No. 632,214. Patented Aug. 29, 1899.

# A. B. COWLES.

## PAPER CUTTING MACHINE.

(Application filed Feb. 11, 1896.)

(No Model.) 3 Sheets—Sheet 1.

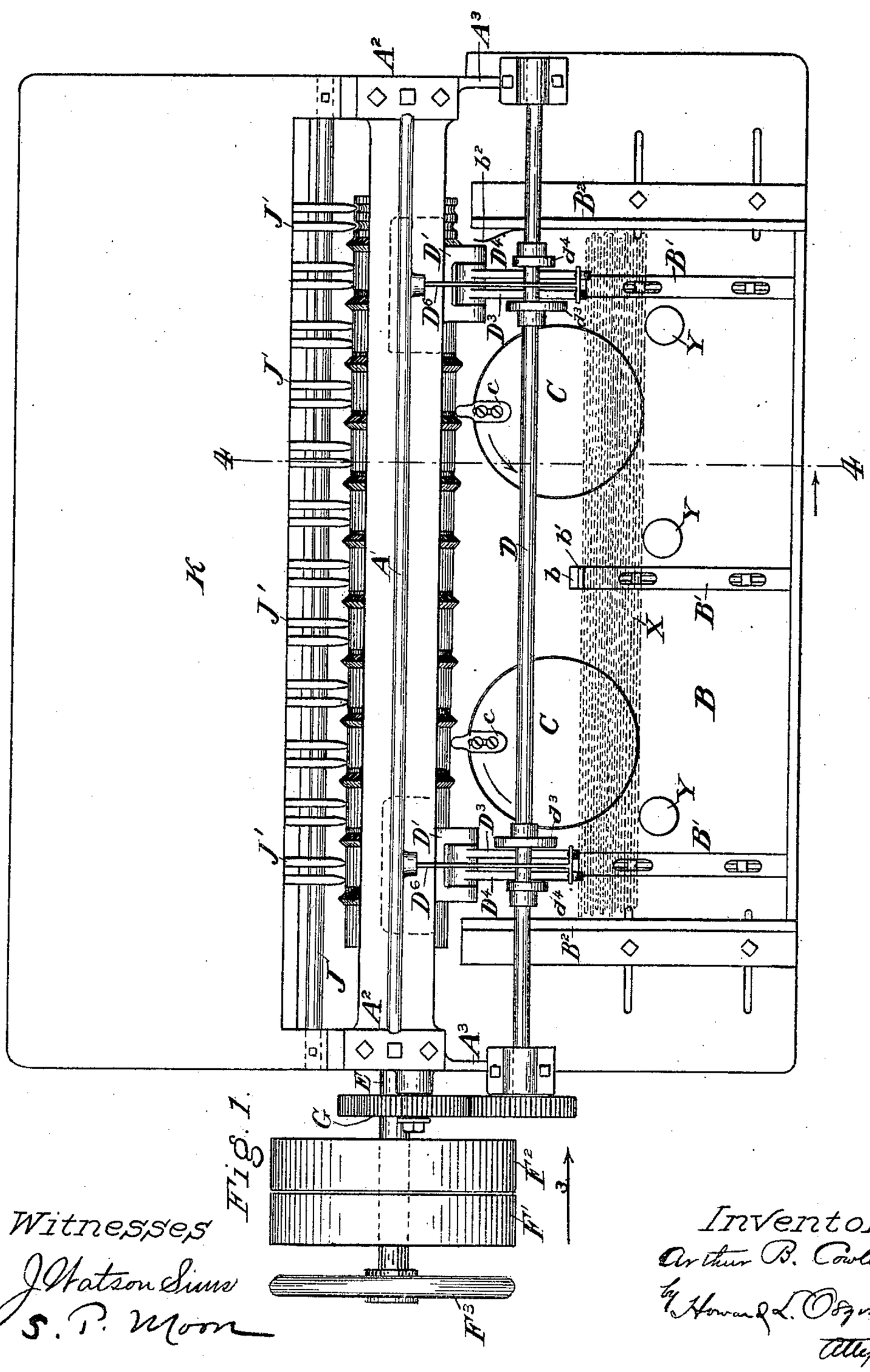


Fig. 1.

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## PAPER CUTTING MACHINE.

(Application filed Feb. 11, 1896.)

(No Model.) 3 Sheets—Sheet 2.

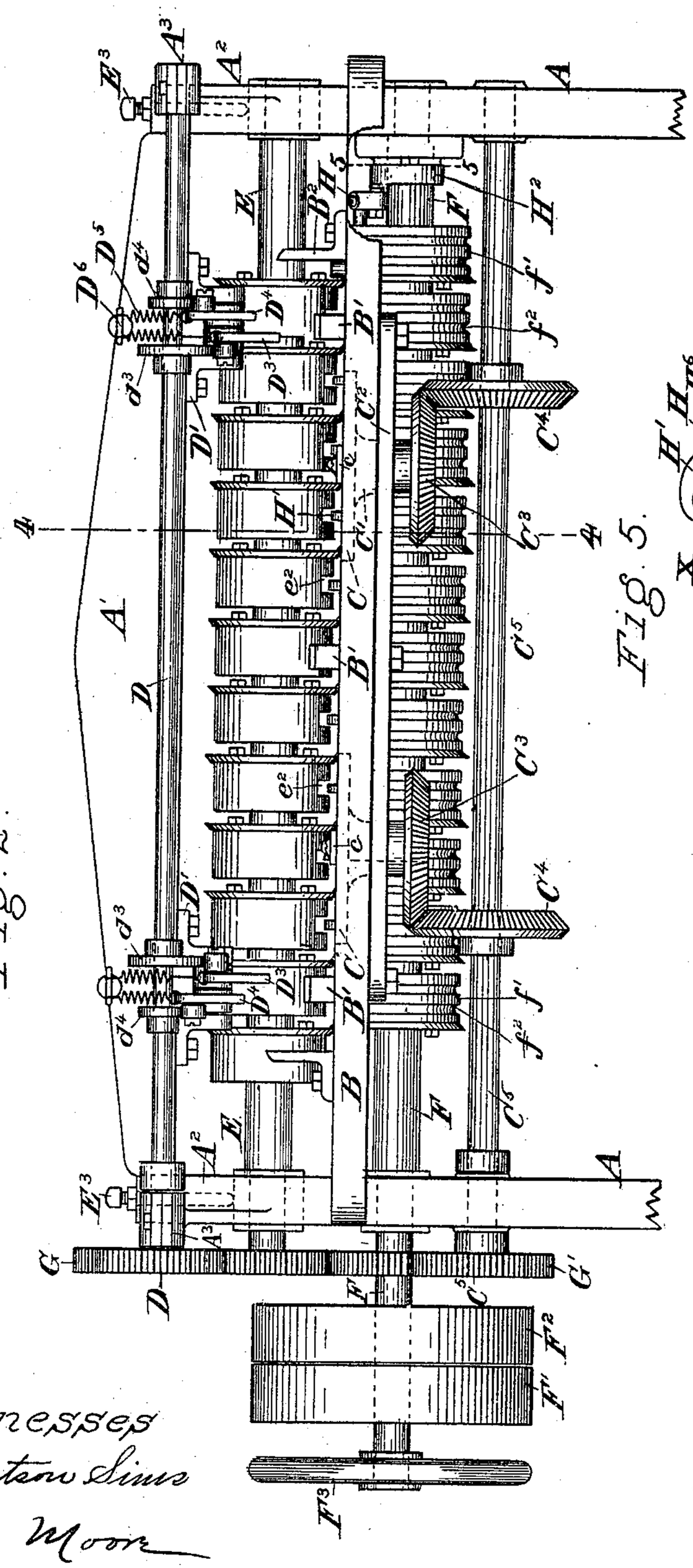

Fig. 2.

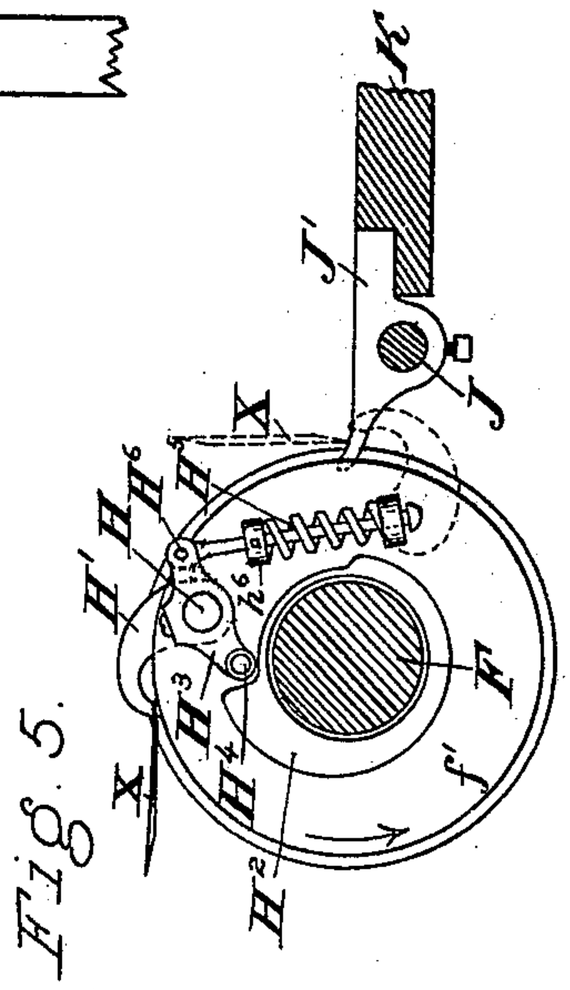

Fig. 5.

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## PAPER CUTTING MACHINE.

(Application filed Feb. 11, 1896.)

(No Model.) 3 Sheets—Sheet 3.

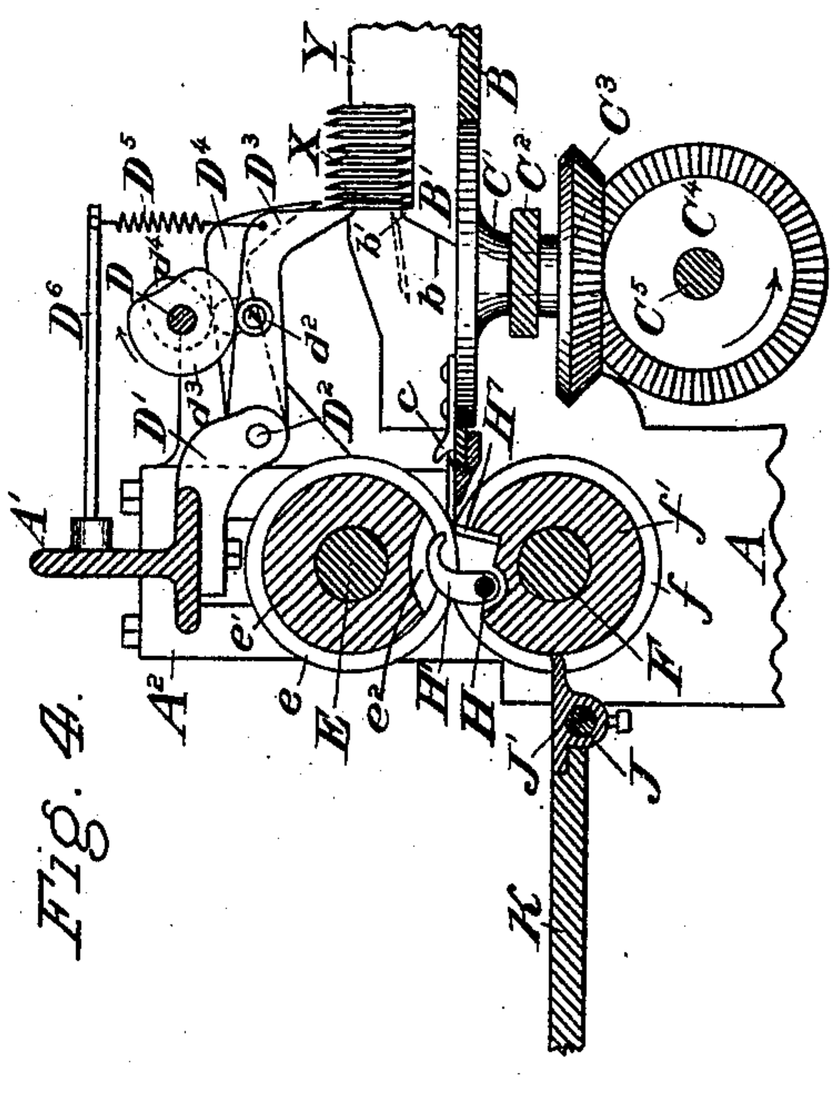


Fig. 4.

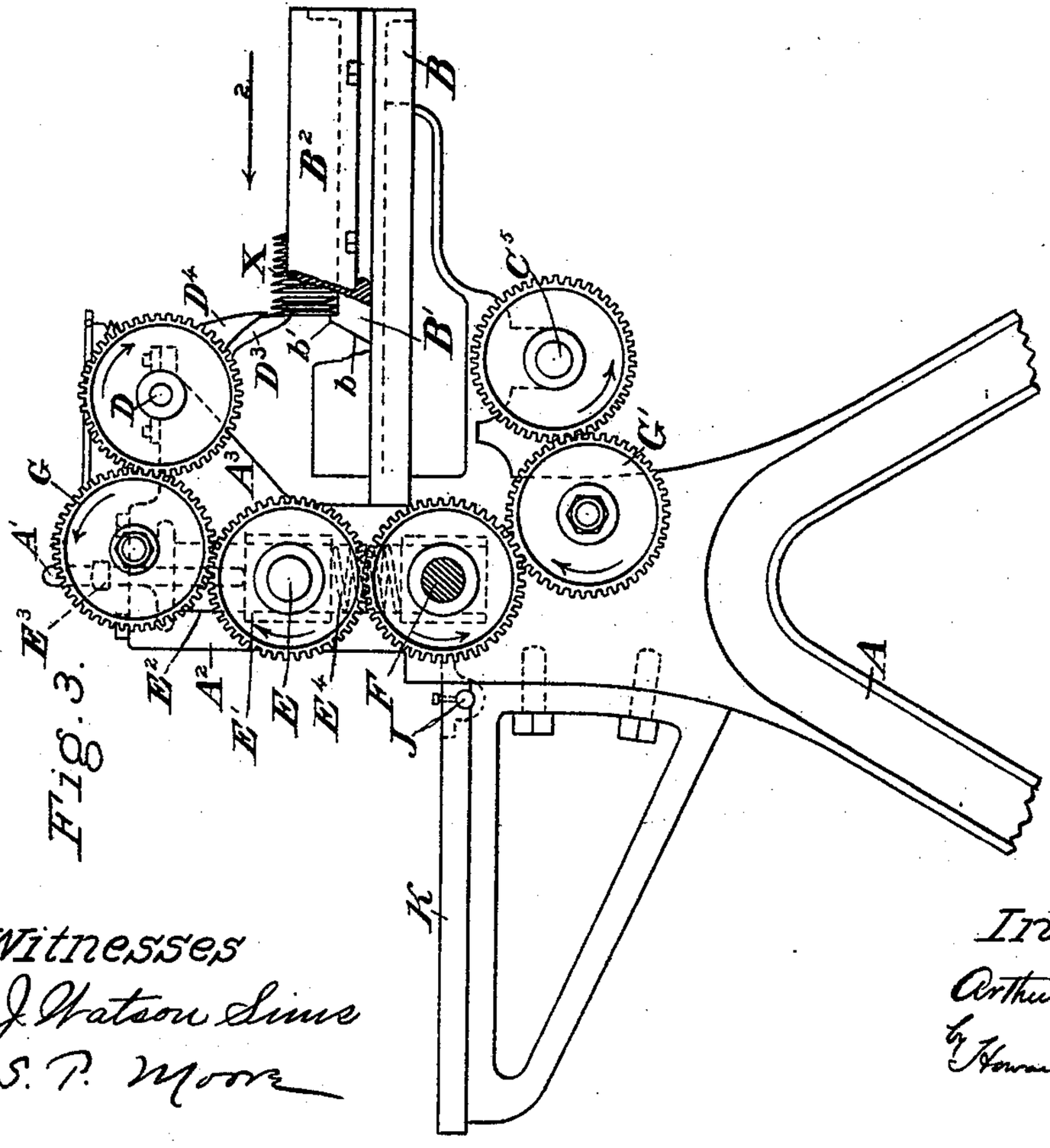


Fig. 3.

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ARTHUR B. COWLES, OF ROCHESTER, NEW YORK, ASSIGNOR TO THE STANDARD LITHOGRAPHING COMPANY OF THE CITY OF NEW YORK, OF NEW YORK.

## PAPER-CUTTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 632,214, dated August 29, 1899.

Application filed February 11, 1896. Serial No. 578,951. (No model.)

*To all whom it may concern:*

Be it known that I, ARTHUR B. COWLES, a citizen of the United States, and a resident of the city of Rochester, in the county of Monroe and State of New York, have invented certain new and useful Improvements in Paper-Cutting Machinery, (for which Letters Patent of Great Britain have been issued to A. J. Boult as a communication from me, No. 17,024, dated July 19, 1897,) of which the following is a specification, reference being had to the accompanying drawings, in which—

Figure 1 is a top plan view of one of my machines. Fig. 2 is a front view thereof, looking in the direction of the arrow marked 2 in Fig. 3. Fig. 3 is a side view thereof, looking in the direction of the arrow marked 3 in Fig. 1, parts being removed to exhibit construction. Fig. 4 is a cross-section on the line 4 4 of Fig. 1, and Fig. 5 is a cross-section on the line 5 5 of Fig. 2.

The object of my invention is to provide an accurate and simple machine for cutting paper, and it is herein shown and described as applied to cutting into the proper lengths the rectangular tubes for forming boxes, such as may be produced, for instance, by the machine set forth in my United States Patent No. 536,371.

My invention consists in the mechanisms hereinafter described and claimed.

In the drawings, A is the frame of the machine, which of course may be of any suitable form necessary to sustain the mechanism. On one side of the frame is the feeding-table B. Longitudinally upon this table I place a series of supporting-bars B′, on which the stock or in the case shown the unslit shells X are placed by the operator. At the end of each supporting-bar next to the cutting mechanism is an upwardly-extending lug or stop $b'$, from which there extends to the surface of the feed-table an inclined face $b$. (See Figs. 3 and 4.) On the feed-table B are also end guides $B^2$, which are adjustable, as usual, on the feed-table, as also are the supporting-bars B′. On one of the end guides, close to the point where the stock is delivered to the cutters, there is a spring $b^2$, which presses the edge of each blank or piece of material against the other end guide, and thus accurately adjusts its position with reference to the cutting mechanism before it begins to be cut.

Through the feed-table B are a pair of circular perforations, in which are set a pair of revoluble disks C, having their upper surfaces flush with the surface of the table B. (See Figs. 1 and 4.) These disks are of the same diameter and are supported on vertical axes C′ equidistant from the cutters and set in bearings $C^2$, hung under the table B, and on the lower end of each axis C′ is a beveled gear-wheel $C^3$, which meshes with a beveled gear-wheel $C^4$ on a transverse shaft $C^5$ under the table and suitably connected with the driving mechanism. The gear-wheel $C^3$ and the gear-wheel $C^4$ operate to turn the two disks C in opposite circular directions and at the same rate of speed. It will be noticed that the edge of the disk C nearest to the front of the machine extends to a suitable distance between the supporting-bars B′ and that the diametrically opposite edge of the disk extends close to the cutting mechanism. Upon the upper surface of each disk C is an adjustable lug *c*.

Across the top of the machine is a brace A′, extending between side supports $A^2$ of the frame, and from each side support $A^2$ in the direction of the feed-table extends a bracket $A^3$ to support a transverse shaft D, driven as hereinafter described. To the brace A′ are fastened two brackets D′, to which are pivoted by horizontal pivots $D^2$ (see Fig. 4) a pair of feeding-dogs $D^3$ $D^4$, each of which is normally pulled upward by a spring $D^5$, attached to an arm $D^6$, fixed to the brace A′. The feeding-dogs extend from the pivots $D^2$ to points immediately over the lugs $b'$ on the two outside supporting-bars B′, and the dogs have lower edges parallel to the axis D. Upon the shaft D adjacent to each dog is a cam $d^3$ $d^4$, each of which bears upon an antifriction-roller $d^2$ (see Fig. 4) on the side of a dog. The cams $d^3$ $d^4$ are of such form and are so set on the shaft as to cause the dogs $D^3$ $D^4$ to rise and fall alternately, and the two corresponding dogs $D^3$ are operated by the shaft D to rise and fall exactly together, and the

same is the case with the two dogs $D^4$. I preferably make the cams as shown in Fig. 4, so that the dog $D^4$ has a quick descent and quick ascent and remains depressed only for a short time, while the dog $D^3$ has a quick descent and ascent, but remains depressed for a much longer period than the dog $D^4$. The feeding-dogs and their operating mechanism constitute an auxiliary feeding mechanism.

Boxes are frequently manufactured in long tubes having lithographed matter on their outsides, and the machine, as shown, is adapted to separate the single long tube into eleven separate box-covers. On account of the lithographed matter it is necessary to separate the individual covers with great accuracy on the lines of division between the separate prints in order that there shall be as little waste as possible of paper, and it is also necessary that the cuts across the long tube shall be perfectly square and clean.

That portion of my machine thus far described operates as follows: The operator places a series of the long tubes X, just described, vertically on edge upon the supporting-bars B′, pushing them forward toward the lugs $b'$. When the foremost tube rests against the lugs $b'$, it also rests against the front faces of two of the dogs $D^3$ or $D^4$, as shown in Figs. 3 and 4. If the shaft D is now operated in the direction of the arrow in Fig. 4 and the foremost tube rests against the faces of the dogs $D^3$, these dogs remain depressed in the position shown in Fig. 4 until the camss $d^3$ permit the dogs to rise for a brief period, pulled by their springs $D^5$, whereupon one of the tubes X drops forward under the dogs $D^3$ on account of the engagement over its upper edge of the dogs $D^4$, which have been suddenly and momentarily depressed by the cams $d^4$. The wedge-like ends of the dogs enter between the foremost tube and the next and tilt the foremost tube forward and allow it to drop over the lugs $b'$ and to fall down the inclined faces $b$ upon the surface of the feed-table B. The tube in the course of this tilting and dropping is shown in dotted lines in Fig. 4. When the tube falls forward upon the table B, it also falls across the disks C at a time when the lugs $c$ are back of the ends $b$ of the supporting-bars B′. The revolution of the disks C (which occurs in the direction of the arrows in Fig. 1) brings the lugs $c$ against the back edges of the tube X, and the continued revolution of the disks C presses the tube forward toward the cutters, both ends of the tube moving with equal speed and in lines exactly at right angles to the cutter-shaft. When the tube is pushed forward far enough to engage with the side spring $b^2$, the tube is pressed against the other end guide $B^2$ and is thus accurately placed with regard to the lines on which it is to be cut. The revolution of the disks C, bringing the lugs $c$ into the position shown in dotted lines in Fig. 1, fully delivers the leading edge of the tube to the cutting mechanism.

It will be seen that the shafts $C^5$ and D operate in time together and, as shown in my drawings, at the same number of revolutions per minute. One tube after another is automatically delivered from the series on the supporting-bars B′ to the rotary feeding mechanism of the feed-table, and thus in respect of the feeding to the cutters the machine is wholly automatic, and it is only necessary for the operator to keep a sufficient number of tubes upon the supporting-bars B′ and by a weight Y or other suitable device placed upon the table B to keep them pressed forward against the lugs $b'$ and the faces of the dogs $D^3$. The elasticity of the tubes when collapsed into the forms shown in Figs. 3 and 4 causes a gradual feeding forward of the tubes, so that it is not necessary for the operator to press the series of tubes upon the supporting-bars B′ constantly in the direction of the feeding device.

Transversely in the frame A are journaled two parallel shafts E and F, carrying rotary cutters of a well-known form arranged in pairs. The cutting-points of the respective pairs of cutters are in the same plane with the surface of the table B. In Fig. 4 a tube is shown in the position of delivery to the cutters $e$ $f$. There are of course a sufficient number of pairs of cutters on the shaft to slit the tube along as many lines as may be desired. The lower shaft F is in fixed boxes, but the upper shaft E is set in movable boxes E′, sliding in ways $E^2$ to and from the shaft F, being pressed toward the shaft by the set-screw $E^3$ and being pressed away from the shaft F by the spring $E^4$. The shaft F is also the driving-shaft and bears the fast and loose pulleys F′ $F^2$ and, if desired, a hand-wheel $F^3$ for use in setting the apparatus preparatory to operating it by power. The shafts $C^5$, F, E, and D are all parallel and are geared together as follows: The shafts E and F directly, the shaft D to the shaft E by the idler G, and the shaft $C^5$ to the shaft F by the idler G′. The arrows in Fig. 3 show the direction of rotation of the respective shafts and idlers.

Between the cutters on the shaft F are a series of drums $f'$, having peripheral grooves $f^2$ therein. Through these drums and through the cutters $f$, eccentric to the axis, passes a gripper-shaft H, bearing a series of gripper-hooks H′, one for each drum. Upon the shaft H is an arm $H^3$, bearing an antifriction-roller $H^4$ for engagement with the cam $H^2$, which is stationary and is fixed to the frame A. A spring $H^5$, attached to an arm $H^6$ on the gripper-shaft H, normally tends to keep the gripper-hook H′ closed. The spring operates against a fixed abutment $h^6$, so as to be independent of the action of the cam $H^2$, and when the cam revolves the gripper-finger is alternately closed and opened. The opening is performed quickly by an abrupt depression in the cam, as shown in Fig. 5, and the closing thereof is also quick. The gripper-finger

is thus closed by the operation of the spring $H^5$ and is also opened by the operation of the cam. The position of the cam with reference to the position of the arm $H^3$ is timed with reference to the rotation of the feeding-lugs *c*, so that as soon as the lugs reach their extreme position in feeding the tube X forward the grippers take hold of the leading edge of the tube, the same being caught between the end of the gripper and the abutment-plate $H^7$. In Fig. 4 the parts are shown in the position when the tube is fed forward and the gripper-finger is just at the point of being operated to grasp the tube, and in Fig. 5 the full lines show the parts in position when the gripper-finger has just taken hold of the leading edge. The shaft H and the gripper mechanism revolve with the shaft F, while the cam $H^2$ is stationary. On the shaft E are also a series of drums *e'*, provided with openings $e^2$ to permit the movements of the gripper-fingers H'. The drums on the respective shafts assist in keeping the tubes flat and straight during the process of cutting.

On the delivery side of the machine is the receiving-table K. Across the machine and between the receiving-table and the cutters is a shaft J, bearing a series of adjustable strippers and stationary shell-stopping fingers J', having their upper surfaces in the same plane as the table K and substantially in a radial plane or line of the drums *f'* and cutters *f* and having points projecting into the grooves $f^2$ of the drums *f'*. After the grippers have taken hold of the leading edge of the tube the revolution of the shaft pulls the tube through the cutters and slits the tube on the desired lines, and in my mechanism the feeding and cutting must necessarily proceed with equal speed without buckling the tube or tearing or breaking the edges by reason of slip of feeding mechanism or by difference in speed between the feed and the cutting. When the tube is slit, the cam $H^2$ raises the arm $H^3$ and disengages all the grippers H' simultaneously from the series of shells just before the leading edges of the individual shells come in contact with the strippers or stopping-fingers J', which are radial to the rotary cutters. The positions of the gripper and of the shell at this moment are indicated in dotted lines in Fig. 5. The operation of the cam causes the grippers to grasp the shell X through about one-quarter of the revolution of the shaft F and to hold the individual shells till they are delivered in a vertical position on the shell-stopping fingers J', whereby further movement of the shells or sheet-sections is arrested. As each tube is slit the shells are delivered against the shells just previously cut, and thus they are arranged in order upon the table K in a position for convenient handling. As these shells or sheet-sections are thus delivered they are arrested by said stopping-fingers and substantially perpendicular thereto, and since these stopping-fingers constitute continuations of the table-surface the series of sheet-sections resting on edge on the stopping-fingers and on the table are moved forward by the sheet-sections produced by each successive cut. The manner of stopping the sheet-sections and the delivery thereof on edge upon the stopping-fingers will be clearly seen in Fig. 5.

It is obvious that my device is adapted to the cutting of other forms of paper stock than the tubular blanks mentioned above. For instance, it is adapted to feed sheets or strips of paper or of cardboard and to cut the sheet-sections accurately and rapidly. It is further clear that the tubes and tube-sections herein described are merely forms of sheets and sheet-sections, and in this specification and in the following claims sheets of paper, strips of cardboard, tubular blanks, and other like materials or articles are to be considered as equivalents.

What I claim is—

1. In a paper-cutting machine, the combination of a pair of shafts having pairs of co-operating rotary cutters thereon, a series of grippers one for each pair of cutters, said grippers revolving with one of said shafts and adapted to carry sheets through the cutters, mechanism for opening and closing said grippers, and a delivery-table having stopping-fingers for arresting the sheet-sections extending into the path of the sheet-sections and in continuation of the table-surface and below the level of the line of cut of said rotary cutters, whereby the sheet-sections are delivered to said table and perpendicular thereto.

2. In a paper-cutting machine, the combination of a pair of shafts having pairs of rotary cutters thereon, a series of grippers, one for each pair of cutters, said grippers revolving with one of the shafts and adapted to carry sheets through the cutters, mechanism for opening and closing said grippers, and a delivery-table below the level of the line of cut of said rotary cutters having stationary stopping-fingers for arresting the sheet-sections extending into the path of said sheet-sections and substantially radial to the rotary cutters, whereby the sheet-sections are delivered to said table and perpendicular thereto.

3. The combination of a feeding-table, and a feeding device consisting of a pair of disks of equal diameter revolving horizontally in opposite rotary directions and having their surfaces in the same plane with the feeding-table, and a lug on each disk extending above the surface of the table, whereby material placed upon said feeding-table and across said disks is fed forward by the motion of said lugs.

4. In a paper-cutting machine, a feeding-table, and an auxiliary feeding mechanism consisting of a stop on said table and pairs of alternately-moving feeding-dogs operating alternately on the upper edge of each blank for separating the successive blanks from a mass of vertically-arranged blanks.

5. In a paper-cutting machine, a feeding-table, and an auxiliary feeding mechanism consisting of a stop on said table and pairs of alternately-moving feeding-dogs operating alternately on the upper edge of each blank for separating the successive blanks from a mass of vertically-arranged blanks and a mechanism to which the dogs deliver the blanks for advancing the same to the cutters.

6. In a paper-cutting machine, a feeding-table, and an auxiliary feeding mechanism consisting of supporting-bars above the level of the feed-table, each bar having a stop on its end next the cutters, and pairs of alternately-moving feeding-dogs operating alternately on the upper edge of each blank for separating the successive blanks from a mass of vertically-arranged blanks and delivering them successively over the stop upon the feeding-table.

7. In a paper-cutting machine, a feeding-table, an auxiliary feeding mechanism consisting of a stop on said table, and pairs of alternately-moving feeding-dogs operating alternately on the upper edge of each blank for separating the successive blanks from a mass of vertically-arranged blanks and delivering them successively over the stop upon the feeding-table.

8. In a paper-cutting machine, a feeding-table, and a feeding device, consisting of a pair of disks of equal diameter revolving horizontally in opposite directions and having their surfaces in the same plane with the feeding-table, a lug on each disk whereby the blank is pressed forward to the cutters, and an auxiliary feeding mechanism consisting of a stop on said table, and pairs of alternately-moving dogs operating alternately on the upper edge of each blank for separating the successive blanks from a mass of vertically-arranged blanks and delivering them successively over the stop upon the feeding-table, and across said disks.

9. In a paper-cutting machine, a feeding device, consisting of a pair of disks of equal diameter revolving horizontally in opposite directions, a lug on each disk whereby the blank is pressed forward to the cutters, and an auxiliary feeding mechanism, consisting of a stop on said table and pairs of alternately-moving feeding-dogs operating alternately on the upper edge of each blank for separating the successive blanks from a mass of vertically-arranged blanks and delivering them successively to said feeding device.

10. In a paper-cutting machine, a feeding-table, and a feeding device, consisting of a pair of disks of equal diameter revolving horizontally in opposite directions having their surfaces in the same plane with the feeding-table, a lug on each disk whereby the blank is pressed forward to the cutters, and an auxiliary feeding mechanism, consisting of a stop on said table and pairs of alternately-moving feeding-dogs operating alternately on the upper edge of each blank for separating the successive blanks from a mass of vertically-arranged blanks and delivering them successively over the stop upon the feeding-table.

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