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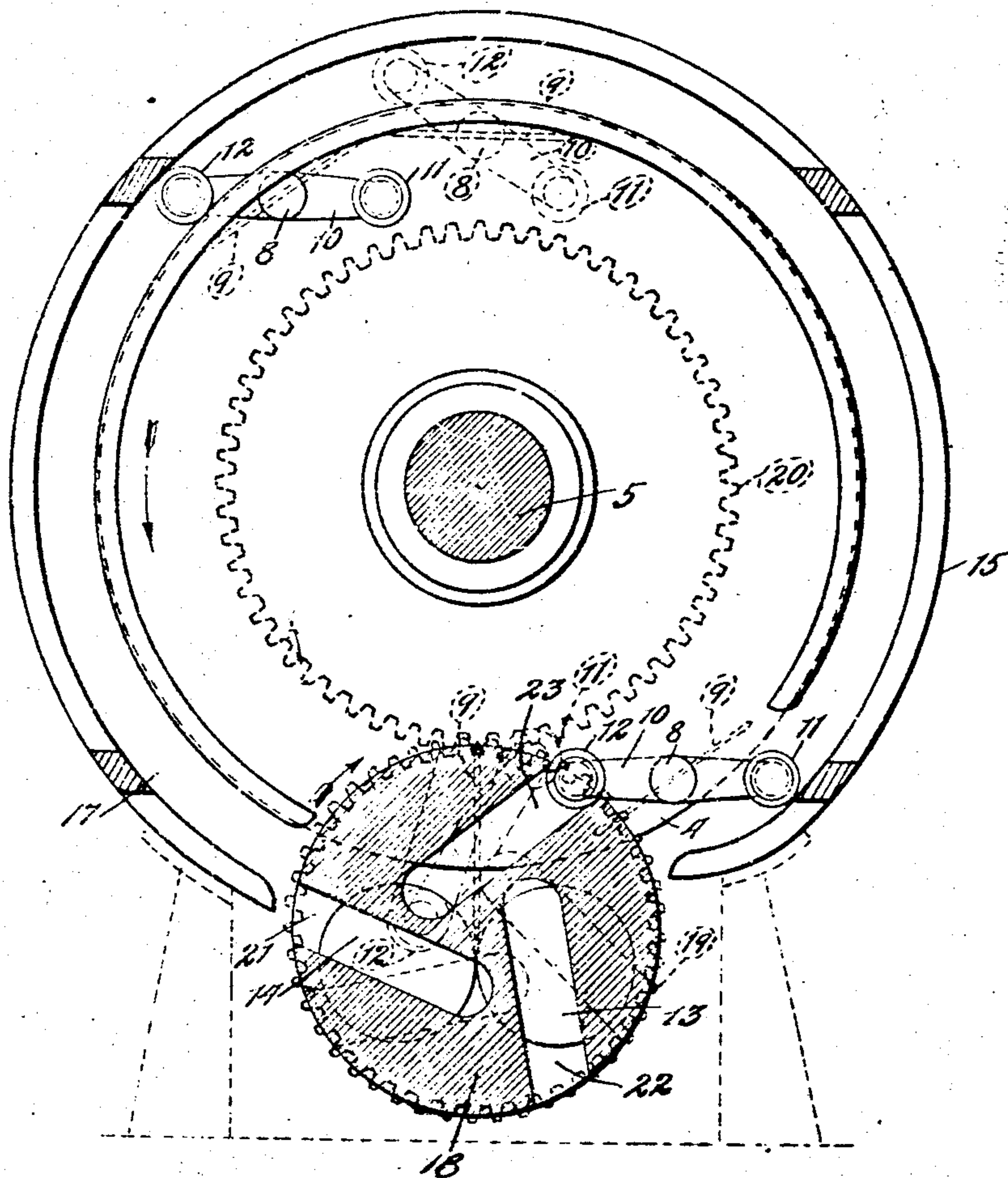
PATENTED NOV. 12, 1907.

H. P. HUSBY.
FOLDING APPARATUS FOR PRINTING PRESSES.

APPLICATION FILED MAR. 29, 1907.

3 SHEETS—SHEET 1.

Fig. 1.



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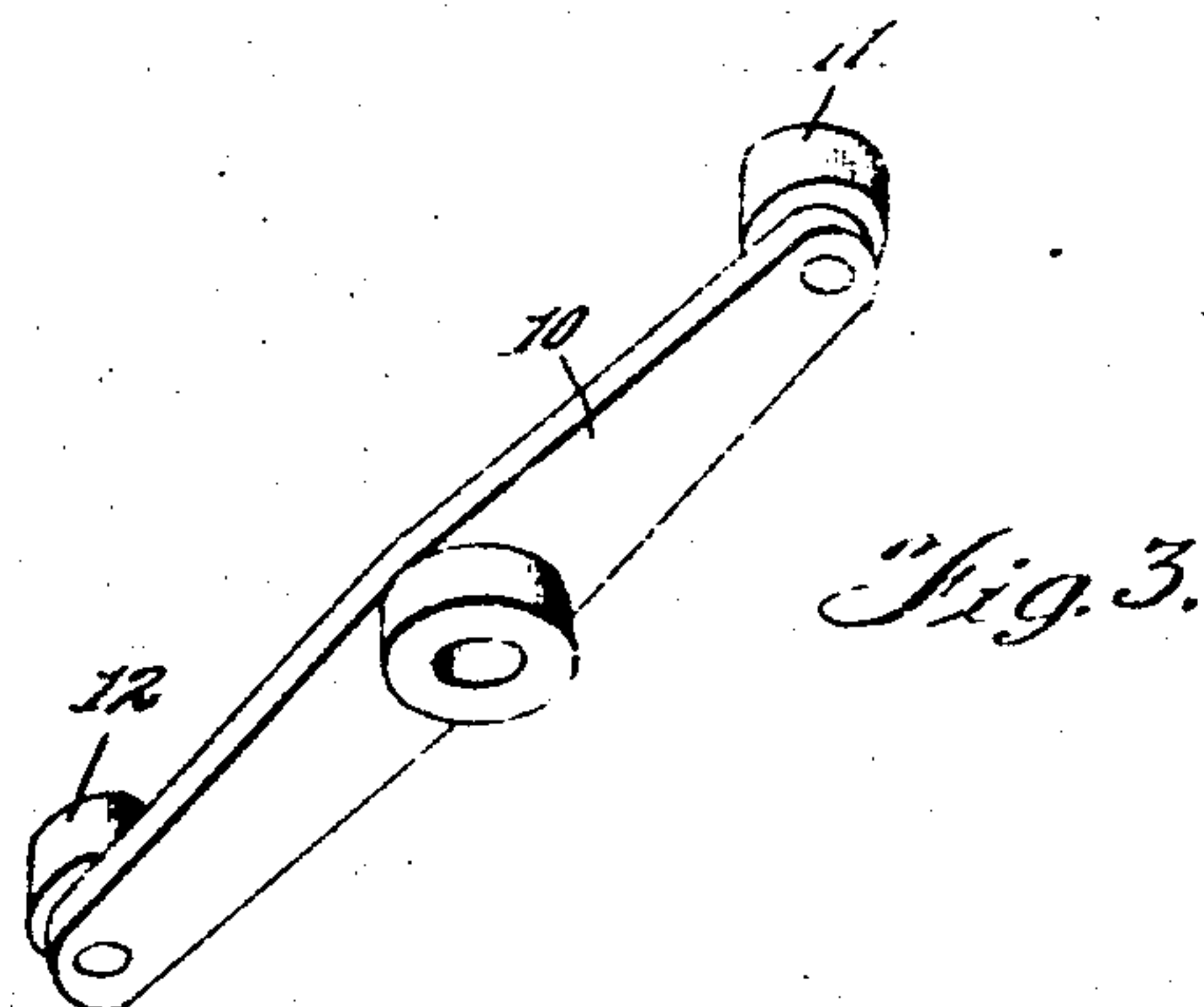
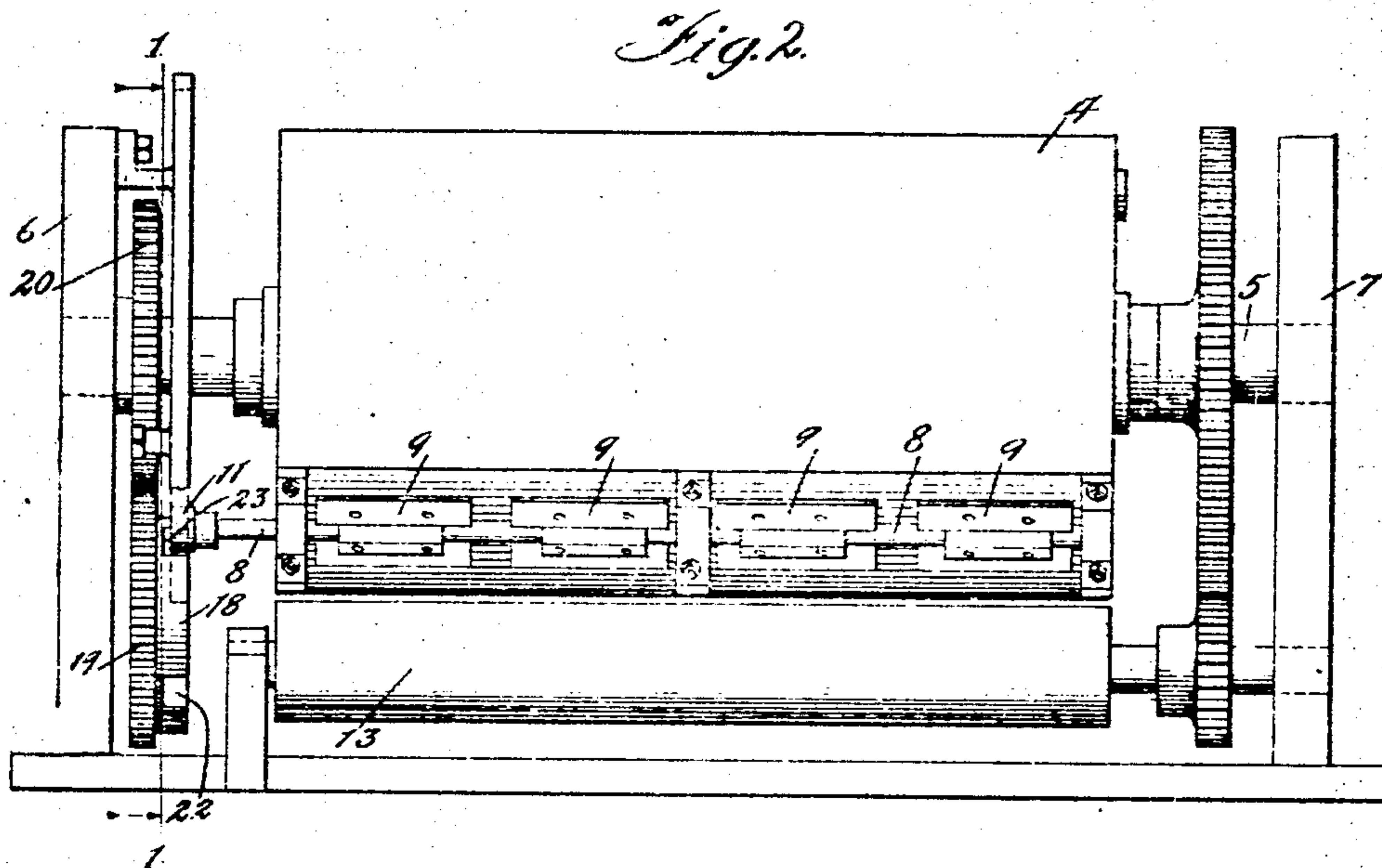
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3 SHEETS—SHEET 2.



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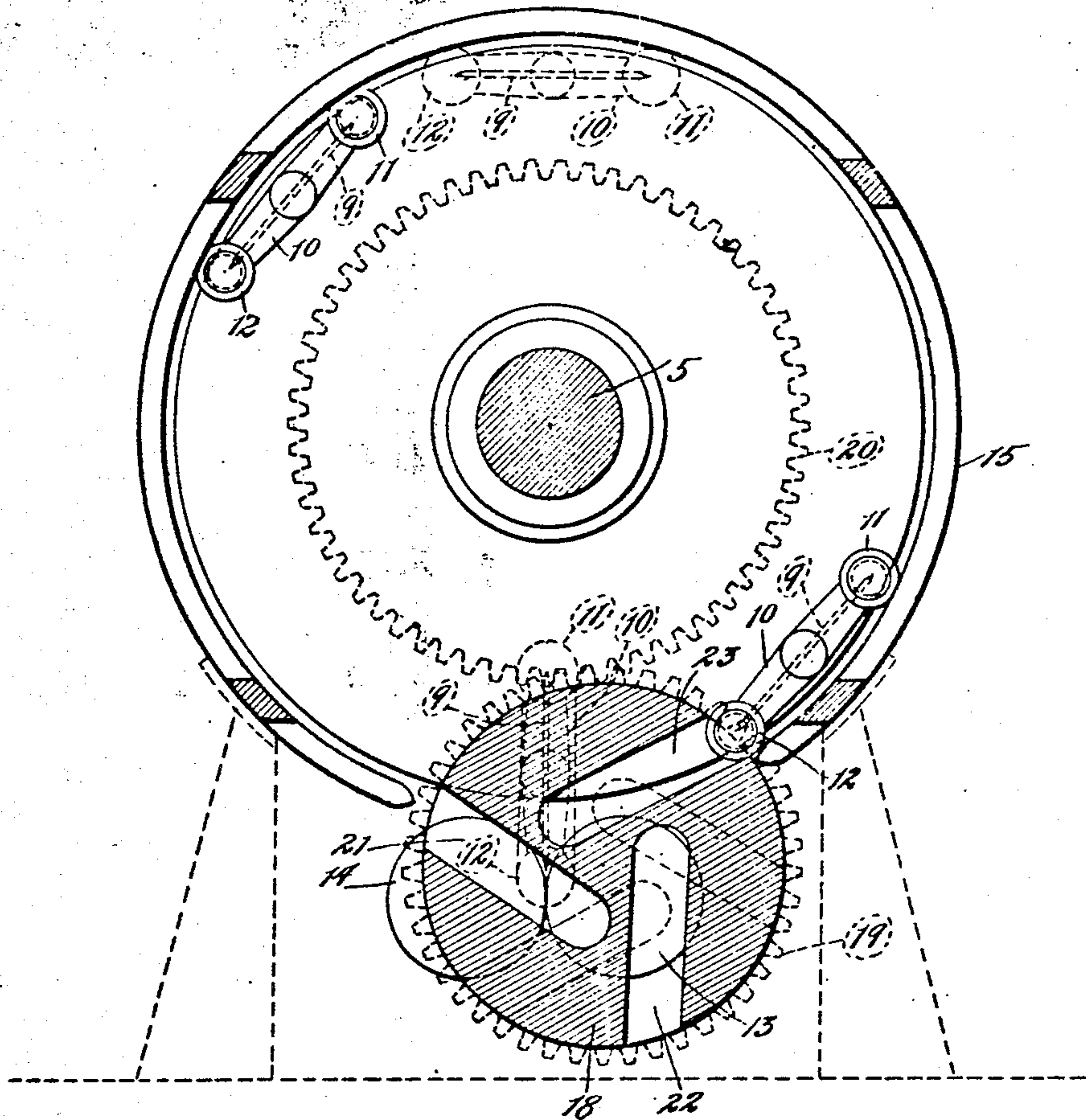
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3 SHEETS—SHEET 3.

Fig. 4.



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UNITED STATES PATENT OFFICE.

HANS P. HUSBY, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE GOSS PRINTING PRESS COMPANY,
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FOLDING APPARATUS FOR PRINTING-PRESSES.

No. 871,038.

Specification of Letters Patent.

Patented Nov. 12, 1907.

Application filed March 29, 1907. Serial No. 355,304.

To all whom it may concern:

Be it known that I, HANS P. HUSBY, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Folding Apparatus for Printing-Presses, of which the following is a specification, reference being had to the accompanying drawings.

My invention relates to folding apparatus for printing presses, and its object is to provide new and improved rotary folding mechanism which may be run at a very high rate of speed without injury to the working parts.

It has long been a well-known fact in the art that the speed of a printing press has been limited by the speed at which the folding and delivery mechanism could be efficiently and safely operated,—in other words, that the printing mechanism could be operated to print the paper at a greater speed than the folding and delivery apparatus could be safely and efficiently operated to fold and deliver the printed paper,—and many improvements looking to a higher speed and greater safety and efficiency have been made so that the folding and delivery mechanism is now commonly run at a high rate of speed. The speed, however, at which the best forms of folding and delivery mechanism in use can be run is still not so high as that at which the printing mechanism can be run. This is largely due to the fact that the transverse folding mechanism which folds the paper transversely of its run, consisting generally of a folding cylinder, coacting folding rollers and a folding blade which is operated at intervals to thrust the paper into the bite of the folding rollers, contains mechanism for operating the folding blade which causes a blow or violent contact between the parts at each operation of the folding blade. The folding blade, in other words, is operated by one species or another of cam against which some portion of the apparatus connected with the folding blade strikes as the cylinder rotates in order to throw the folding blade into and out of operative position. This violent contact between two or more of the operative parts causes, of course, a severe shock and strain upon the operative parts, and when it is attempted to run the folding mechanism at a speed exceeding in any considerable degree certain pretty well defined limits it is apt to cause breakage of the parts, a stripping of the gears, or breaking down of the machine at some other point of strain.

It is the object of my invention to produce a rotary folding mechanism for folding paper transversely on the run which shall operate without the violent contact of the operating parts in the course of the operation of the folding blade, and which, avoiding this exceedingly rapid series of blows and consequent

strain, will enable the folding mechanism to be run at a much higher degree of speed than has heretofore been deemed practicable.

To this end my invention consists primarily in the providing of new and improved mechanism for operating the folding blade,—namely to throw it out of normal into folding position, and out of folding position into normal position,—without violent contact of the parts and consequently without the series of exceedingly rapid and severe blows upon the parts. This mechanism for operating the folding blade, speaking generally, consists of a rotary member provided with guides adapted to operatively engage with the folding blade when the folding blade is in inoperative position and while traveling in the same general direction, to move the folding blade into and out of its folding position without the sudden and violent contact of parts and, without the aid of other parts, to discharge the folding blade in normal position to be carried around in its normally inoperative position by the rotary carrier. As embodied in the form shown and described herein I provide the rotary member with carrying guides, preferably in the form of slots and preferably three in number.

The rotating member consists preferably of a disk rotating in the opposite direction to the folding cylinder, and so arranged that the guides or slots on said disk at the time of engaging the tumbling lever to rock the folding blade into operative position are traveling in the same direction as the folding blade on the folding cylinder, and that the said guides will smoothly and without violent contact of parts move the engaged end of the tumbling lever, and therefore the operating edge of the folding blade, in a curve downwards and forwards to nearly the line of contact of the folding rollers, then in a corresponding curve upwards and forwards, and discharge the tumbling lever from the same end of the slot or guide at which it entered and while moving in the same general direction as the axis of the folding blade. The engaging slot or guide passes from the circumference of the rotating member or disk towards its interior on a line tangent to a circle concentric with the rotating member and of smaller diameter. The diameter of this circle to which the guide is tangent will, of course, depend upon a number of points fixed in advance, such as the diameter of the folding cylinder, the relative speed of rotation of the folding cylinder and rotating disk, the point at which the two folding rollers are tangent to each other and the length of the tumbling lever and folding blade. In order to secure the best operation, these guides or slots are three in number and are so arranged upon the rotating member or disk that their central longitudinal lines, projected, will form an equilateral triangle concentric with the rotating member by which they are carried. These

guides are thus so disposed that as the parts rotate one of them will be in proper position to receive the tumbling lever, or equivalent device, while its folding blade is in normal position in the folding cylinder,—

5 that is to say in the inoperative position in which it is carried around by the rotary carrier or folding cylinder which, in the construction shown, is with the line of the blade from operating edge to operating edge at right angles with that radius of the folding cylinder

10 which passes through the pivotal line of said tumbling lever. The usual roller upon the lead end of the tumbling lever thus entering the slot will enter it without a blow or violent contact of the parts, and as the cooperating parts rotate the engaged end of the tumbling

15 lever will be smoothly and without any violent contact or blow moved along the curve, as above described, to throw the folding blade into folding position. As the parts still further rotate, the engaged end of the tumbling lever will be moved upwards and onwards in a

20 similar curve, and the grooves or guides are so arranged that just at the moment of the discharging of the tumbling lever from the groove the folding blade, turned other edge first, will again be in normal position so that the tumbling lever and folding blade will be carried

25 down around during the operative part of their movement without any violent contact or blow of the parts. It is, of course, necessary that the folding blade during the inoperative portion of its travel should be maintained in normal position in order that the operative

30 parts may be sure to be in position to operate each time they come into the position at which they are intended to operate. By means of these devices freeing the parts from violent contact and rapid blows I have been enabled to increase the speed at which the folding cylinder can be operated safely fully one-half.

35 In the accompanying drawings,—Figure 1 is a section on line 1—1 of Fig. 2, illustrating one form of my improved folding apparatus; indicating the driving gears 19 and 20 in dotted lines for the purposes of clearness of illustration; Fig. 2 is an end view thereof; Fig. 3 is a perspective view of the cross-head which carries the guide rollers; and Fig. 4 is a sectional view, illustrating another form of the folding apparatus embodying my invention indicating the driving gears 19

40 and 20 in dotted lines.

Referring to the drawings,—4 indicates a folding cylinder mounted on a shaft 5, which is suitably mounted on the side members 6—7 of the frame of the press. Said cylinder carries one or more, preferably two, folding-blade shafts 8, each carrying a folding-blade 9, which is preferably made in sections, as shown in Fig. 2. Each of said shafts carries at one end a cross-head or tumbling lever 10, which, at its ends, is provided with guide rollers 11—12, as shown in Figs. 1 and 3.

50 13—14 indicate a pair of folding rollers arranged in juxtaposition near the periphery of the cylinder 4, so that they may conveniently receive the sheets folded by the folding-blade 9. The folding cylinder and folding rollers are driven by any suitable mechanism.

60 The cross-heads or tumbling levers 10 with their respective guide rollers 11—12 are employed to control the movement of the folding blades 9. To this end they cooperate with a slotted disk 18, which is geared to the shaft 5 by a gear 19 which meshes with a gear 20 mounted on said shaft, as shown in Figs. 1 and 4. It

will be noted that in the construction shown in Fig. 1 the cross-heads or tumbling levers 10 are set at an angle to their respective folding-blades 9 so that the plane of the rollers 11—12 intersects said folding-blade, whereas in the construction shown in Fig. 4 the cross-

70 heads with their respective rollers lie in the plane of their respective folding-blades. Either arrangement may be employed. Where the cross-head and rollers are set at an angle to the folding-blade, as shown in Fig. 1, two stationary guide-rings are provided for guiding

75 the cross-heads while out of engagement with the slotted disk,—15 indicating an external guide-ring and 16 an internal guide-ring set concentrically with the external ring and a short distance from it so as to provide a space between them in which the rollers 11—12

80 may run. The ends of the guide-rings 15—16 lie at opposite sides of the folding rollers 13—14 and disk 18, as shown in Fig. 1, so that they receive the leading roller 11 or 12, as the case may be, as it leaves the slotted disk 18 and guide the cross-head and folding-blade

85 as the cylinder rotates. In the arrangement shown in Fig. 4 the external guide-ring 15 only is provided.

21—22—23 indicate slots or grooves in the disk 18,—said grooves extending from the periphery inward tangentially to a circle concentric with and of smaller

90 diameter than said disk, as shown in Figs. 1 and 4, and being placed 120 degrees apart so that they open on the periphery of the disk at equally distant points.

It will be evident that in operation the folding-blade when projected farthest between the folding

95 rollers 13—14 is perpendicular to a line connecting the axes of said folding rollers and at the same time is in line with the axis of the folding cylinder. In order to secure this result, where the cross-head or tumbling lever with its guide rollers is disposed at an angle to the

100 folding-blade, as shown in Fig. 1, the guide disk 18 is so placed that its axis also is in line with the folding-blade when said blade is projected to the greatest extent between the folding rollers, as clearly shown in Fig. 1. Where the cross-head is arranged in line with

105 the folding-blade, the guide disk 18 is so set that its axis is at one side of the plane of the folding-blade when said blade is projected to the greatest extent between the folding rollers, as clearly shown in Fig. 4,—this being necessary to compensate for the eccen-

110 tricity of the slots 21, 22 and 23.

In the construction shown in Fig. 1, assuming that the folding cylinder rotates in the direction indicated by the arrow in Fig. 1, which, however, is not essential, as it may rotate in the other direction—the leading

115 roller 11 or 12, as the case may be, moves in the space between the guide-rings 15—16 until it reaches the disk 18 at which time one of the slots 21, 22 or 23 is in line with the end of the guide space 17. The guide roller then enters said slot and by the operation of said slot

120 coacting with the rotating movement of the folding cylinder carrying the axis of the folding blade around in the direction indicated by the arrow in Fig. 1, the guide roller will be moved in a curve downward and forward, thereby rocking the folding-blade and caus-

125 ing it to fold and tuck the sheet into the bite of the folding rollers 13—14, as indicated by dotted lines in Fig. 1. As the rotation continues the roller engaged in the slot is carried upward and forward along a similar curve, bringing the folding blade into normal posi-

130

tion just as the roller leaves the slot and swinging the opposite roller forward and in position to enter between the guide rings 15-16, as is shown in full lines in Fig. 1.

5 It will be understood, of course, that the gears 19-20 are of such proportion that the speed of the disk 18 is properly timed to cooperate with the guide rollers in the manner described.

The operation of the parts in the form shown in Fig. 4 is similar to that above described. In this case the plane of the folding blade is the same as the plane of tumbling levers, and the folding blade is held in normal position by the bearing of the two rollers 11 and 12 upon the interior surface of the circular guide 15. As the parts rotate, one of the slots on the disk 18 comes into position to receive the roller on the lead end of the tumbling lever just as it passes the end of the guide 15 and with the folding blade in its normal position. The roller thus enters the slot without any violent contact or blow between the parts, and as the disk 18 is carried around by the coaction of the slot with the rotation of the parts the lead end of the tumbling lever, and with it the lead edge of the folding blade, is moved in a curve forward and downward into the position shown in dotted lines in Fig. 4, at which point it tucks or thrusts the paper into the bite of the folding rollers. As the rotation continues, the engaged end of the tumbling lever is moved upward and forward along a similar curve, and by this action of the groove without the medium of any other part or parts, either stationary or movable, the folding blade has been turned over so that it is again in normal position just as the engaged roller leaves the slot and the rollers 11-12 are in position to bear upon the interior surface of the guide 15 without any further operation in order to be carried around for the next operation of the folding blade.

It will be seen from the above description that with the arrangement shown, in the first place, the folding blade is operated without a sudden or violent contact of the operating parts and without the rapid succession of severe blows which limit the operative speed of the machine and tend to cause breakage of the parts; in the second place, that by the mere cooperation of the groove or guide on the rotating member with the rotation of the folding cylinder carrying the folding blade around, the tumbling lever is received by the guide when the folding blade is in normal position and is released by the guide when the folding blade, having been turned over, is again in normal position, without the cooperation or additional action of any other stationary or movable member, thus preventing any violent contact and severe blows between moving and operating parts.

I wish it to be understood that my invention is not restricted to the specific details of the construction illustrated and described, as many modifications may be made without departing from my invention.

It will be understood that instead of using rollers on the cross-head any other equivalent devices may be employed, and the term "rollers" as used in the claims is to be construed accordingly.

It will, of course, be understood that in actual practice the folding cylinder will be provided with some usual and well-known means—such as grippers or impaling pins, for instance—to engage the lead end of the

sheet and hold it upon the cylinder prior to the operation of the folding blade. These parts, however, are so well known and understood that I have not shown them in the drawings, in order that the parts to which my invention specifically relates may be more clearly shown without unnecessary additions. Their operation will, therefore, be readily understood.

That which I claim as my invention, and desire to secure by Letters Patent, is,—

1. A rotary folding device comprising a rotary carrier, a folding blade carried thereby, and a rotating guide adapted to operatively engage said folding blade when said folding blade is in normal position and while moving in the same direction, and by itself to move said folding blade into folding position and back again into normal position and discharge the same from operative contact with said rotating guide with said folding blade in normal position.

2. A rotary folding device comprising a rotary carrier, a folding blade carried thereby, coacting folding rollers, and a rotating member provided with a guide adapted to operatively engage said folding blade when said folding blade is in normal position and while moving in the same direction, and by itself to move said folding blade into folding position and back again into normal position and discharge the same from operative contact with said rotating guide with said folding blade in normal position.

3. The combination with a rotating carrier, a folding blade carried thereby, and a tumbling lever connected with said folding blade, of a rotating member, and a guide on said rotating member adapted to engage the lead end of said tumbling lever when said folding blade is in normal position, and by itself to operate said folding blade, to return the same into normal position and discharge said tumbling lever from said guide with said folding blade in normal position.

4. The combination with a rotating carrier, a folding blade carried thereby, and a tumbling lever connected with said folding blade, of a rotating member, a guide on said rotating member adapted to engage the lead end of said tumbling lever when said folding blade is in normal position, and by itself to operate said folding blade, to return the same into normal position and discharge said tumbling lever from said guide with said folding blade in normal position, and means adapted to coast with said folding blade to complete the fold.

5. The combination with a rotary carrier, a folding blade carried thereby, and coacting folding rollers, of a tumbling lever connected with said folding blade, a rotating member, a guide on said rotating member adapted to engage said tumbling lever while said folding blade is in normal position and while traveling in the same direction therewith and by its bearing on said tumbling lever to move said folding blade into folding position and back again into normal position and to discharge said tumbling lever with the folding blade in normal position.

6. The combination with a rotary carrier, a folding blade carried thereby, coacting folding rollers, and means for retaining said folding blade in a normal position when not operating, of a tumbling lever connected with said folding blade, a rotating member, a guide on said rotating member adapted to engage said tumbling lever while said folding blade is in normal position and while traveling in the same direction therewith and by its bearing on said tumbling lever to move said folding blade into folding position and back again into normal position and to discharge said tumbling lever with the folding blade in normal position.

7. The combination with a rotary carrier, a folding blade carried thereby and folding rollers coacting therewith, of a tumbling lever connected with said folding blade, a rotating member, and a guide on said rotating member adapted to engage the lead end of said tumbling lever when said folding blade is in normal position to operate said folding blade to return the same into normal position and discharge said tumbling lever from said guide with said folding blade in normal position.

8. The combination with a rotary carrier, a folding blade carried thereby, and coacting folding rollers, of a

rotating member, a guide on said rotating member extending inwards from its periphery, and means connected with said folding blade adapted to be engaged by said guide when said folding blade is in normal position to operate

5 said folding blade, withdraw the said folding blade from operative position into normal position and be discharged from said guide with said folding blade in normal position.

9. The combination with a rotary carrier, a folding blade carried thereby and coacting folding rollers, of a
10 tumbling lever connected with said folding blade, a rotating member, a guide on said rotating member extending inwards from its periphery and adapted to engage the lead end of said tumbling lever when said folding blade is in normal position to operate said folding blade and
15 discharge said tumbling lever from said guide when said folding blade is again in normal position from the same end of said guide by which the tumbling lever was first engaged.

10. The combination with a rotary carrier, a folding blade carried thereby and coacting folding rollers, of a
20 tumbling lever connected with said folding blade, a rotating member, a guide on said rotating member tangential to a circle concentric with and of less diameter than said rotating member and adapted to engage the lead end of
25 said tumbling lever when said folding blade is in normal position, operate said folding blade and discharge said tumbling lever from said guide with said folding blade in normal position.

11. The combination with a rotary carrier, a folding blade carried thereby and coacting folding rollers, of a
30 tumbling lever connected with said folding blade, a rotating member, a plurality of guides on said rotating member tangential to a circle concentric with and of less diameter than said rotating member and adapted to engage the
35 lead end of said tumbling lever when said folding blade is in normal position, operate said folding blade and discharge said tumbling lever from said guides with said folding blade in normal position.

12. The combination with a rotary carrier, a folding blade carried thereby and coacting folding rollers, of a
40 tumbling lever connected with said folding blade, a rotating member, a plurality of guides on said rotating member having their longitudinal lines, projected, so disposed as to form an equilateral polygon concentric with said rotating member and adapted to engage the lead end of said
45 tumbling lever with said folding blade in normal position to operate said folding blade, restore it to normal position and discharge said tumbling lever with said blade in normal position.

13. The combination with a rotary carrier, a folding blade carried thereby and coacting folding rollers, of a
50 tumbling lever connected with said folding blade, a rotating member, three guides on said rotating member having their longitudinal lines, projected, so disposed as to form an equilateral triangle concentric with said rotating member and adapted to engage the lead end of said tumbling
55 lever with said folding blade in normal position to operate said folding blade, restore it to normal position and discharge said tumbling lever with said blade in normal position.

14. The combination with a rotary carrier, a folding blade carried thereby and coacting folding rollers, of a
60 rotating member, a guide on said rotating member extending inwards from its periphery and tangential to a circle concentric with and of less diameter than said rotating member, and means connected with said folding blade

adapted to be engaged by said guide with said folding blade in normal position to operate said folding blade and to be discharged from said guide with said folding blade again in normal position.

15. The combination with a rotary carrier, a folding blade carried thereby and coacting folding rollers, of a tumbling lever connected with said folding blade, a rotating member, a guide on said rotating member adapted to engage said tumbling lever when the folding blade is in normal position and while traveling in the same direction, to move said folding blade into operative position and out of operative position into normal position and to discharge said tumbling lever from the engaging end of said guide while traveling in the same general direction therewith and with the folding blade in its normally inoperative position.

16. The combination with a rotary carrier, a folding blade carried thereby and coacting folding rollers, of a tumbling lever connected with said folding blade, a rotating member, a plurality of slots on said rotating member adapted to engage the lead end of said tumbling lever while traveling in the same direction and move said folding blade into and out of operative position and to release said tumbling lever with said folding blade in normal position from the same end of the slot with which said tumbling lever was first engaged.

17. The combination with a rotary carrier, a folding blade carried thereby, coacting folding rollers, a tumbling lever connected with said folding blade, and a guide bearing on said tumbling lever and adapted to hold said tumbling lever and folding blade in normal position when not operating, of a rotating member, a slot on said rotating member adapted to engage said tumbling lever as said tumbling lever leaves said guide with said folding blade in normal position and while traveling in the same direction therewith and by its bearing on said tumbling lever as said folding cylinder rotates to move said folding blade into folding position and back again into normal position and to discharge said tumbling lever when in normal position to again enter said guide.

18. The combination with a rotary carrier, a folding blade carried thereby, and a tumbling lever connected with said folding blade, of a rotary member and a guide on said rotary member adapted to engage the lead end of said tumbling lever and guide the folding knife into and out of folding position and to discharge the engaged end of said tumbling lever from the same end of said guide by which said tumbling lever was engaged.

19. A folding device having a rotary carrier, a folding blade carried thereby, a tumbling lever connected with said folding blade, and a moving guide adapted to engage said tumbling lever when said folding blade is in normal position and by itself to move said folding blade into and out of folding position and to discharge said tumbling lever with the folding blade in normal position.

20. The combination with a rotary carrier, a folding blade carried thereby and a tumbling lever connected with said folding blade, of a moving guide adapted to engage said tumbling lever and guide the folding blade into and out of folding position and to discharge the engaged end of said tumbling lever from the same end of said guide by which said tumbling lever was engaged.

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Witnesses:

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