

Nov. 13, 1928.

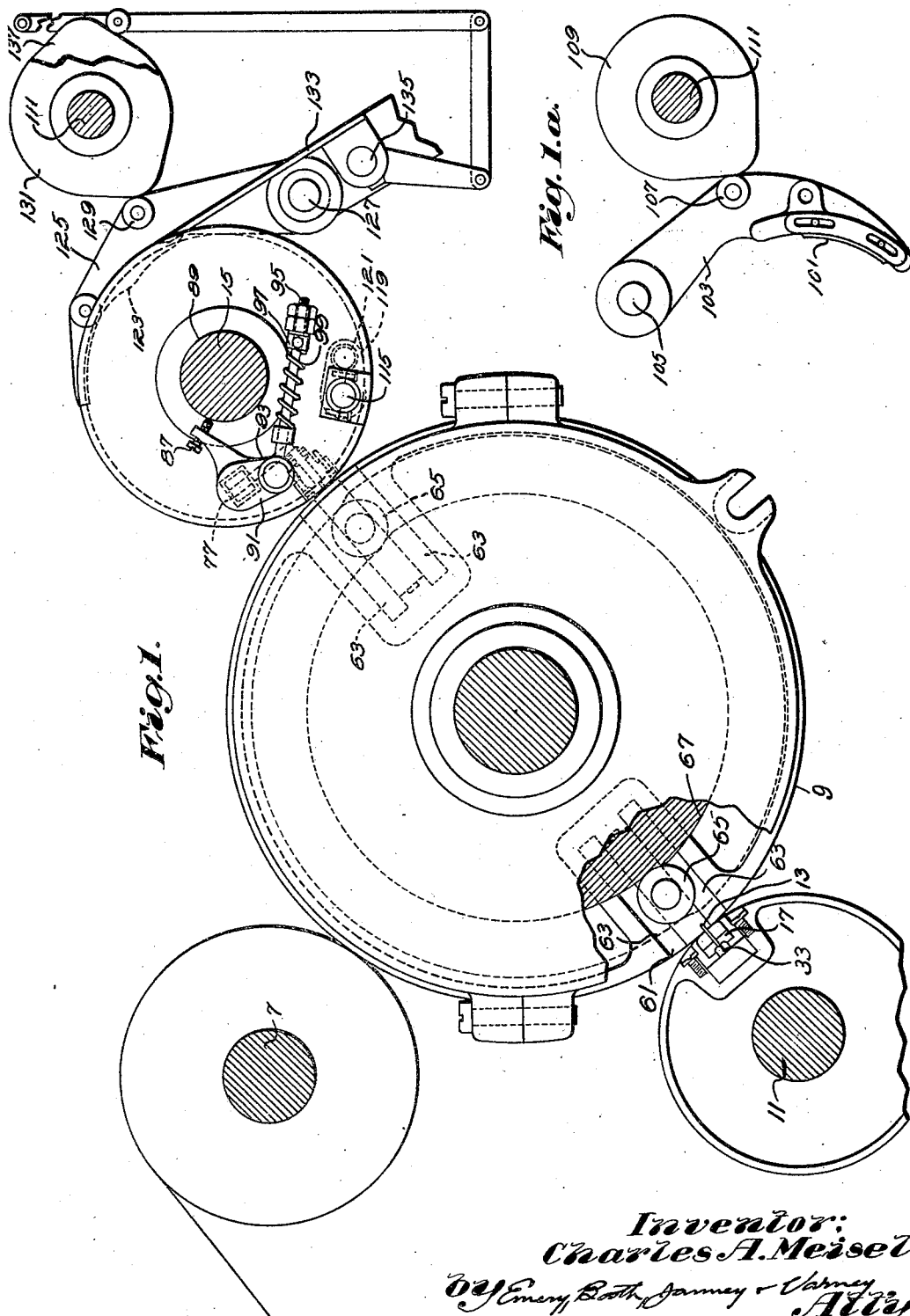
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SHEET HANDLING MECHANISM

Filed March 2, 1927

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

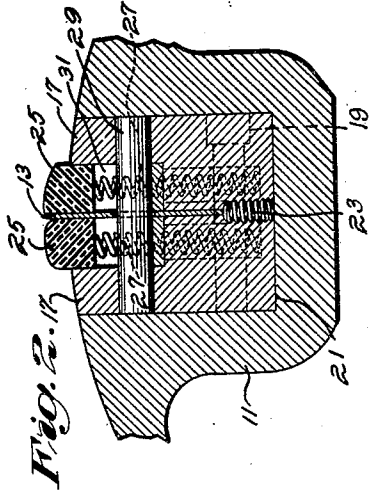


Fig. 4.

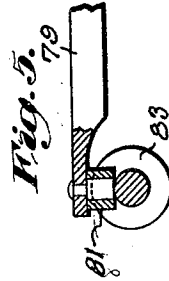
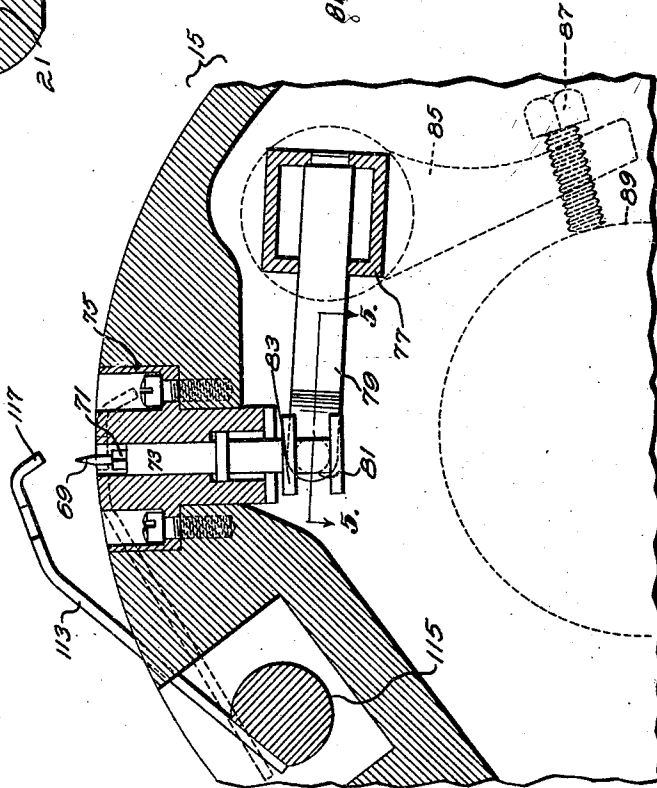
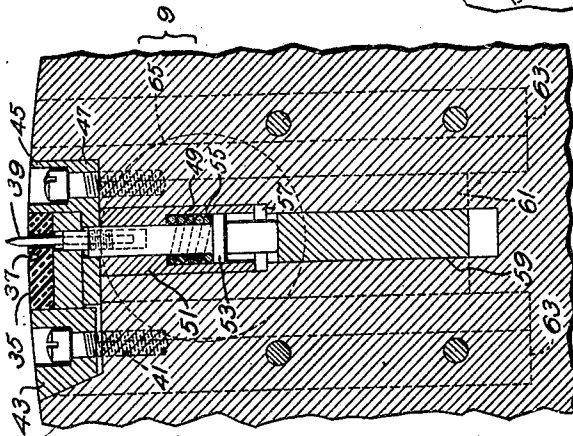


Fig. 3.



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UNITED STATES PATENT OFFICE.

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SHEET-HANDLING MECHANISM.

Application filed March 2, 1927. Serial No. 172,004.

This invention relates to sheet handling mechanism and, while various features herein disclosed are capable of more extended application, I have herein disclosed as a specific example of my invention a mechanism adapted to cut sheets from a web, to accumulate a desired number of them in superposed relation and to deliver this number to some suitable cooperating mechanism.

The specific embodiment of my invention disclosed will be well understood by reference to the following description taken in connection with the accompanying drawings, wherein:

Fig. 1 is a simplified and more or less schematic view showing in side elevation a series of cylinders by means of which a pile of sheets is accumulated;

Fig. 1^a is an elevation of a cam controlling the operation of mechanism associated with the cylinder which appears in Fig. 1 immediately above Fig. 1^a and is shown as if lifted from its normal position nearer the reader in Fig. 1 and disposed downwardly to the position shown. In other words, Fig. 1 is simplified by the omission of the parts shown in Fig. 1^a and consequently the parts lying behind them are more clearly disclosed;

Fig. 2 is a radial section through the cutting knife cylinder disclosing the knife mechanism;

Fig. 3 is a radial section through the cutting die cylinder disclosing the pin mechanism carried thereby;

Fig. 4 is a section through the accumulating cylinder disclosing the pin mechanism thereof and the strippers; and

Fig. 5 is a detailed section on the line 5—5 of Fig. 4.

Referring to Fig. 1 of the drawings, a web of paper *w* such as a printed web coming from a printing press is led over a guide roll 7 and around a cutting die cylinder 9 with which cooperates a cutting knife cylinder 11 carrying the radially projecting knife 13. On each revolution of the cylinder 11 the web of paper overlying the cylinder 9 is severed and by suitable means on the cylinder 9, such as the pin mechanism hereinafter to be described, the edge of the paper at the rear of the cut is engaged with the cylinder 9 and carried around thereby in a counterclockwise direction to a substantially diametrical

point at which is located the accumulating cylinder 15. The cylinder 9 is twice the circumference of the cylinder 11 and when this edge of the paper reaches the position illustrated in Fig. 1 corresponding to half past one on a clock dial the blade 13 operates again, severing from the web a sheet of paper whose length equals substantially half the circumference of the roll 9 and the leading edge of this sheet is then delivered by the cylinder 9 to suitable mechanism, herein shown as pins, on the cylinder 15. This operation takes place at each half revolution of the cylinder 9 and a series of sheets is thus delivered to accumulating cylinder 15 in superposed relation until after a desired number of cycles mechanism is set in action to release the accumulated pile of sheets from the cylinder 15 and deliver them to suitable carrying-off mechanism, not shown.

In Fig. 2 I have shown the construction of the cutting mechanism carried by cylinder 11 and it will be seen that the lower portion of the knife 13 is held between the opposed faces of two carrier bars 17 secured together by means of screws 19 and set in a suitable longitudinal recess in the cylinder 11. Along the bottom of these bars the opposing faces are recessed to provide tapped holes to receive set screws 23 on which rests the bottom of the knife blade 13, adjustment of these screws providing for radial adjustment of the knife. On either side of the knife adjacent the periphery of the cylinder in suitable recesses in blocks 17 are mounted blocks 25 of fiber or the like yieldably supported in the position shown in Fig. 2 with their faces beyond the surface of the cylinder and substantially flush with the edge of the knife by means of springs 27 received in suitable radial holes drilled in the bars 17 and in the blocks 25. Cross-pins 29 playing in slots 31 in the blocks 25 retain them in position in the recesses provided therefor in the bars 17. As is customary in such constructions, the bars 17 (see Fig. 1) are secured by bolts 33 at the ends of the cylinder. As the cylinder 11 rolls in contact with cylinder 9, the blocks 25 engage the web of paper and are pressed back, clamping the web of paper and exposing the knife 13 which severs the web transversely.

Referring now to Fig. 3, in the embodi-

ment of the invention shown the knife blade 13, as distinguished from prior constructions, operates against a die surface 35 carried by cylinder 9 of relatively soft rubber and which may be provided with a groove 37 which receives the edge of the knife. As the knife 13 projects beyond the plane of tangency of the two rolls, it is withdrawn from the cooperating die surface with a twisting motion and in the present instance the yielding character of the rubber and of the walls of the groove 35 permits this disengagement of the knife edge. There is no necessity for a clearance as the knife rolls and the use of mechanically moving parts is done away with. On this account the pins 39, which are utilized to engage the paper at the rear of the cut, may be placed close up to the cut and near the edge of the sheet which is to be formed. One advantage would arise if the sheets were to be trimmed later to eliminate the holes as the waste would be correspondingly small.

I have herein shown the pins 39 as projecting out through the rubber block 35 which in turn rests on a wooden filler 41 supported by the carrier bars 43 and 45 bolted into a groove in cylinder 9. Each pin 39 conveniently is a sharpened piece of wire and is mounted in a screw 47 tapped into the end of a pin carrier 49 slidably mounted as shown in a counterbored hole in a bar 51 set in the radial groove in the cylinder, the pin carrier 49 having a collar 53 with which cooperates a spring 55 normally tending to withdraw the pin from the position shown in Fig. 3. Suitable spacers 57 may be utilized between the inner ends of the pin carriers 49 where they project inwardly beyond the inner surface of the bar 51. The screw 47 serves as a chuck to hold the pin tightly but permits the latter to be readily adjusted as the outer end wears, conveniently when the screw is withdrawn. The carrier 49, as shown in the dotted lines of Fig. 3, may be bored to receive the surplus length of the pin at the inner end.

To thrust the pins outwardly to the position shown in Fig. 3 against the force of the springs the inner ends of the carriers 49 may rest on a bar 59, the ends of which are secured to slides 61 which move between guides 63 at each end of the cylinder. A cam roll 65 is carried by a slide 61 and by means of a suitable cam presently to be described the bar 59 may be reciprocated positively to force the pin carriers outwardly against the force of springs 55 to the position shown in Fig. 3 or to retract bar 59 to permit the pin carriers to be retracted inwardly by the action of the springs.

To effect this action (see Fig. 1) cam roll 65 may run in the cam groove 67 of a stationary cam organized at the end of the cylinder. In the position shown in Fig. 1, the knife 13 has just severed the web, the pins 39 are just at the rear of the point of tangency of the cyl-

inders 9 and 11 and are held by their springs inwardly of the circumference of the cylinder. At this point the cam roll 65 moves to the part of the cam track 67 which is of greater radius and the pin is projected to engage the paper and remains in that position until it arrives at the diametrical point when the cam roll moves inward, releasing the pins from the paper, at which time the paper is delivered to the cylinder 15.

The parts shown in Fig. 3 are, as indicated in Fig. 1, duplicated at diametrical points of the cylinder 9 so that on each half revolution of the cylinder 9 a set of pins is engaging the web of paper at the rear of the cut just made by knife 13 and another set of pins is delivering a severed sheet to a cooperating mechanism on the accumulating roll 15. The successive sheets are delivered by the cutting die cylinder 9 from its pins 39 to pins 69 on accumulating cylinder 15 and this action is repeated until a desired number of sheets have been superposed upon one another on the cylinder 15, let us say, for convenience, ten.

Referring now to Fig. 4, the pins 69 of the accumulating cylinder 15 may be secured by screws 71 in pin-carrying rods 73 sliding in the block 75 mounted lengthwise of the cylinder. Since the pins 69 must pierce ten sheets and must be withdrawn from this pile of sheets to free the same when the accumulated pile is to be released to the carrying-off mechanism, the mechanism for operating the pins is different. I have here shown extending longitudinally through the cylinder a rock shaft 77, here shown as having a hollow square body, from which project arms 79 which are suitably engaged with the pin carriers 73 to reciprocate the same when shaft 77 is rocked. As best shown in Fig. 5, I have herein shown each arm 79 as carrying a laterally projecting roller 81 working between two transverse strips 83 at the inner end of each pin carrier 73 which provide a track on which the roller moves. A rectilinear retraction and protraction of the carrier is provided for by this connection although obviously the roller 81 moves through a circular arc about the center of rock shaft 77. At either end of the cylinder the rock shaft may be provided with arms 85 through which project screws 87 which may make contact with the trunnions 89 of the cylinder 15 to limit movement of the shaft in one direction. At one end of the cylinder, herein the nearer end viewing Fig. 1, the arm 85 forms a portion of a lever 91 which carries a cam roll 93 by means of which the rock shaft may be operated. To this lever 91 I have also shown connected a rod 95 passing through a fixed lug 97 at the side of the cylinder and surrounded by a strong helical spring 99 interposed between this lug and a collar on the rod and strongly tending to rock lever 91 clockwise viewing Fig. 1 and

holding the screws 87 against the stops provided by the trunnions 89 and the pins 69 projected in the position shown in Fig. 4 to receive successive sheets from the cylinder 9.

At suitable intervals, say at every ten revolutions of the cylinder 15, the shaft is operated to retract the fingers from the accumulated pile of sheets and this is effected by a positive mechanical action through the rock shaft 77 as it will be understood that a relatively powerful action is desirable to release the pins from the restraining friction of the pile of sheets. For this purpose I utilize a suitable cam which may be moved into position to cooperate with roll 93. In Fig. 1 the cam surface 101 which cooperates with roll 93 is shown as adjustably mounted on a swinging arm 103 depending from the center 105 in such manner that when the parts are in position the surface 101 is presented generally in an angular position relative to the cylinder 15 corresponding to the space between three and four o'clock on a clock dial. The arm 103 may be more or less angular presenting at the angle in about two o'clock position a cam follower roll 107 which is adapted to be operated on by an edge cam 109 on a shaft 111 which is rotated at a fractional speed relative to the cylinder 15, say 1 to 10. Thus, on every tenth revolution of the cylinder the arm 103 is swung clockwise and the surface 101 is brought into position to act on cam roll 93 to rock shaft 77 and retract the pins.

Suitable stripper means are provided to lift the sheets from the pins and from the surface of the cylinder and to hold the leading edges extended away therefrom to be guided to the carrying-off mechanism. In Fig. 4 I have shown stripper arms 113, the full line position being the active position when they serve to strip the paper and the dotted line position being the inactive position which they occupy for the major portion of the time. The full line showing is somewhat inconsistent with the showing of the pins 69, the position of which in Fig. 4 corresponds to the dotted line position of the stripper arms 113. However, the position of the pins 69 is the normal position which they occupy the major portion of the time and because of the position of the arms 113 inwardly of the circumference of the cylinder, they in their normal position would in any instance show dotted. Consequently I have adopted the full lines for the operating position of arms 113 by way of contrast. These arms 113 may be attached to a rock shaft 115 extending lengthwise of the cylinder in a position rearward of the position of the pins 69 and extend toward the same through suitable grooves in the position of a secant and their ends cross the line of pins and may be terminally directed downwardly, as indicated at 117, to guard against the introduction of anything beneath the same. From the time

rock shaft 115 is operated, which is actually at the time the pins 69 are withdrawn, the arms 113 are lifted from the dotted line position, lifting the leading edge of the pile of sheets and holding it extended from the edge of the cylinder to be shot off at an angle thereto to suitable carrying-away mechanism, such, for instance, as delivery tapes and cooperating fly sticks. For this purpose shaft 115 (see Fig. 1) carries at one end of the cylinder, that is, the one opposite that on which lever 91 is located, a lever 119 carrying cam roll 121. Suitable spring means similar to those attached to lever 91 may be utilized for returning the stripping arms to the neutral or dotted line position of Fig. 4 but to simplify the drawings they have been omitted from Fig. 1 as they are conventional and readily understood. The cam surface cooperating with cam roll 119 should be located with respect to cylinder 15 at such an angle at the rear of the location of the cam surface 101 as corresponds with the angle between the rolls 93 and 121. I have herein shown this surface 123 as carried on a swinging arm 125 located at the further end of the cylinder 15 and projecting upwardly from its pivot 127. The cam surface 123 may extend substantially from the one o'clock to the two o'clock position. This arrangement of the arms 103 and 125 at opposite ends of the cylinder 15, one depending from its pivot and the other projecting upwardly therefrom, provides for a proper positioning of the cam surfaces and permits the organization of a cam follower 129 at the angle of arm 125 which may be operated on by an edge cam 131 mounted on the shaft 111 which carries cam 109, these cams being suitably timed on the shaft to effect the desired movement of the parts, although as shown the rise portions will be substantially in alignment.

To further aid in disengaging the pile of sheets from the cylinder 15 suitable stripper fingers 133 may be provided which may be swung in in advance of the leading edge of the pile of sheets, their ends being received as customary in suitable grooves in the cylinder to provide a surface extending angularly from the roll along which the pile of sheets is directed. Herein I have shown these fingers as mounted on a rock shaft 135 which may be operated by link-work diagrammatically shown in Fig. 1 from a cam 137 on the fractional speed shaft 111.

There has been no attempt to show in the drawings the relation of the parts transversely of the machine but it will be understood that there are longitudinal series of pins, stripper arms and the like and that various of the cooperating parts, as, for instance, the stripper arms 113 and the stripper fingers 133, are placed out of alignment at different planes and that suitable clearance slots or grooves are provided in the various

cylinders or parts to permit the passage of elements carried by an adjacent cylinder, as is customary in the art. It will also be understood that the cylinders 7, 9, 11 and 15 are geared together to rotate at the same angular speed. The relative timing of cams 101 and 123 is illustrated, however, in Figs. 1 and 1^a, the latter and the right hand portion of Fig. 1 being sections through the shaft 111 in different planes and showing the parts at the same moment of the cycle.

I have described in detail the construction illustrated in order that it might be well understood and without any definitive or limiting intention.

What I claim as new and desire to secure by Letters Patent I shall express in the following claims:

1. In paper handling mechanism, an accumulating cylinder having reciprocating pins, a rock shaft longitudinal of the cylinder connected to said pins to reciprocate the same, a lever on the rock shaft at one end of the cylinder, a second rock shaft longitudinal of the cylinder, stripper arms carried thereby, a lever on the said second shaft at the other end of the cylinder, followers on said levers, swinging arms cooperating therewith and a shaft adjacent the cylinder having cams for positioning said arms.

2. In paper handling mechanism, an accumulating cylinder having reciprocating pins, a rock shaft longitudinal of the cylinder connected to said pins to reciprocate the same, a lever on the rock shaft at one end of the cylinder, a second rock shaft longitudinal of the cylinder, stripper arms carried thereby, a lever on the said second shaft at the other end of the cylinder, followers on said levers, swinging arms cooperating there-

with and means for intermittently moving said arms to act on said followers.

3. In paper handling mechanism, an accumulating cylinder having reciprocating pins, a rock shaft longitudinal of the cylinder connected to said pins to reciprocate the same, a lever on the rock shaft at one end of the cylinder, a second rock shaft longitudinal of the cylinder rearwardly of the first, stripper arms carried thereby and extending over the line of the pins, a lever on the said second shaft at the other end of the cylinder, followers on the levers, swinging arms having camming surfaces to cooperate with the followers, the arms extending in generally opposite directions from their pivots and presenting such surfaces in successive angular positions about the cylinder, and a shaft parallel to the cylinder having cams presented to intermediate portions of said arms to position the same for operation of said surfaces on said followers.

4. In paper handling mechanism, an accumulating cylinder having means for engaging the sheets, a rock shaft longitudinal of the cylinder for operating the same, a lever for the shaft, a second shaft longitudinal of the cylinder carrying stripper arms, a lever for the said second shaft, stripper fingers adapted to be moved toward the cylinder to divert the sheets therefrom, movable cams adapted to be shifted into the path of said levers, a fractional speed shaft adjacent the cylinder and cams thereon for moving said movable cams and for operating the fingers.

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

CHARLES A. MEISEL.