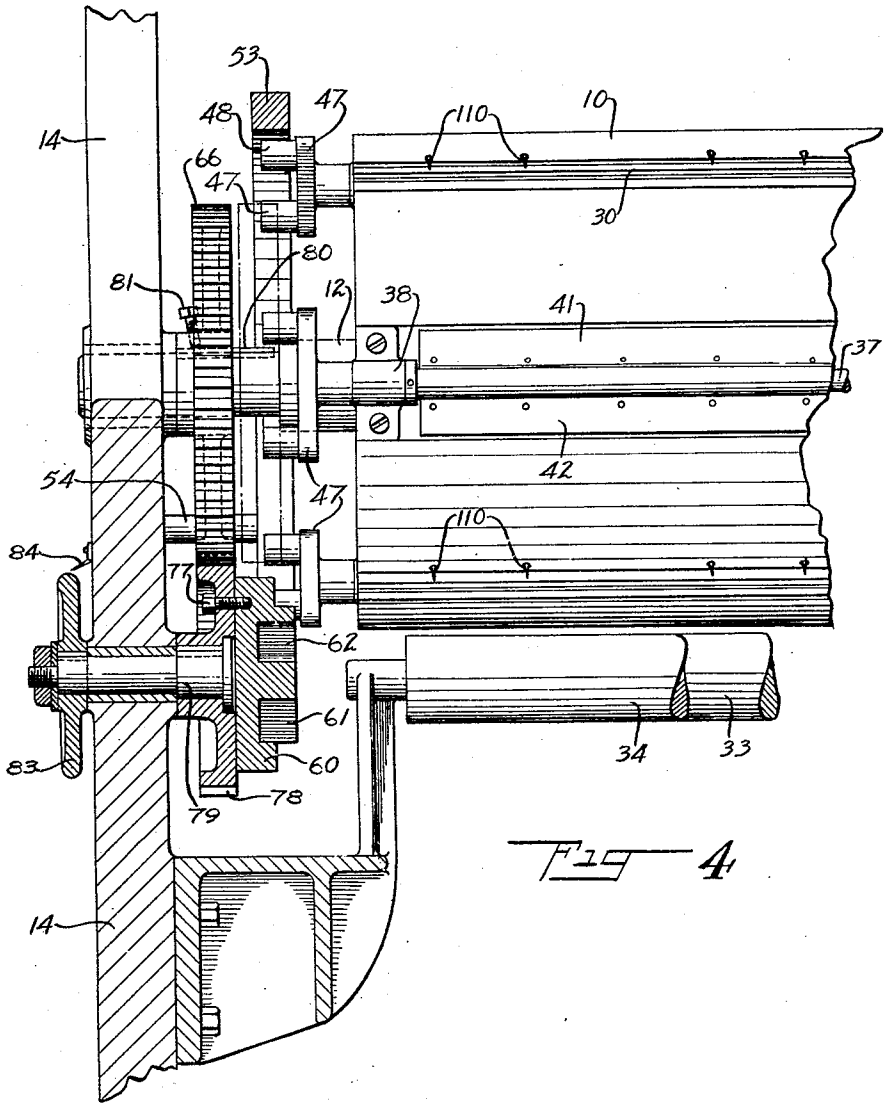


Fig 4

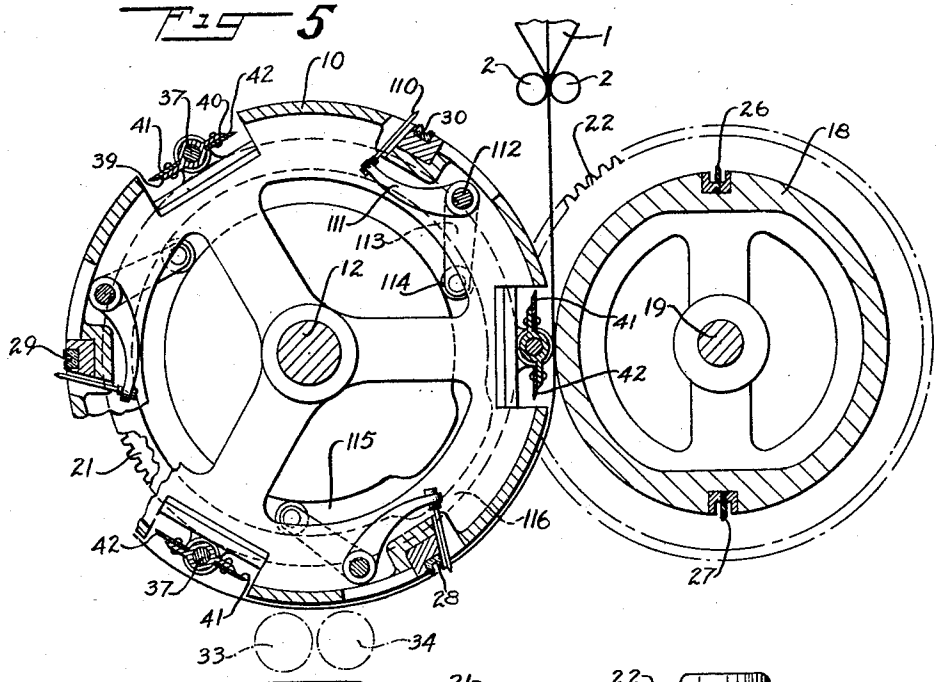
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SHEET CUTTING, COLLECTING, AND FOLDING MECHANISM

Filed Dec. 24, 1929 4 Sheets-Sheet 4

Fig 5



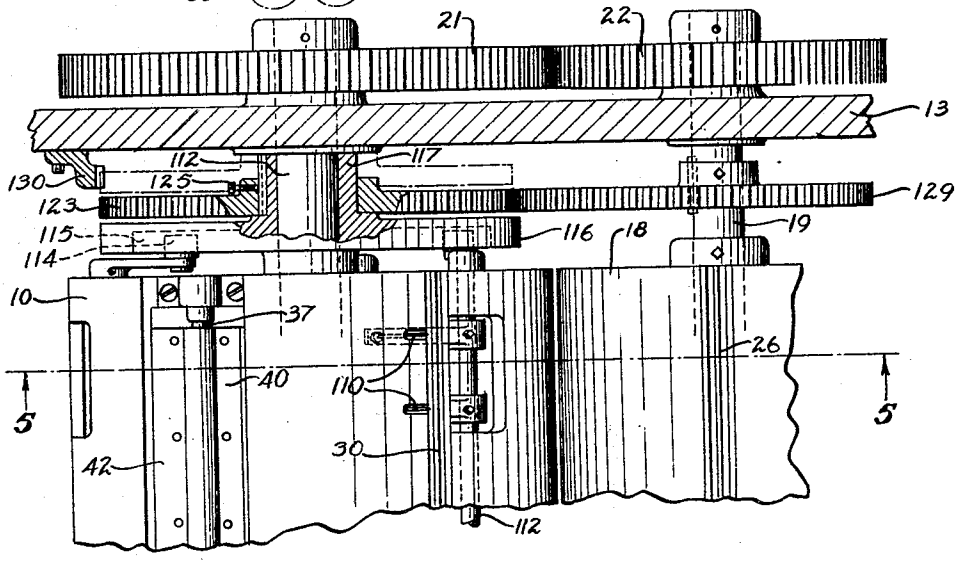


Fig 6

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Patented Oct. 6, 1931

1,826,652

UNITED STATES PATENT OFFICE

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SHEET CUTTING, COLLECTING, AND FOLDING MECHANISM

Application filed December 24, 1929. Serial No. 416,230.

The invention relates to new and useful improvements in sheet cutting, collecting and folding mechanisms, and more especially to such improvements as applied to fast 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 vertical fragmentary section of one end of a mechanism embodying the invention, and is taken substantially on line 1—1 of Fig. 2;

Fig. 2 is a fragmentary vertical, transverse section taken substantially on the line 2—2 of Fig. 1, and showing the non-collecting setting of the folding mechanism;

Fig. 3 is a fragmentary section corresponding to the lower part of Fig. 1 and showing the collecting setting of the folding mechanism;

Fig. 4 is a sectional view showing the mechanism of Fig. 1 with a modified form of the settable means for effecting the collecting or non-collecting action;

Fig. 5 is a fragmentary vertical, transverse section, taken at the other end of the mechanism shown in Fig. 2, and substantially on the line 5—5 of Fig. 6; and

Fig. 6 is a fragmentary top plan of the mechanism shown in Fig. 5, with the frame in section.

The invention is directed to providing novel sheet folding mechanism combined and cooperating with very simple, sturdy and highly efficient novel means for optionally collecting before folding off or for folding off the product uncollected.

The invention finds wide and advantageous application in a type of folder mechanism having a multi-way collecting cylinder equipped with sheet-cutting means and folding devices for each sheet-carrying surface or section of the cylinder, coacting with folding off rollers and a mechanism at the folding-off station for variably actuating all the folding devices to fold off the sheets either collected or uncollected. Cooperating with the sheet-cutting means on said collecting cylinder is a cutting cylinder, their axes being preferably in the same horizontal plane, the running web or webs being fed from a source of supply directly into the bite of said cylinders. The novel folding mechanism controlling means of my invention may be used, however, in other types of folding mechanism.

With this arrangement of mechanism, the webs and sheets follow a very short and simple path, which is the same for collecting and not collecting; there is clear, short and direct feed of the webs, with plenty of room at either side for any desired cross-association of webs; there is no transfer of cut sheets during collection; and very simple, fast and reliable means are provided for selectively operating the folding devices to fold off either collected or uncollected products.

The invention provides rotary, blade-equipped folding means and actuating and controlling devices therefor which positively actuate the folding mechanism at the folding off locus, or as a desired alternative, positively prevent actuating of the folding mechanism, for either collected or uncollected folding off. The change from one function to the other is effected by a simple quarter turn of the cam controlling the folding-off action.

Referring now to the embodiment of the invention illustrated by way of example in the accompanying drawings, a running web supply is received from a suitable source, such as a fast rotary printing press, in which case the supply is longitudinally folded, and

usually associated. The webs in such case are run over a former 1 (Fig. 5), having pairs of forming and forwarding rolls 2. The sheet cutting, optionally collecting, and folding-off mechanisms comprise a multi-way cylinder having an odd number of sheet-supporting and collecting surfaces thereon (for cooperation with the usual arrangement of plates on the form cylinders of a printing press, that is, either two or four plates around), such sheet-supporting spaces being usually three in number. The folding-off devices are located medianly of the respective sheet-supporting surfaces, and a cutting cylinder, cooperating with the multi-way cylinder, to cut the sheets from the running web, is positioned preferably on the horizontal axial plane with the multi-way cylinder.

As embodied (Figs. 1, 2 and 5), the multi-way cylinder 10 is fixed on a shaft 12, which is journaled in the machine side frames 13 and 14. The cooperating cutting cylinder 18 is fixed on a shaft 19, journaled at 20 in the folder side frames 13 and 14. This cylinder is located substantially beside the collecting cylinder, and they preferably have their axes in the same horizontal plane. The web is preferably delivered directly to the sheet-cutting locus, which is likewise located preferably on the axis of the former from which the main web supply comes. Thus the web and sheets take a short and direct path and maximum space is afforded for cross-association when it is employed. Gear wheels 21 and 22, fixed respectively on the shafts 12 and 19, cause the two cylinders to rotate together. As shown, the cooperating cutting cylinder 18 has a circumference equal to the length of two sheets, and cuts twice for every revolution of the cylinder. Two male cutting members 26 and 27 are mounted diametrically opposite in the cylinder 18, and three female cutting members 28, 29 and 30 are mounted in cylinder 10, a sheet length apart circumferentially, and cooperate with the male cutters to cut the sheets from the running webs.

The embodied form of folding-off mechanism (Figs. 1, 2 and 3) comprises a rotary blade mechanism, to which is imparted a half rotation in passing the folding-off rollers 33 and 34 to fold off the sheets into the bite of the folding-off rollers. As embodied, each of these rotary blade mechanisms comprises a shaft 37, mounted at its ends in bearings 38, formed in the ends of the cylinder 10. Each of these shafts within the cylinder 10 is provided with two radially extending seats 39 and 40, in which are mounted, respectively, two folding blades 41 and 42. Thus, on each actuation, or half revolution, of the folding device, as it passes the folding-off station, the product on the particular section of the cylinder is folded off between the folding-off rollers 33 and 34, the folding device being silenced in passing the folding station to effect the collecting on the particular section of the cylinder.

In accordance with the present invention, there is located at the folding-off station a controlling and actuating device for the folding mechanisms, which device is settable either to actuate the folding device, to impart a half revolution thereto, or to prevent such actuation of the folding device and to cause it to pass by the folding-off position silent during a collecting revolution, as though the guiding cam ring were continuous past the folding station. In the embodied form of said actuating and controlling means, one end of each of the shafts 37 projects beyond the head of cylinder 10, and fixed on the projecting end of each shaft 37 is a cross arm or tumbler head 47, carrying at either end thereof a pair of cam rollers 48 and 49. These cam rollers run on the inner face of a fixed, circular cam track 53, mounted by means of supports 54 on the side frame 14 of the machine. The actuating and controlling devices at the folding-off locus, coacting with the tumbler heads of the folding devices, comprises a rotary disc-like member 60 (Figs. 1, 2 and 3) which in the present embodiment is geared to rotate in a three-to-two ratio with respect to the three-way collecting cylinder 10. This device operates on the well-known Husby cam principle. As so embodied, it is settable to and fro through an angle of ninety degrees. It is provided with two straight, tangentially disposed cam slots 61 and 62, which in one angular setting or position of the mechanism (Fig. 2), actuate the folding devices. In the ratio of rotation stated, these will engage each successive tumbler head 47 of the folding devices, as the cylinder 10 rotates, and cause a half rotation of each of the folding devices, with a consequent folding-off of the sheets from every one of the sheet-supporting surfaces every time it passes the folding-off station.

On the other setting of said embodied actuating and controlling devices (Fig. 3) that is, after an angular resetting through a quadrant, the folding cylinder collects on every other passing of a sheet collecting section past the folding-off station. The embodied device causes an actuation of any particular folding device on one rotation of the cylinder 10 and prevents actuation of the next succeeding folding device, that is, it actuates each folding device on every other revolution of the cylinder as it passes the folding-off station. In said embodied form of alternatively presentable folder device control, there is provided a cam slot 63, similar to the ones already described, and an open cam track 64 which is shaped so that the rollers of a tumbler head pass thereover so as to maintain the tumbler head on substantially its circular track past the folding-

off station, and thus without any actuation of the folding device.

When the slot 63 and track 64 are selectively set in operative position (Fig. 3), the slot 63 receives the forward roller of the tumbler head of one folding device, and gives the folding device a half revolution to fold off the corresponding sheets. When the next folding device reaches the folding-off station, the rollers of its tumbler head engage with the track 64, ride past the folding-off station on substantially the circular path, and there is no actuation of that folding device. That is, with this setting of the mechanism, one folding device is given a half revolution to fold off on one revolution of the cylinder 10, and on the next revolution it is guided by the folding-off station without folding and the sheets are collected.

The embodied mechanism is changed from noncollecting operation to collecting operation, or vice versa, by changing the setting of the disc 60 through an angle of ninety degrees in one direction or the other. In the embodied form of said means (Fig. 1) and of the associated and cooperating devices, a gear wheel 66 is fixed on shaft 12 of the collecting and folding cylinder. Gear 66 meshes with a hollowed gear 67, mounted loosely on a shaft 68, which is journaled in a bearing in the side frame 14, and in a bearing in a bracket 69. A disc 70 fits within the hollow face of gear 67, the disc 70 being mounted on and fixed to shaft 68 by a pin 72. There are a plurality of screw-threaded holes tapped in the inner flat face of disc 70, which fits against the flat face of gear 67, and there are corresponding holes in gear 67, spaced a quadrant apart. Tap bolts 71 hold the gear and disc together in either position after the mechanism is so set. On the inner end of shaft 68 is fixed, by a pin 73, the cam disc 60 already described. By removing bolts 71, disc 60 can be rotated through ninety degrees and the bolts reinserted, thus selectively and settably causing the collecting or noncollection folding off of the sheets.

In Fig. 4 is shown a modified form of the settable devices for effecting either collecting or non-collecting folding off. Therein the cam disc 60 is fixed, by bolts 77, on a gear wheel 78, fixed on a shaft 79, which shaft is journaled in the side frame 14, and projects outwardly therefrom. Gear wheel 78 meshes with the driving gear wheel 66 on shaft 12 of the collecting and folding cylinder. In this case gear 66 is mounted on shaft 12 to be slipped into and out of mesh with gear 78, by means of a spline 80 and clamping screw 81. There is fixed to shaft 79, on its exterior end, a hand-wheel 83, having a degree scale marked thereon, and a pointer 84 cooperates therewith. When the gears 66 and 78 are out of mesh, the hand wheel 84 can be rotated through ninety degrees and the change between collecting and non-collecting folding off effected.

The means for effecting a collecting or non-collecting movement of the sheet holding and releasing devices of the collecting cylinder, as embodied, comprises a series of impaling pins 110, mounted in close proximity to the corresponding sheet-cutting device on the cylinder 10. The pins 110 are mounted on a series of arms 111, fixed on a shaft 112, journaled at its ends in the heads of the cylinder 10. One end of the shaft 112 projects outside the cylinder, and said exterior end has fixed thereon an arm 113 carrying a cam roller 114. These rollers run in a grooved cam track 115, formed in a cam disc 116, the hub 117 of which is journaled loosely on the shaft 12 of the cylinder 10. A driving gear 123 is mounted on the hub 117 of the cam plate with a spline 124, whereby the gear wheel 123 may be moved axially on the hub 117 of the cam disc 116, but the cam disc and gear wheel rotate together. A clamping screw 125 may be provided for holding the gear wheel in desired position on the hub. Gear wheel 123, in one of its positions, meshes with a driving gear 129 fixed on the shaft 19 of the cutting cylinder 18. When the mechanism is so connected, the cam disc 116 has a three-to-two forward rotation relatively to the cylinder 10, and thereby the respective impaling pins will be actuated only every second time that they pass the folding-off position.

To effect consecutive actuation of the impaling pins for each rotation of the cylinder 10, cam disc 116 is held stationary. The gear wheel 123 is clipped from full line to broken-line position in Fig. 6, and thus passes out of mesh with its driving gear 129, and passes into mesh with the teeth of a holding detent member 130, and thereby the cam plate 116 is held stationary, and the impaling pins are retracted on each rotation of the folding-off cylinder 10, to act in harmony with the non-collecting action of the folding mechanism.

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 collecting and folding mechanism including in combination a multi-way collecting cylinder, a rotary folding device mounted on said cylinder, folding-off rollers, and means including a rotary device at the folding-off locus settable to effect folding off of the sheets on every passage of the folding device or only on a plurality of such passings.

2. A sheet collecting and folding mechanism including in combination a collecting cylinder having a plurality of sheet-supporting surfaces, folding devices located medianly of the sheet supporting surfaces, folding-off rollers, and means at the folding-off position selectively settable to actuate each folding device as it passes or to actuate one folding device and to prevent another folding device from operating.

3. A sheet collecting and folding mechanism including in combination a collecting cylinder having a plurality of sheet-supporting surfaces, folding devices located medianly of the sheet supporting surfaces, folding-off rollers, and means at the folding off position passing into engagement with each of the folding devices in succession and selectively settable to actuate each folding device as it passes or to actuate one folding device and to prevent another folding device from operating.

4. A sheet collecting and folding mechanism including in combination a collecting cylinder having a plurality of sheet-supporting surfaces, folding devices having rotary folding blades located medianly of the sheet-supporting surfaces, and a rotary device at the folding-off station engaging successive folding devices to cause one to fold off and to prevent another from folding off.

5. A sheet collecting and folding mechanism including in combination a collecting cylinder having a plurality of sheet-supporting surfaces, folding devices having rotary folding blades located medianly of the sheet-suporting surfaces, and a rotary device at the folding-off station settable to engage successive folding devices to cause one to fold off and to prevent another from folding off.

6. A sheet collecting and folding mechanism including in combination a collecting cylinder having a plurality of sheet-supporting surfaces, folding devices having rotary folding blades located medianly of the sheet-supporting surfaces, and a rotary device at the folding-off station angularly settable to engage successive folding devices to cause one to fold off and to prevent another from folding off.

7. A sheet collecting and folding mechanism including in combination a collecting cylinder having a plurality of sheet-supporting surfaces, folding devices having rotary folding blades located medianly of the sheet supporting surfaces, folding-off rollers, and a rotary device at the folding-off station settable to actuate every successive folding device or to actuate one folding device and to prevent a succeeding one from being actuated.

8. A sheet collecting and folding mechanism including in combination a collecting cylinder having a plurality of sheet supporting surfaces, folding devices having rotary folding blades located medianly of the sheet supporting surfaces, folding-off rollers, and a rotary device at the folding-off station angularly settable to actuate every successive folding device or to actuate one folding device and to prevent a succeeding one from being actuated.

9. A sheet collecting and folding mechanism including in combination a rotating sheet carrier, a folding device thereon, folding-off rollers, and means at the folding-off locus coacting with the folding device as it passes the folding-off rollers to cause it to, or to prevent it from, folding off the sheets.

10. A sheet collecting and folding mechanism including in combination a rotating sheet carrier, a folding device therein, folding-off rollers, and means at the folding-off locus coacting with the folding device as it passes the folding-off rollers to cause it to fold off on one rotation and to prevent it folding off on a succeeding rotation.

11. A sheet collecting and folding mechanism including in combination a rotating sheet carrier, a folding device thereon, folding-off rollers, and means at the folding-off locus selectively settable to actuate the folding device at every passing of the folding-off rollers or only on a plurality of said passings.

12. A sheet collecting and folding mechanism including in combination a rotary sheet carrier, a rotary folding-device carried thereon, folding-off rollers, and a rotary device having a member presentable at the folding-off locus to rotate the folding device and a member alternatively presentable to prevent rotation of the folding device.

13. A sheet collecting and folding mechanism including in combination a rotary sheet carrier, a rotary folding device carried thereon, folding-off rollers, and a rotary device having a slot presentable at the folding-off locus to rotate the folding device and a track alternatively presentable to prevent rotation of the folding device.

14. A sheet collecting and folding mechanism including in combination a rotating sheet carrier, a rotating folding device thereon, folding-off rollers, and means at the folding-off locus coacting with the folding device as it passes the folding-off rollers to cause it to, or to prevent it from, folding off the sheets.

15. A sheet collecting and folding mechanism including in combination a rotating sheet carrier, a rotating folding device thereon, folding-off rollers, and rotating means at the folding-off locus coacting with the folding device as it passes the folding-off rollers to cause it to, or to prevent it from, folding off the sheets.

16. A sheet collecting and folding mechanism including in combination a rotating sheet carrier, a rotating folding device thereon, folding-off rollers, and rotating

means at the folding-off locus coacting with the folding device as it passes the folding-off rollers to cause it to fold off on one rotation and to prevent it folding off on a succeeding rotation.

17. A sheet collecting and folding mechanism including in combination a rotating sheet carrier, a rotating folding device thereon, folding-off rollers, and rotating means at the folding-off locus selectively settable to actuate the folding device at every passing of the folding-off rollers or only on a plurality of said passings.

18. A sheet collecting and folding mechanism including in combination a rotating sheet carrier, a rotating folding device thereon, folding-off rollers, and rotating means at the folding-off locus angularly selectively settable to actuate the folding device at every passing of the folding-off rollers or only on a plurality of said passings.

19. A sheet collecting and folding mechanism including in combination a rotary sheet carrier, a rotary folding device carried thereon, folding-off rollers, and a rotary device having slots presentable at the folding-off locus to rotate the folding device, a member alternatively presentable to prevent rotation of the folding device, and means angularly settable to cause said folding device to fold off on every revolution or only on a plurality of revolutions.

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

CURTIS S. CRAFTS.