

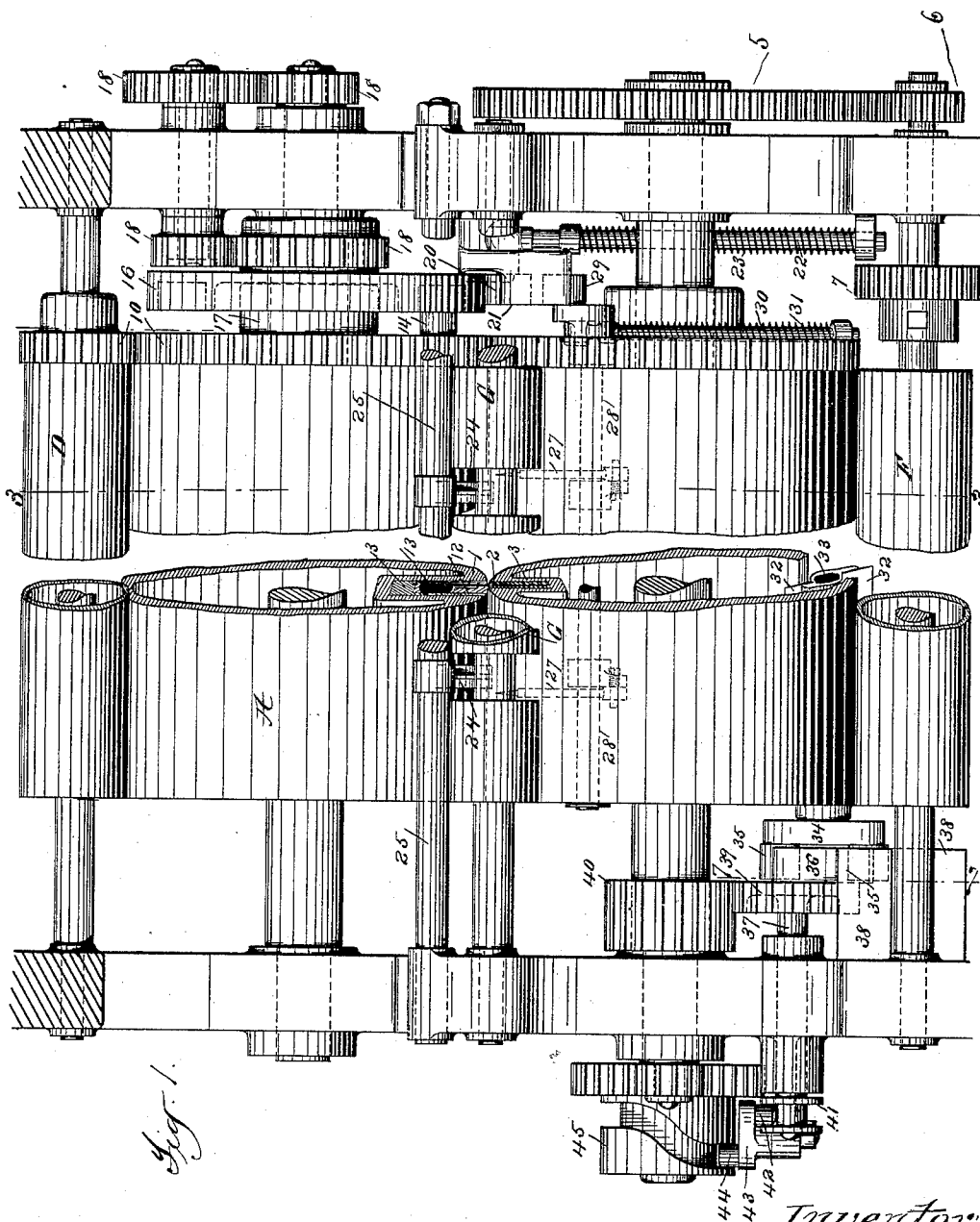
(No Model.)

3 Sheets—Sheet 1.

S. D. TUCKER.  
SHEET COLLECTING MECHANISM.

No. 465,604.

Patented Dec. 22, 1891.



*Fig. 1.*

*Attest:*  
*Geo. H. Botts.*  
*Ym. Bond*

*Inventor:*  
*Stephen D. Tucker*  
*By Philip Phelps Hooy*  
*Atty's*

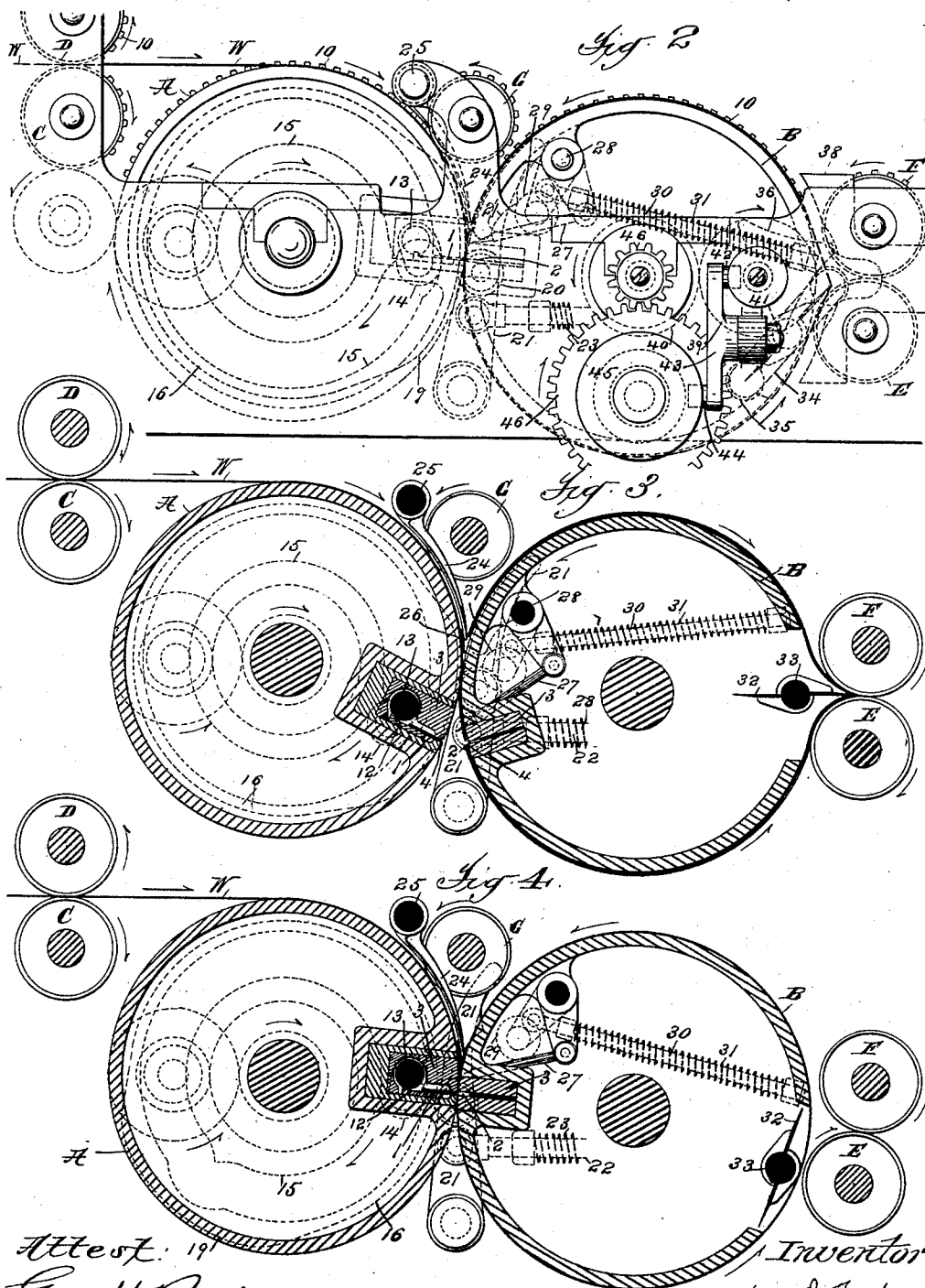
(No Model.)

3 Sheets—Sheet 2.

S. D. TUCKER.  
SHEET COLLECTING MECHANISM.

No. 465,604.

Patented Dec. 22, 1891.



Attest: 191  
Geo H. Batts.  
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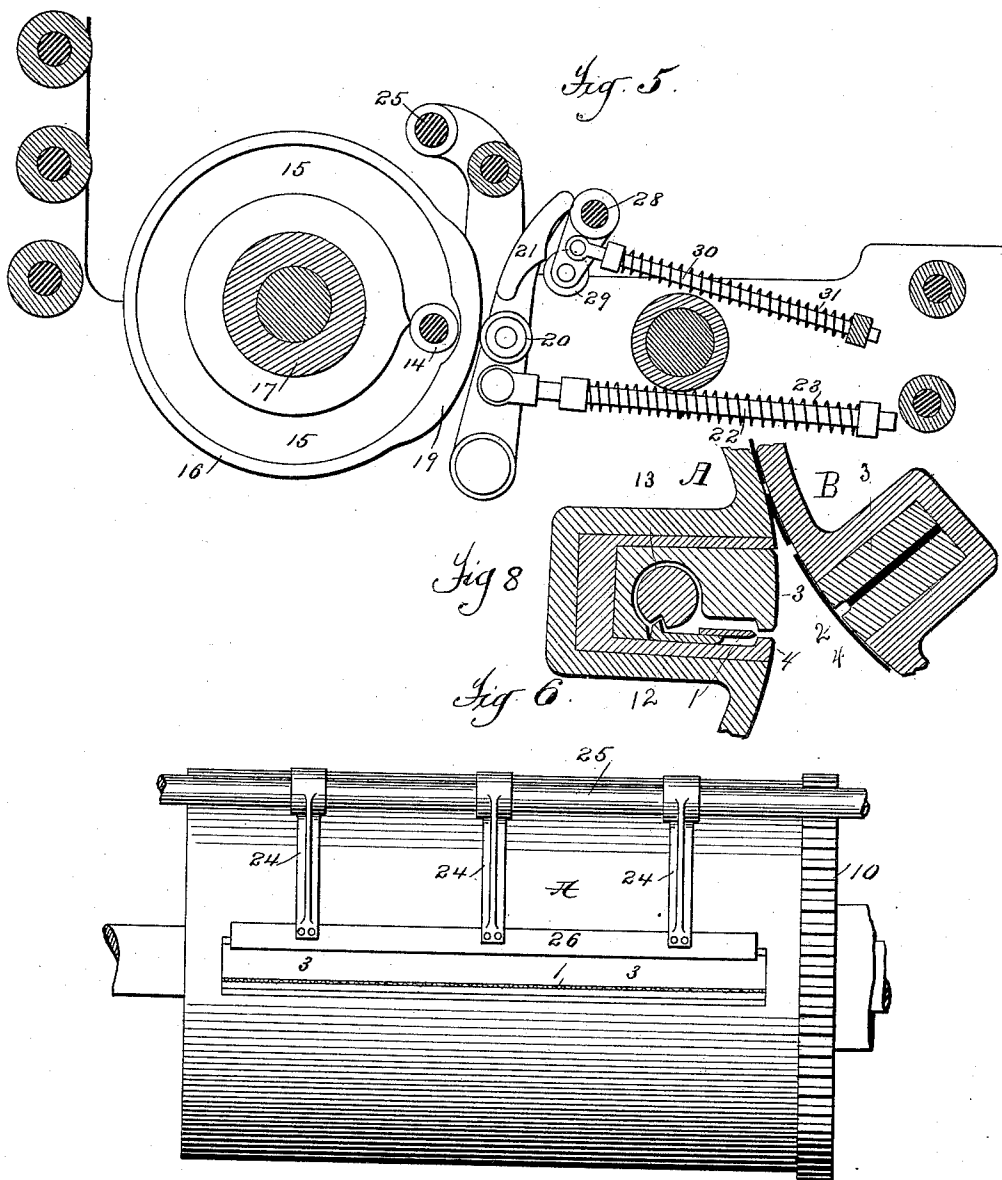
(No Model.)

3 Sheets—Sheet 3.

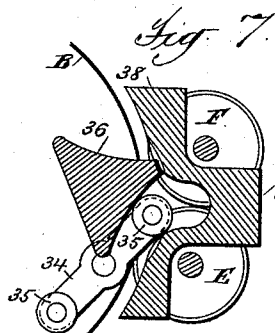
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Attest:  
Geo. H. Bott  
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Inventor:  
Stephen D. Tucker  
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# UNITED STATES PATENT OFFICE.

STEPHEN D. TUCKER, OF NEW YORK, N. Y.

## SHEET-COLLECTING MECHANISM.

SPECIFICATION forming part of Letters Patent No. 465,604, dated December 22, 1891.

Application filed August 6, 1890. Serial No. 361,205. (No model.)

*To all whom it may concern:*

Be it known that I, STEPHEN D. TUCKER, a citizen of the United States, residing at New York, county of New York, and State of New York, have invented certain new and useful Improvements in Sheet-Collecting Mechanisms, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to rotary paper-folding machines, its object being to provide an improved method of and means for collecting from the web and folding a number of sheets of paper, whereby an accurate registry of the sheets is secured and greater certainty and uniformity of action of the collecting, cutting, and folding mechanism obtained.

To this end my invention consists in a method of collecting and folding sheets, and in various constructions and combinations of mechanism, all as fully described in the following specification, and pointed out in the claims.

For a full understanding of my invention a detailed description of the preferred form of mechanism embodying the same will now be given, reference being had to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a broken sectional plan of a pair of collecting, cutting, and folding cylinders and the parts co-operating therewith. Fig. 2 is an end elevation looking to the right in Fig. 1 and showing the parts during the operation of severing the sheets. Fig. 3 is a vertical section on the line 3 3 of Fig. 1, showing the parts during the operation of folding the sheets after they have been severed. Fig. 4 is a similar section showing the parts at the completion of one revolution of the cylinders. Fig. 5 is a section on the line 5 5 of Fig. 1. Fig. 6 is a side view of the male cutting-cylinder, Fig. 7 is a detail section on the line 7 7 of Fig. 1, and Fig. 8 is a detail of the cutting devices.

Referring now to said drawings, A B are a pair of collecting, cutting, and folding cylinders, to which the web W passes from a pair of feed-rolls C D and by which the collected sheets are folded between a pair of folding-rolls E F, the web being led to the cylinders A B between the elastic pressure-roll G and the cylinder A, these cylinders and rolls being geared together to run in proper time by

a train of gears 10. As herein shown, the cylinders A B are of equal size and run in unison, and are arranged to collect three sheets and the seizing, cutting, and folding devices operate only at each third revolution of the cylinders, and the mechanism will be described as thus arranged. It will be understood, however, that the relative size of the cylinders A B and the number of sheets collected thereby may be varied as desired.

The feeding-rolls C D may receive a web of paper from any suitable mechanism in accordance with the machine to which the collecting, cutting, and folding mechanism is applied; but the mechanism of the present invention is intended specially for use in connection with a web-printing machine, in which case the feed-rolls may receive the web directly from the printing-cylinders or from a longitudinal folding mechanism, as desired.

The cylinder A is the male cutting-cylinder, and is provided with perforating blade or cutter 1, co-operating with the groove 2 in the female cylinder to partially sever the sheets. This cutter is carried by the cutter-bar 12, operated by the cutter-shaft 13, which is provided with a crank-arm carrying a bowl 14, running in a cam-groove 15 in a cam-plate 16. This cam-groove, as shown, is so constructed as to rock the shaft 13 and project the cutter 1 for the severing operation by a quick movement, the operating part of the cam being formed as shown in Fig. 5. The construction and operation of this blade and cam-plate 16 are the same as that shown and described in United States Letters Patent No. 180,966, August 8, 1876, except that the cam-plate instead of being fixed revolves loosely on the cylinder-shaft and makes one revolution to three of the cylinder, the knife thus being brought into cutting operation only at each third revolution of the cylinder. This movement of the plate 16 is secured by mounting it upon the shaft of the cylinder A by means of a loose sleeve 17 and employing a series of change-speed gears 18 between the cylinder-shaft and sleeve. The revolving cam-plate 16 carries also upon its periphery a cam 19, which at each revolution of the cam-plate engages a bowl 20 upon a cam-arm 21, pivoted in the frame of the machine and rocks the cam-arm into position to withdraw the sheet-retaining pins of the cylinder B. This cam-

arm is returned to position by means of the usual rod 22 and spring 23.

A series of curved guiding-fingers 24 are carried by a stationary shaft 25, extending longitudinally of the cylinder A, and a guiding-strip of thin steel carried by these guides extends across their point and enters as far as possible between the cylinders. These guides and the guiding-strips aid in entering the leading end of the web between the cylinders and protect the web from contact with the rear ends of the sheets as the latter are drawn backward in folding, as will presently be described.

The female cylinder B is provided with the usual series of sheet seizing and retaining pins 27, mounted upon crank-arms on the shaft 28, this shaft being rocked by a crank-arm carrying a bowl 29, which is engaged by the cam-arm 21 when the latter is rocked into operative position by means of the cam 19, the sheet-retaining pins thus being withdrawn to release the sheets and returned to position to seize the next sheets by means of the rod 30 and spring 31, as usual in this class of devices. It will be understood that as the cam-plate 16 makes but one revolution to three of the cylinder the cam 19 rocks the cam-arm 21 into position for the withdrawal of the pins only after three sheets have been taken by the cylinder B. The cylinder B carries, also, a double-edged rotating folding-blade 32, mounted upon a shaft 33, extending longitudinally of the cylinder, this blade and its operating device forming a folding mechanism similar to that shown in United States Letters Patent No. 171,196, dated December 14, 1875, the devices for causing the folding-blade to operate at each third revolution being the same as those shown and described in United States Letters Patent No. 191,494, dated May 29, 1877, Figs. 30 and 31.

The construction and operation of this folding mechanism are fully set forth in the patents referred to, and a brief description herein will suffice. The folding-blade shaft 33 carries a transverse arm 34, provided with bowls 35, by which the blade is operated by means of a flying cam 36, carried by the shaft 37 and by a stationary female cam 38. The flying-cam shaft 37 carries a gear 39, engaging a broad-faced gear 40 on the shaft of cylinder B, and the cam-shaft carries also outside the frame of the machine a grooved wheel 41, engaged by a stud 42 on an operating-lever 43, the opposite end of which is provided with a stud 44, engaging a cam 45, rotated from the shaft of cylinder B by a series of gears 46, these gears being so proportioned that the cam 45 is rotated to project the flying cam 36 into the path of bowls 35 only at each third revolution of the cylinders. By this construction the folding-blade 32 operates to fold the sheets from the cylinder B between the folding-rolls E F only after three sheets have been collected upon the cylinder. The folding-rolls E F are driven by the gears

5 6 at a slightly greater speed than the cylinders A B, as is common in this class of mechanism, and are geared together by gears 7. The cutting blade and groove are placed in the usual blocks 3 in the male and female cylinders, and are cushioned only at 4 in front of the blade and groove, as shown clearly in Fig. 8, the usual cushions behind the blade and groove being omitted, so that the sheets as they are severed are gripped tightly only by their rear ends, and as the leading ends of the sheets are not gripped they are free to be drawn backward and torn apart from their rear ends as the sheets are severed.

The operation of the mechanism will now be described. As the web passes between the cylinders A B its leading end is seized by the sheet-holding pins and carried around by the cylinder B until three sheets have been superposed thereon, the cutting-blade being inoperative and the sheet-holding pins not withdrawn during this operation, the folding-blade also being inoperative as flying cam 36 is withdrawn. The web is thus wrapped three times around the lower cylinder, the pins penetrating the web at each revolution. Just before the third revolution is completed the cam-plate 16 is brought into position to operate the perforating-blade and to throw the cam-arm 21 into position to withdraw the pins and the flying cam 36 is advanced into position to operate the folding-blade. The pins are now withdrawn from the web and the folding-blade begins to operate and strains the three plies of the web tightly on the cylinder, as shown clearly in Fig. 2, and the perforating-blade descends and partially severs three sheets from the web. The sheets, as previously described, are gripped by the cushions at their rear ends only, so that as the cylinders continue to revolve and the folding-blade forces the sheet between the folding-rolls, the leading ends of the sheets are drawn backward and torn apart from their rear ends, this backward movement of the ends of the sheets being prevented from interfering with the leading end of the web by means of the guiding-strip 26 and fingers 25. None of the breaking strain produced by the blade, however, can come on the leading end of the web, which is still held gripped tightly between the cushions, and the web is thus left slightly attached to the outer sheet upon the cylinder, and is led forward thereby. The perforating-blade is now withdrawn and the pins protrude and seize the leading end of the web, as shown in Fig. 3. The surface speed of the folding-rolls is slightly greater than that of the cylinders, and by this accelerated movement of the sheets, as they are carried forward by the folding-rolls, the outer sheet is torn from the leading end of the web which is held by the pins, this operation being the same as described in connection with a single sheet in United States Letters Patent No. 192,954, July 10, 1877. The three sheets are then carried forward by the folding-rolls and

delivered in any desired manner, and the leading end of the web is again wrapped three times about the cylinder B and the operation previously described repeated.

5 While I have shown the preferred form of mechanism for carrying but my invention, it will be understood that the various collecting, cutting, and folding devices shown and described are only one of many common  
10 forms of such devices, and my invention is not to be limited to the specific form of any part of the mechanism shown, but consists, broadly, in the method and constructions hereinafter claimed.

15 What I claim is—

1. The method of collecting and folding sheets from a web of paper, consisting in wrapping the web around a rotating carrier to superpose a plurality of sheets thereon,  
20 severing said sheets simultaneously, and folding them from the carrier, substantially as described.

2. The method of collecting and folding sheets from a web of paper, consisting in  
25 wrapping the web around a rotating carrier to superpose a plurality of sheets thereon, partially severing said sheets simultaneously, and completing the severance of said sheets by folding them from the cylinder at a speed  
30 in excess of that of the rotating carrier, substantially as described.

3. The combination, with a rotary sheet collecting, cutting, and folding mechanism and the sheet retaining, cutting, and folding  
35 devices carried thereby, of means for operating said sheet retaining, cutting, and folding devices to wrap the web about the cylinder and superpose a plurality of unsevered sheets thereon, and then to sever said sheets simultaneously and release and fold said sheets together from the collecting mechanism, sub-  
40 stantially as described.

4. The combination, with a rotary sheet-collecting mechanism provided with sheet-retaining devices constructed and adjusted to  
45 release the sheets only at certain revolutions of the mechanism, whereby a plurality of unsevered sheets are superposed, of a cutter and folding mechanism constructed and adapted  
50 to sever the superposed sheets and fold them together from the collecting mechanism, substantially as described.

5. The combination, with a pair of sheet-collecting cylinders provided with sheet-retaining devices operating to release the sheets  
55 only at certain revolutions of the cylinders, whereby a plurality of unsevered sheets are superposed upon the sheet-carrying cylinder, of a perforating-cutter for partially severing  
60 said superposed sheets, and a folding mechanism operating to fold the sheets from the cylinder and complete their severance, substantially as described.

6. The combination, with a pair of sheet-collecting cylinders provided with sheet-retaining devices operating to release the sheets  
65 only at certain revolutions of the cylinders,

whereby a plurality of unsevered sheets are superposed upon the sheet-carrying cylinders, of a perforating-cutter for partially severing said superposed sheets, a folding-blade  
70 operating to strain the sheets upon the cylinder during the operation of the cutter, and accelerated folding-rolls to which the blade folds the sheets from the cylinder, substantially  
75 as described.

7. The combination, with a pair of sheet-collecting cylinders provided with sheet-retaining devices operating to release the sheets only at certain revolutions of the cylinders,  
80 whereby a plurality of unsevered sheets are superposed upon the sheet-carrying cylinder, of a perforating-cutter for partially severing said superposed sheets, cushions whereby only  
85 the rear ends of the sheet are gripped, and a folding mechanism operating to strain the sheets upon the cylinder during the operation of the cutter and fold them from the cylinder, substantially as described.

8. The combination, with a pair of sheet-collecting cylinders provided with sheet-retaining devices operating to release the sheets only at certain revolutions of the cylinders,  
90 whereby a plurality of unsevered sheets are superposed upon the sheet-carrying cylinder, of a perforating-cutter for partially severing said superposed sheets, a folding mechanism  
95 operating to strain the sheets upon the cylinder during the operation of the cutter and fold them from the cylinder, and a guide projecting between the cylinders at the rear of the cutter and separating the collected sheets from the web, substantially as described.  
100

9. The combination, with a pair of sheet-collecting cylinders provided with sheet-retaining devices operating to release the sheets only at certain revolutions of the cylinders,  
105 whereby a plurality of unsevered sheets are superposed upon the sheet-carrying cylinder, of a perforating-cutter for partially severing said superposed sheets, cushions whereby only  
110 the rear ends of the sheet are gripped, a folding mechanism operating to strain the sheets upon the cylinder during the operation of the cutter and fold them from the cylinder, and  
115 a guide projecting between the cylinders at the rear of the cutter and separating the collected sheets from the web, substantially as described.

10. The combination, with the cylinders A  
120 B, and sheet retaining and cutting devices carried thereby, of pivoted spring-pressed cam-arm 21, by which the sheet-retaining devices are operated, and rotating cam-plate 16, having cam 19, engaging said cam-arm,  
125 and cam-groove 15 for operating the cutting devices, substantially as described.

In testimony whereof I have hereto set my hand in the presence of two subscribing witnesses.

STEPHEN D. TUCKER.

Witnesses:

F. W. H. CRANE,  
D. CUNNINGHAM.