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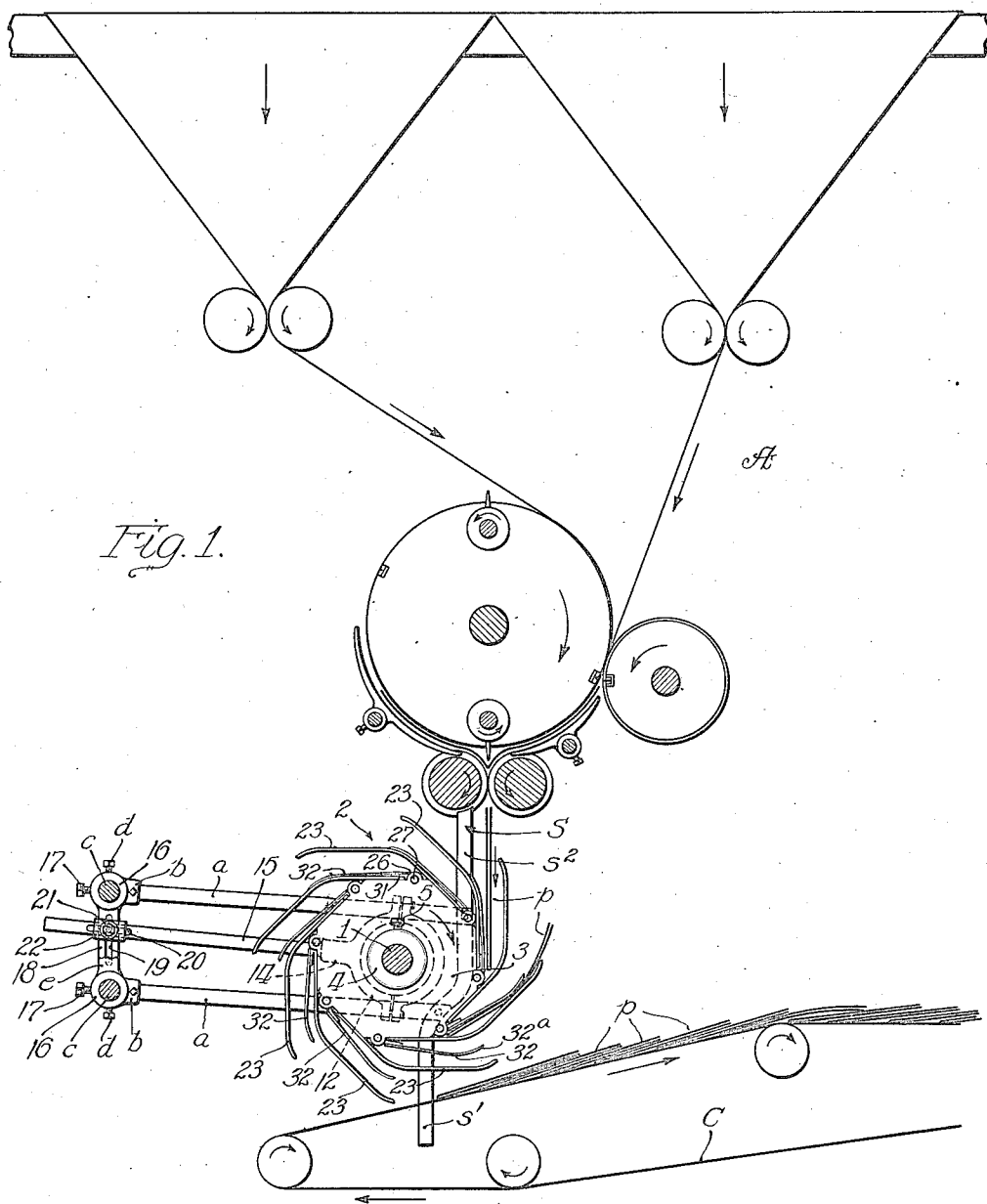
F. SEWICK

2,031,136

CONTROLLING DELIVERY FAN

Filed April 14, 1934

3 Sheets-Sheet 1



Inventor:
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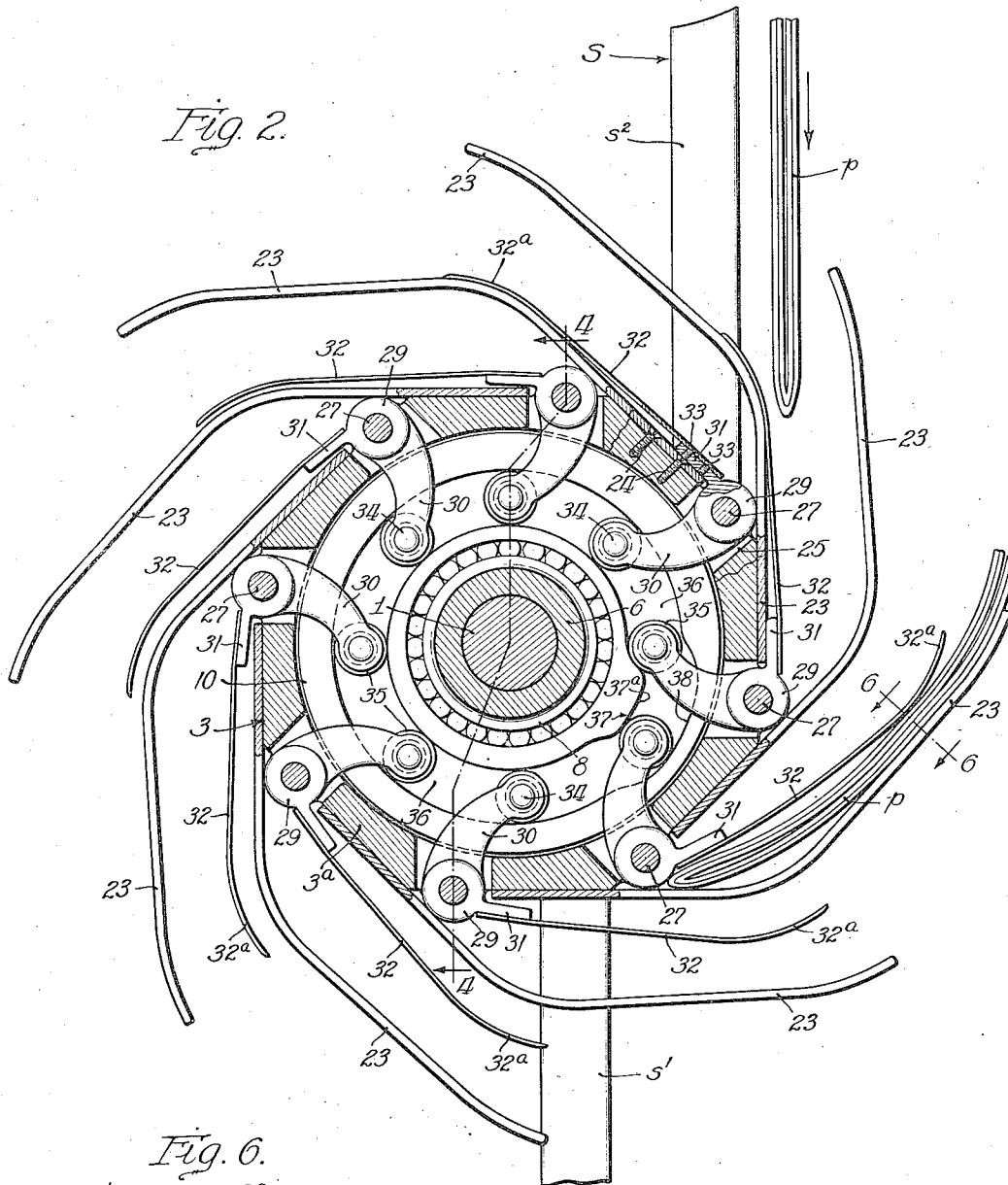
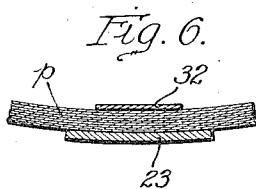
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3 Sheets-Sheet 2



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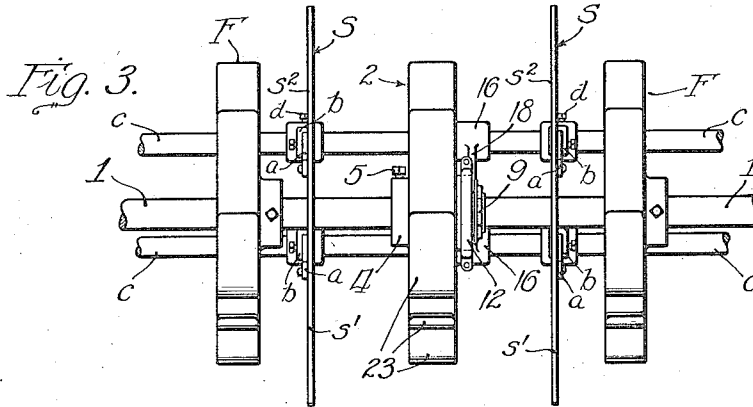
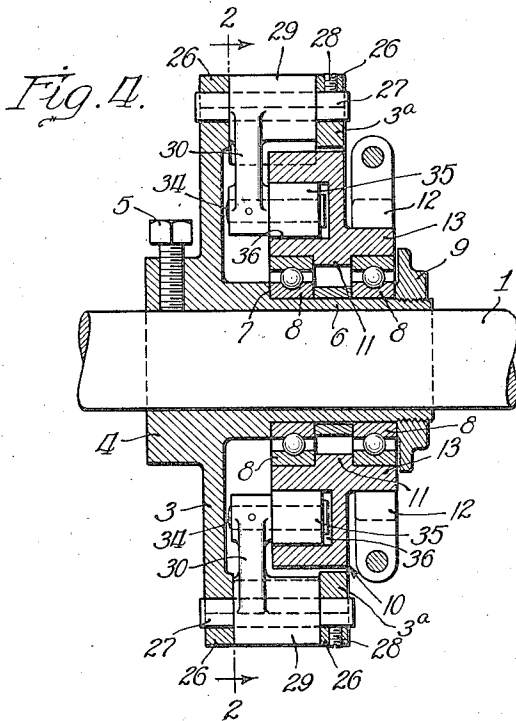
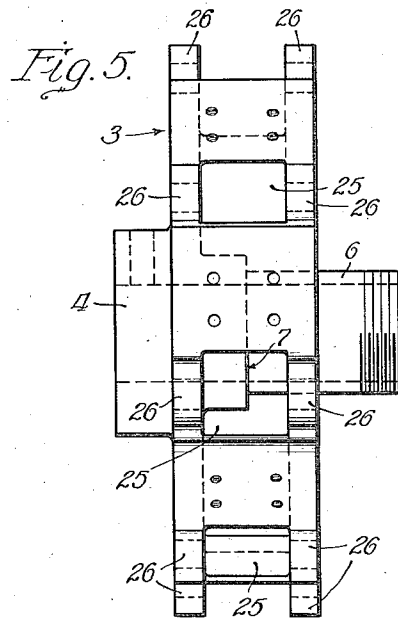
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CONTROLLING DELIVERY FAN

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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

2,031,136

CONTROLLING DELIVERY FAN

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Application April 14, 1934, Serial No. 720,554

8 Claims. (Cl. 271—80)

This invention relates to printing presses, and has to do more particularly with a delivery fan for positively controlling delivery of the cut and folded papers from the cutting and folding unit of a newspaper printing press to the dispatch conveyor.

In newspaper printing presses of known type, the printed papers are delivered from the cutting and folding unit downward to a delivery fan structure which serves to deposit the papers upon the dispatch conveyor. This fan structure comprises a plurality of fans, each of which commonly comprises an octagonal body secured to the fan shaft for rotation therewith, and angular arms secured to the body, substantially tangent thereto, and defining paper receiving passages which, in the rotation of the fan structure, are brought into vertical alignment with the space between the folding and delivery cylinders of the cutting and folding unit. The folded papers drop between the arms of the fans and are retained loosely therebetween during rotation of the fan structure. Guide and stop members are provided between the fans and the folded papers contact the stop portions of these members as the fan rotates, the arms of the fan passing from beneath the papers, and the latter being deposited upon the dispatch conveyor. When the press is operating at moderate or low speeds, the fan structure serves to deposit the papers upon the conveyor, at right angles thereto, and properly spaced, so as to prevent any of the papers getting out of alignment and causing jamming of the conveyor. When the press is driven at higher speeds, corresponding to 25,000 papers or more per hour, the fan structure is driven at correspondingly increased speed, with the result that considerable air turbulence is created by the fan whipping the papers onto the dispatch belt at high speed. In addition to this turbulence, the papers tend to move outward between the arms of the fan, due to centrifugal force. This renders it impossible to position the papers accurately upon the dispatch conveyor when the press is operating at high speed. As a result, many of the papers are deposited upon the dispatch conveyor at a considerable inclination, transversely thereof, instead of at right angles to the conveyor, and proper spacing of the papers is impossible. This inaccurate positioning of the papers on the conveyor gives rise to conditions which are apt to cause clogging of the conveyor system, and considerable time may be required in clearing the clogged conveyor. This means that many of the papers are torn and otherwise rendered unfit for use. During the

clearing of the conveyor system, the press must be shut down, and is thus out of operation for an appreciable time, which is a much more serious objection than the spoiling of the papers. A further objection to the inaccurate positioning of the papers on the dispatch conveyor is that it renders difficult packeting of the papers at the delivery end of the conveyor system, since the press is operating at high speed, and the operators do not have time to stack the papers accurately by hand preliminary to packeting thereof.

The primary object of my invention is to provide means for delivering the folded papers from the cutting and folding unit to the dispatch conveyor, and positively and accurately positioning the papers on the conveyor. A further object is to provide a delivery fan having means for accurately controlling the positioning of the papers on the dispatch conveyor. Another object of my invention is to provide a delivery fan which is of comparatively simple construction and positive in operation and which may replace the delivery fans now commonly used or may be used in association therewith. Further objects and advantages of my invention will appear from the detail description.

In the drawings:—

Figure 1 is a side view of a delivery fan embodying my invention associated with the cutting and folding unit and the dispatch conveyor of a newspaper printing press, the conveyor and the cutting and folding unit being shown semi-diagrammatically;

Figure 2 is a section taken substantially on line 2—2 of Figure 4;

Figure 3 is a front view of a delivery fan structure and associated parts, showing a fan embodying my invention, used in conjunction with two other fans such as are now commonly used;

Figure 4 is a section taken substantially on line 4—4 of Figure 2;

Figure 5 is a plan view of the body of the fan of my invention;

Figure 6 is a section taken substantially on line 6—6 of Figure 2 on an enlarged scale.

I have illustrated the fan of my invention as used in conjunction with a cutting and folding unit A of a newspaper printing press. This unit is of known construction and operation and need not be illustrated nor described in detail. The cut and folded papers are delivered downward from the unit A to the delivery fan, and this fan deposits the papers upon a dispatch conveyor C, which is also of known construction and driven in a known manner, and need not be illustrated

nor described in detail. A fan shaft 1 is rotatably mounted on the press frame in a known manner, and extends transversely of conveyor C above the latter and below the unit A. Shaft 1 is driven in a known manner, the speed of rotation of this shaft varying in accordance with the speed of operation of the press.

Two fans F of known construction and operation, are secured on the shaft 1 for rotation therewith, and receive the papers from the unit A and deliver them to the conveyor C. Guide and stop members S are supported in advance of shaft 1 in substantially vertical position, by means of arms a secured in sleeves b mounted on rods c which are disposed in rear of and parallel to fan shaft 1, these rods being rigidly mounted in the press frame in a known manner. Sleeves b are secured in adjustment lengthwise of rods c by set screws d, or in any other suitable manner, and are rigidly connected together by a bridge element e. The lower portions of each of the members S is offset rearwardly to provide a stop element s¹, the upper portion of this member forming a guide element s². In the operation of the press, the cut and folded papers are delivered downward from unit A between the arms of the fan and, in the continued rotation of the fan structure, contact the stop element s¹ so as to be deposited upon the conveyor C transversely thereof and uniformly spaced thereon, when the press is operating at moderate or low speed. When the press is operating at increased speed, however, the papers are not accurately positioned upon the dispatch conveyor C, due to the high air turbulence and centrifugal force exerted on the papers in the rotation of the fan structure, as above explained.

In Figure 3 I have shown a fan structure comprising two delivery fans F of known type, and a delivery fan 2 embodying my invention. This fan comprises an octagonal body 3 provided at one end with a hub 4 which fits about shaft 1 and is secured thereto in a suitable manner, as by means of a set screw 5. A sleeve 6, shouldered at 7, extends along shaft 1 from hub 4 and inward of body 3. Ball bearings 8 are mounted on sleeve 6 in spaced relation and are confined between shoulder 7 and a retaining ring 9 screwed onto the outer end of the sleeve. A box cam 10 is supported by the ball bearings 8 and is provided with an inwardly projecting rib 11 which fits between the outer races of the ball bearings and cooperates therewith for holding the box cam against movement lengthwise of shaft 1. A split ring 12 is clamped tightly about outwardly projecting flange 13 of box cam 10 and is provided with a rearwardly extending socket element 14 (Figure 1) in which is secured the forward end of an adjusting arm 15. Two sleeves 16 are mounted upon rods c and are secured in lengthwise adjustment thereon in a suitable manner, as by means of set screws 17. These sleeves are connected by a vertical bridge member 18 provided with a lengthwise slot 19. Arm 15 extends across bridge member 18 and is provided with a lengthwise slot 20 which intersects slot 19. A clamping bolt 21 passes through slots 19 and 20 and a plate 22 at the outer side of arm 15, providing means for securing this arm in adjustment and thus holding the box cam against turning movement. In this manner, the angular relation of the box cam to the fan shaft may be varied as desired or as conditions may require.

Receiving arms 23 are secured to the flat faces of body 3 of the fan and spaced apart circum-

ferentially thereof. These arms are of approximately L-shape and each arm has its inner portion seating flat upon a face of body 3 and secured thereto in a suitable manner, as by means of screws 24 (Figure 2). The inner portion of each arm is disposed substantially tangent to the body of the fan and the outer portion of each arm is disposed substantially parallel to the inner portion of the next preceding arm, so as to define therewith a paper receiving passage open at its outer end and extending substantially tangent to the body of the fan. It may be here noted that the fans F of Figure 3, which are of known construction, comprise an octagonal body similar to body 3, shown in Figure 2, and receiving arms shaped and disposed similarly to arms 23 of Figure 2, the arms of the fans F being secured to the body of the fan in the same manner as in Figure 2 or in any other suitable manner.

The delivery fan of my invention, when in use, is rotated in a clockwise direction as viewed in Figures 1 and 2. Body 3 is provided, adjacent the forward portion of each flat peripheral face of the body with reference to the direction of rotation of the fan, with an opening 25 and with aligned bosses 26 (Figure 4) at the ends of this opening. A pivot pin 27 extends through the bosses 26 and is suitably secured in one of the bosses, as by means of a set screw 28. This pin passes through hub 29 at the outer end of a crank arm 30 extending through opening 25 and projecting inward of body 3, it being noted that the portion of the body which is provided with the openings 25 is in the form of a flange 3a projecting from the body oppositely to hub 4 thereof. Hub 29 of each of the arms 30 is provided with a flat plate 31 disposed substantially tangent to bore of hub 29 and to seat against the outer face of the inner portion of the adjacent arm 23, in one position of crank arm 30, as shown in Figure 2.

A resilient gripping finger 32 has its inner end secured to plate 31 in a suitable manner, as by means of screws 33. The outer portion 32a of this finger is curved so as to fit about the angle of the adjacent receiving arm 23 when finger 32 is in its full inoperative position shown at the top of Figure 2. This leaves the passage between the two adjacent receiving arms 23 unobstructed for free entry therebetween of a folded paper p delivered downward from the cutting and folding unit A.

A headed pin 34 is secured through the inner end of each crank arm 30, parallel to pin 27, and supports a roller 35 which engages into channel 36 of box cam 10. This cam is provided with a projection 37, the outer portion of which forms a dwell surface 37a, and with a corresponding outwardly offset recess 38. Channel 36 of the box cam is slightly eccentric to the axis of shaft 1 and the cam is so disposed that, in the rotation of body 3, rollers 35 contact the rearward shoulder of projection 37 immediately after the paper p has fully entered the passage between receiving arm 23 and the associated gripping finger 32. At this time, the lower folded edge of the paper is in contact with the inner portion of arm 23 and with bosses 26 immediately in rear of this arm. As the paper reaches this position, roller 35 is moved outwardly by projection 37 of the cam, thus swinging the finger 32 forwardly so as to press firmly against the paper, as shown at the lower righthand portion of Figure 2. This serves to hold the paper positively in proper position on

the arm 23, until the folded edge of the paper contacts the stop element s^1 , at which time roller 35 passes from the dwell 37a of projection 37 onto the forward shoulder of projection 37 and thence into channel 36, thus releasing the paper, and arm 23 then immediately passes from beneath the paper, which is still held in contact with the stop element s^1 so as to be deposited accurately upon the dispatch conveyor C with the folded edge of the paper extending across the conveyor perpendicular thereto. During the continued rotation of the body 3, roller 35 is moved inward of body 3 so that the gripping finger 32 fits snugly against the next succeeding receiving arm 23 and about the angle thereof, when the gripping finger 32 has reached the upper portion of body 3, as shown in Figure 2. The gripping finger 32 is held in this position while the folded paper is projected downwardly between this finger and the next preceding arm 23, by the folding and delivering cylinders of unit A, as shown in Figures 1 and 2, immediately after which the finger 32 is moved into position to grip the folded paper as above set forth. A delivery fan constructed in the manner illustrated and described, provides positive control of the papers and assures delivery thereof to the dispatch conveyor in such manner that the papers are deposited upon the conveyor at right angles thereto and are uniformly spaced or lapped thereon. This eliminates possibility of clogging or jamming of the dispatch conveyor due to inaccurate positioning of the papers thereon, and also greatly facilitates handling and packeting of the papers delivered by the conveyor system.

Preferably, the outer portion of each of the receiving arms 23 is of concavo-convex cross-section, with its concave surface directed rearwardly. When the gripping finger 32 is moved into cooperating relation to arm 23, it tends to distort the folded paper p to conform to the transverse curvature of arm 23, thus providing a better gripping effect than if the arm 23 were flat transversely. When finger 32 is moved toward releasing position, the paper tends to straighten out so as to have line contact only with arm 23 at each side of the latter. This reduces friction between arm 23 and the paper so as to facilitate withdrawal of the arm from beneath the paper and eliminate possibility of tearing or injury to the latter. While it is preferred to curve the outer portion of each arm 23 transversely, as above, this is not essential and the arm 23 may be flat transversely. The width of the arm 23 and of the gripping fingers 32 may be varied as desired or as conditions may require.

I find that under ordinary conditions the desired degree of accuracy of positioning of the papers upon the dispatch conveyor can be obtained by using one delivery fan embodying my invention, with two fans of ordinary construction. It will be understood, however, that any desired or required number of fans embodying my invention may be employed in the fan structure of the press. If a press operates at exceptionally high speed, it may be desirable to use two, or even three, delivery fans, constructed in accordance with my invention, in the fan structure of the press, the number of these fans used depending upon requirements. It will be noted that the box cam is normally held against movement, but may be adjusted about the axis of the fan shaft either when the fan is being rotated or when it is stationary, which is advantageous in permitting adjustment of the cam so as to obtain

accurate timing of the operation of the gripping fingers. In this manner, the fan can be adjusted to suit the speed of operation of the particular press with which it is used.

What I claim is:—

1. In a delivery fan structure, a fan body, arms mounted on the body and spaced apart circumferentially thereof, gripping fingers pivoted on the body on axes parallel to the axis of the body for movement into and out of operative relation to the respective arms, and cam means mounted on the body for moving the fingers into and out of operative relation to the respective arms in the rotation of the body relative to the cam means, said cam means and said body being connected for relative rotation.

2. In a delivery fan structure, a fan body, arms mounted on the body and spaced apart circumferentially thereof, gripping fingers pivoted on the body on axes parallel to the axis of the body for movement into and out of operative relation to the respective arms, cam means mounted on the body for moving the fingers into and out of operative relation to the respective arms in the rotation of the body relative to the cam means, said cam means and said body being connected for relative rotation, and means for adjusting the cam means about the axis of the body for varying the timing of the fingers.

3. In a delivery fan structure, a rotatably mounted shaft, a fan body secured to said shaft and provided with a sleeve extending therealong, receiving arms mounted on the body and spaced apart circumferentially thereof, gripping fingers pivoted on the body on axes parallel to the shaft for movement into and out of cooperating relation to the respective arms, a box cam mounted on the sleeve, said sleeve and said cam being connected for relative turning movement, and operating means comprising crank members secured to the fingers and contact members carried by the crank member and engaging into the cam for moving said fingers into and out of cooperating relation to said arms in predetermined timed relation to the rotation of said fan body.

4. In a delivery fan structure, a rotatably mounted shaft, a fan body secured to said shaft and provided with a sleeve extending therealong, receiving arms secured to the body and spaced apart circumferentially thereof, each arm being of approximately L-shape and comprising an inner portion secured to the body and an outer portion extending substantially parallel to the inner portion of the next succeeding arm and defining therewith a passage unobstructed at its outer end and disposed substantially tangent to the fan body, gripping fingers pivoted on the body between the arms on axes parallel to the shaft axis, the outer portion of the respective fingers being shaped to fit snugly about the angle of the next succeeding arm when the finger is in full inoperative position, a box cam mounted on said sleeve, the sleeve and the cam having relative turning movement and the cam normally being held against rotation, and operating connections between the cam and the fingers for moving each of the latter into cooperating relation to the next preceding arm during a predetermined portion of a revolution of the fan and returning the finger to full inoperative position during the remainder of said revolution.

5. In a delivery fan structure, a rotatably mounted shaft, a fan body secured to said shaft and provided with a sleeve extending therealong, receiving arms secured to the body and spaced

apart circumferentially thereof, each arm being of approximately L-shape and comprising an inner portion secured to the body and an outer portion extending substantially parallel to the inner portion of the next succeeding arm and defining therewith a passage unobstructed at its outer end and disposed substantially tangent to the fan body, the outer portion of each arm being of concavo-convex cross-section and having its concaved face directed toward the next succeeding arm, gripping fingers pivoted on the body between the arms on axes parallel to the shaft axis, and means for moving the fingers into and out of cooperating relation to the arms.

6. In a delivery fan structure, a rotatable fan body, arms mounted on said body and projecting outward therebeyond, gripping fingers pivoted on the body for movement into and out of operative relation to the respective arms, said fingers when in inoperative position defining with said arms passages unobstructed at their outer ends and disposed substantially tangent to the fan body, operating means for moving said fingers toward and from said arms in the rotation of said fan body in timed relation thereto, and means for adjusting said operating means during rotation of said body for varying the timing of said fingers.

7. In a delivery fan structure, a rotatable fan

body of polygonal cross-section, arms secured to the respective sides of the body, each comprising an inner portion secured to a side of the body and an outer portion extending in spaced substantially parallel relation to the next succeeding side of said body, gripping fingers pivoted to said body between said arms and movable into and out of operative relation to the outer portions of the arms, said fingers when in inoperative position being in proximity to and substantially parallel with the inner portions of the arms, and operating means for moving said fingers into and out of operative position in the rotation of said fan body.

8. In a delivery fan structure, a rotatable fan body of polygonal cross-section, arms secured to the respective sides of the body, each comprising an inner portion secured to a side of the body and an outer portion extending in spaced substantially parallel relation to the next succeeding side of said body, gripping fingers pivoted to said body between said arms and movable into and out of operative relation to the outer portions of the arms, said fingers when in inoperative position fitting about the inner portions of the arms, and operating means for moving said fingers into and out of operative position in the rotation of said body.

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