No. 755,696. PATENTED MAR. 29, 1904.

C. J. PRANKARD, JR.

CUTTING MACHINE.

APPLICATION FILED OCT. 17, 1900.

NO MODEL. 4 SHEETS—SHEET 1.

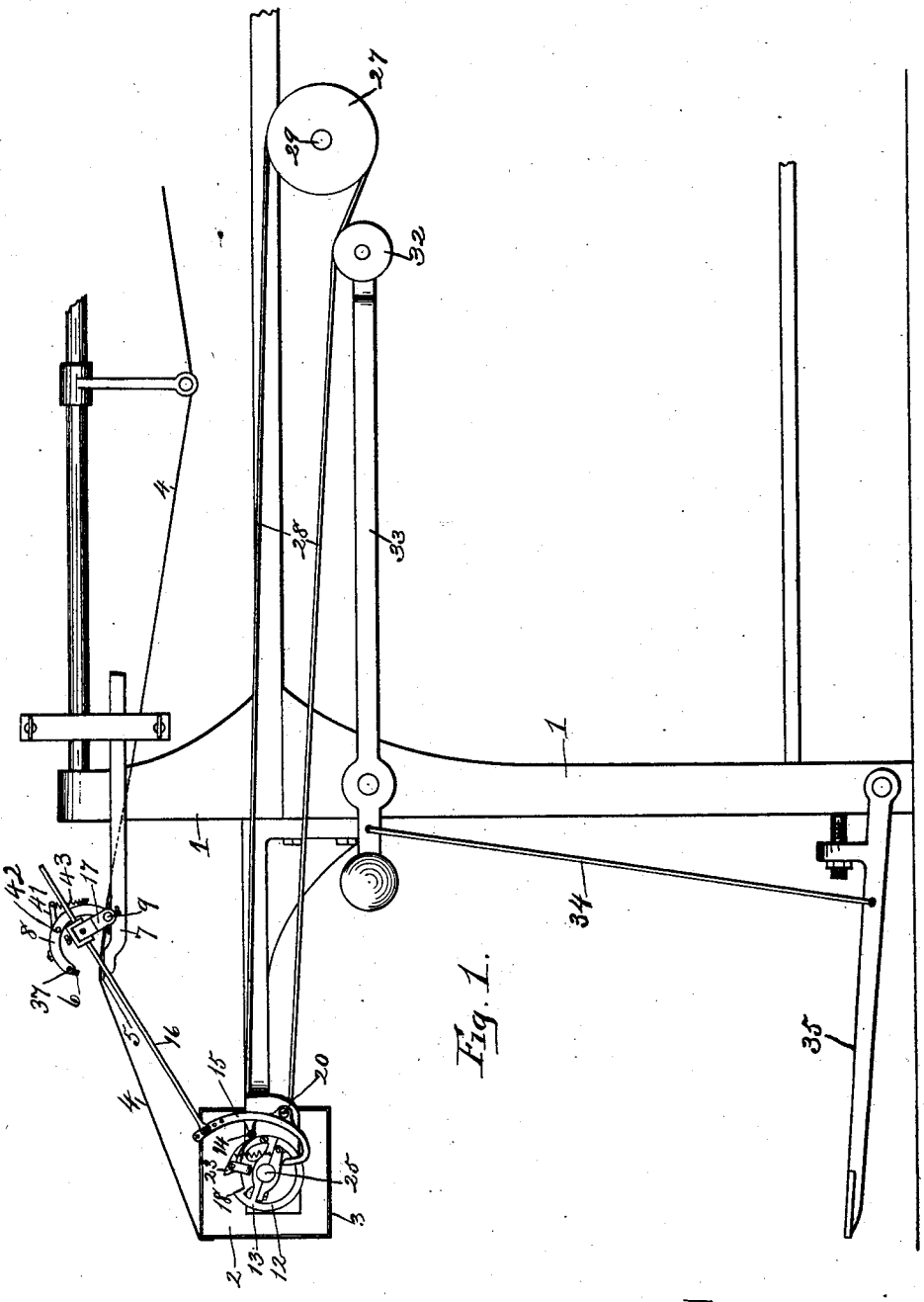


Fig. 1.

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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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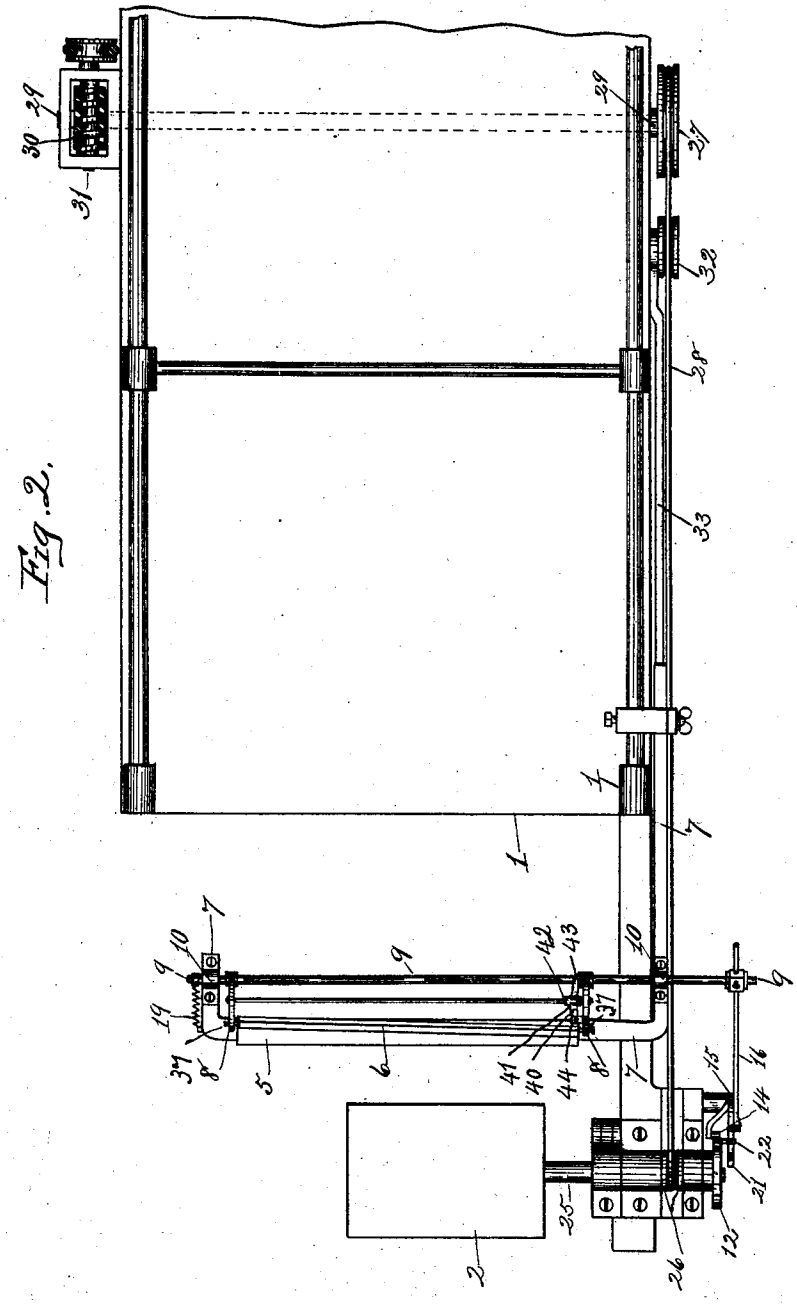
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NO MODEL. 4 SHEETS—SHEET 2.

Fig. 2.



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NO MODEL. 4 SHEETS—SHEET 3.

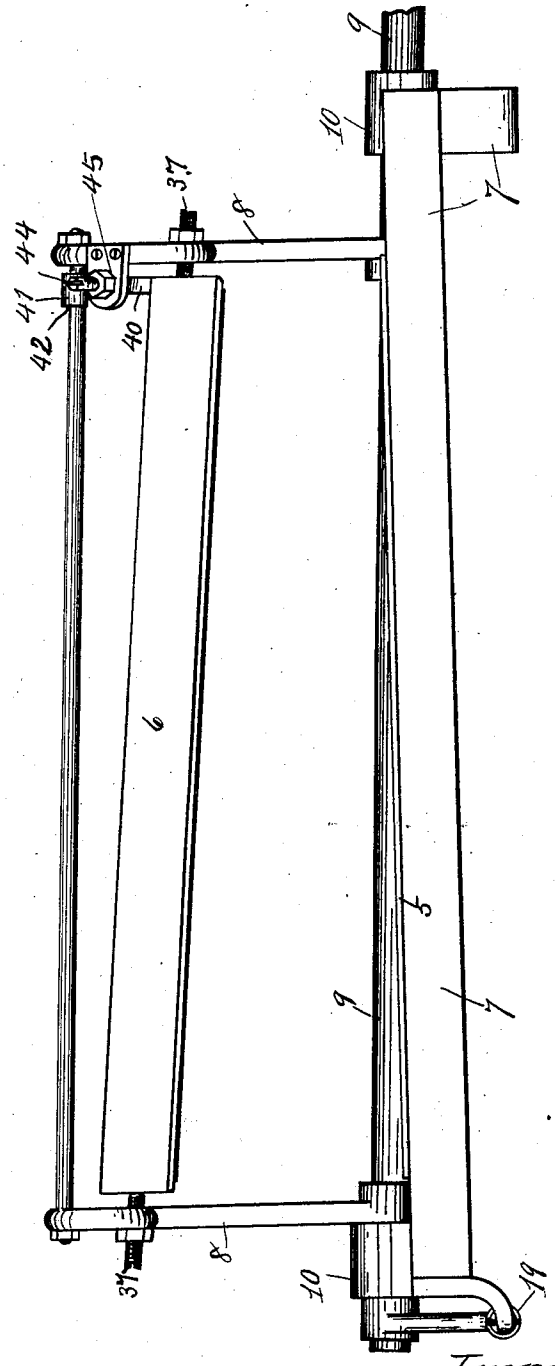


Fig. 3.

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NO MODEL. 4 SHEETS—SHEET 4.

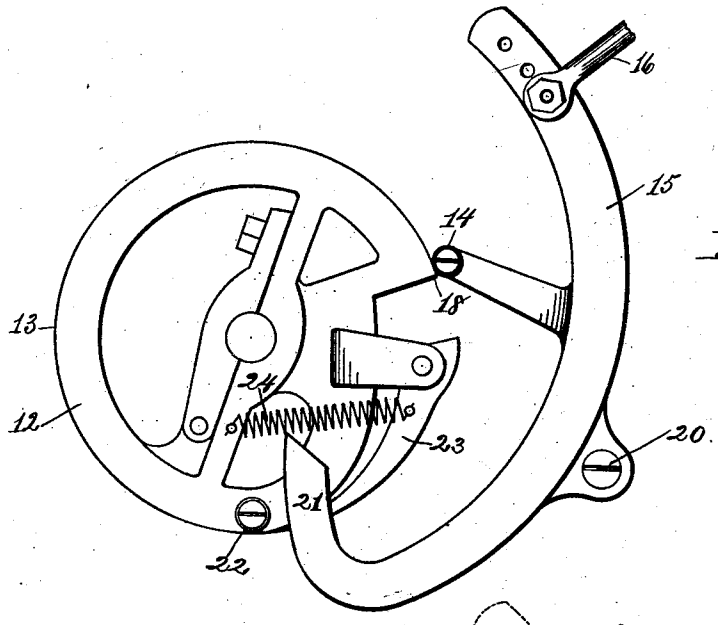


Fig. 4.

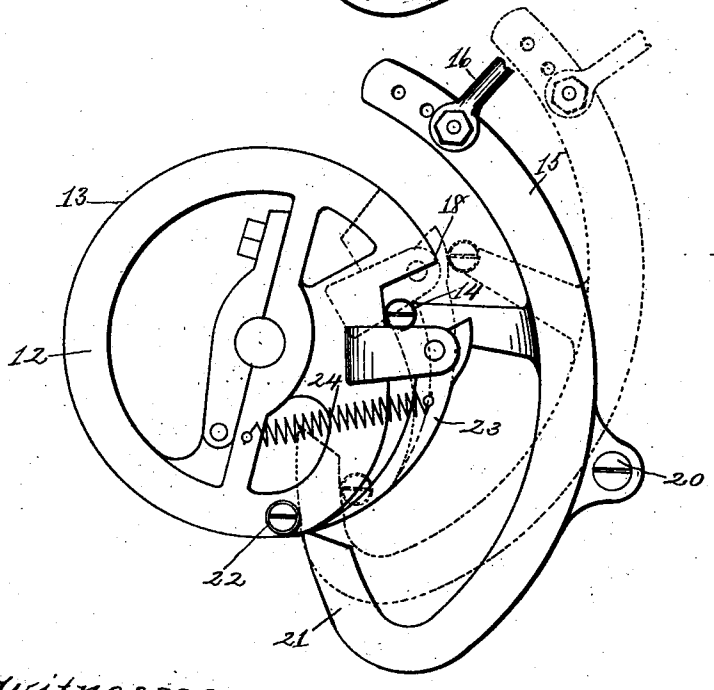


Fig. 5.

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No. 755,696. Patented March 29, 1904.

UNITED STATES PATENT OFFICE.

CHARLES J. PRANKARD, JR., OF TROY, NEW YORK.

CUTTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 755,696, dated March 29, 1904.

Application filed October 17, 1900. Serial No. 33,337. (No model.)

To all whom it may concern:

Be it known that I, CHARLES J. PRANKARD, Jr., a citizen of the United States, residing at Troy, county of Rensselaer, and State of New York, have invented certain new and useful Improvements in Cutting-Machines, of which the following is a specification.

The invention relates to such improvements; and it consists of the novel construction and combination of parts hereinafter described and subsequently claimed.

Reference may be had to the accompanying drawings and the reference characters marked thereon, which form a part of this specification.

Similar characters refer to similar parts in the several figures.

Figure 1 of the drawings is a view in side elevation of one end of a paper-box-covering machine containing my invention. Fig. 2 is a top plan view of the same. Fig. 3 is a view in front elevation of the cutting mechanism. Fig. 4 is a view in front elevation, on an enlarged scale, of the cam mechanism for operating the cutting mechanism, the parts being shown in the position assumed just prior to the cutting operation. Fig. 5 is a similar view showing the position assumed by the parts when a reverse movement is imparted to the cam.

My invention relates to an improved cutting mechanism adapted for various uses, and particularly adapted for use in machines for covering paper boxes, and the invention is herein shown and described in its application to such a machine. In machines of this class the box to be covered is supported upon a rotary block or form, and a strip of paper from a roll or other source of supply and having applied to one of its surfaces a coating of paste or other adhesive is fed between a pair of cutting-blades to the box upon the form as the box and form are rotated until sufficient paper has passed the cutting mechanism to extend entirely around the box, whereupon said mechanism is operated to sever the strip of paper, the operation being repeated as boxes are successively applied to the form.

Referring to the drawings, 1 is the frame of the machine, and 2 is the box-form, which may be constructed in any known manner and rotatively supported upon the frame of the machine.

3 represents a paper box supported on the form, and 4 a strip of paper adapted to be fed from a roll or other source of supply (not shown) to the form-supported box in the usual manner.

My improved cutting mechanism is of the shears type, employing a pair of blades movable one toward the other on an axis extending longitudinally of the blades. In cutting mechanisms of this type heretofore employed it has always been found necessary to make one of the blades of a spiral form in order to secure the desired coöperative shear cutting action of the blades.

Great skill and care are required in the manufacture of spiral cutting-blades, as well as in the subsequent sharpening of the same, it being practically impossible either to bend a piece of hardened steel accurately to spiral form or to temper a soft piece of steel after the same has been bent to spiral form without distortion due to unequal expansions and contraction.

To accurately sharpen spiral blades requires special machinery adapted for the purpose. I have ascertained that in shears of this general type two straight-edged blades can be so arranged that when moved one toward the other on an axis extending longitudinally of the blades they will coöperate with a shear cutting action. In arranging the straight blades in shears of this kind to secure such a result said blades are arranged and maintained in positions oppositely and equally inclined each relatively to the axial plane which intersects its middle portion.

In the drawings, 5 represents the stationary or ledger blade, and 6 the movable blade adapted to coöperate therewith. The ledger-blade is mounted upon the stationary frame or bracket 7, supported by the main frame of the machine, and the movable blade is mounted upon an oscillatory frame 8, fixed upon the shaft 9, which extends longitudinally of both blades and has bearings at 10 in said stationary frame or bracket 7. Each blade has an approximately straight cutting edge,

and the several blades and bearings for the shaft 9 are so arranged in their respective frames that the blades are oppositely and equally inclined each relatively to the plane radial to said shaft and passing through the middle portion of said blade, each blade having every part of its cutting edge equidistant from the axis of said shaft with the coöperating part of the cutting edge of the other blade. As a convenient method of determining the proper location of said blades in their respective frames to secure their coöperative action in the desired manner the blades may first be arranged with their cutting edges coincident with each other and parallel with the axis of the shaft in the same horizontal plane therewith and then oppositely and equally inclined, while their cutting edges are maintained in the same vertical plane which they originally occupied, the angle of inclination imparted to each blade being half that of the shearing angle desired. After the blades are thus secured to their respective frames in such adjusted positions every part of the cutting edge of each blade will be brought into coincidence with the coöperating part of the cutting edge of the other blade when the shears are operated.

The blades may be supported in any desired relatively inclined position, provided every part of the cutting edge of each blade is maintained equidistant from the axis of the shaft with the coöperating part of the cutting edge of the other blade.

The shears may be supported and operated in any known manner.

In adapting my improved shears for use in a box-covering machine I have preferably arranged the shears so that the ledger-blade shall be located in a horizontal plane and parallel with the axis of the box-form in order that the severed portion of the paper strip shall have a squarely-cut end, which is considered desirable. When the shears are arranged with the ledger-blade occupying such a position, the shaft will be inclined in a vertical plane relatively to the stationary blade, and the movable blade will be inclined relatively to the stationary blade when their middle portions are in coöperative engagement at double the angle of inclination of said shaft relatively to said stationary blade.

I have shown mechanism connected with the box-form for automatically controlling and operating the shears and comprising a wiper-wheel 12, fixed upon the box-form-supporting spindle and provided with a cam-surface 13, adapted to be engaged by a cam-follower 14 on the follower-lever 15, connected by link 16 with an arm 17, fixed upon the shaft 9 of the shears.

The closing movement of the shears is induced by gravity, and the wiper-cam operates through the follower and connections with the shaft of the shears to open the shears, and when the highest point 18 of the cam has passed the follower it releases the follower and permits the shears to close to sever the paper.

Spring mechanism 19 may be employed to either accelerate or retard the closing movement of the shears, as desired.

The follower-lever 15 is pivoted at 20 upon a fixed support and is provided with an offset end 21, curved in the form of an arc of a circle, with the pivot of the lever as a center, extending into the path of a pin 22, fixed upon the wiper-wheel in position to engage said offset at the instant the follower leaves the highest point 18 of the cam. This engagement of said pin with the curved end of the follower-lever prevents further rotation of the wiper-wheel, and thus serves as a stop for the box-form and for the feeding of the paper, and said curved offset is of such a length as to remain in the path of said pin until the follower has descended from the highest to the lowest point of the cam, thereby permitting the full closing movement of the shears, whereupon the parts assume the position shown by the solid lines in Fig. 5, in which position the offset end of the follower-lever has moved out of the path of said stop-pin, leaving the wiper-wheel and box-form free to be again rotated.

By the use of automatic stop mechanism substantially as described movement of the paper strip is prevented during the cutting operation of the shears, insuring severance of the paper on a perfectly straight line.

It will be understood that the operator applies the boxes successively to the box-form, and with his hand seizes the end of the web of paper remaining in the shears and draws the same down upon the form-supported box, which is then rotated, drawing the paper through the shears as the operator with his hand presses the pasted paper upon the surface of the box until sufficient paper has passed the shears to fully cover the box and the shears have operated to sever the paper.

As the shears are located at some distance from the box-form, a partial rotation of the form is necessary after the paper has been severed to bring the severed end to the upper side of the form convenient to the hand of the operator, and the cam on the wiper-wheel is preferably so formed that this partial rotation will accomplish the opening movement of the shears to permit the operator to grasp the severed end of the paper, which remains in the shears for application to the next box applied to the form.

As a safeguard for preventing the closing movement of the shears being caused by an accidental reverse movement of the box-form and wiper-wheel I provide a safety-switch 23, adapted to be yieldingly held closed by the spring 24, which switch yields to permit the passage of the follower from the lowest point

to the highest surface of the cam and which automatically closes and prevents the return of the follower to the lower surface of the cam.

If a reverse movement is imparted to the wiper-wheel, the follower rides upon the switch to the position indicated by dotted lines in Fig. 5 until further reverse movement is stopped by engagement of the stop-pin 21 with the offset end of the follower-lever, such reverse movement of the wiper-wheel causing practically no movement of the follower and shears. It is thus impossible for the hand of the operator to be accidentally caught by the operation of the shears induced by a reverse movement of the box-form.

The box-form and wiper-wheel may be rotated by the hand of the operator or in any known manner. As a means for producing such movement while leaving the parts at all times under perfect control of the operator I provide the box-form spindle 25 with a belt-driven pulley 26, connected with the belt-driving pulley 27 by a loose driving-belt 28. The driving-pulley 27 is fixed upon a shaft 29, having a speed-reducing worm-gear connection at 30 with a power-shaft 31, which may be operated in any known manner. Under normal conditions the slackness of the belt 28 prevents the rotary motion of the pulley 27, which operates continuously, from being imparted to the belt-driven pulley 26 to operate the box-form and wiper-wheel. As a means for tightening the belt when it is desired to cause said driven pulley 26 and the connected box-form and wiper-wheel to be operated I provide a belt-engaging friction-pulley 32, mounted upon a lever 33, which lever is connected by link 34 with a treadle 35, adapted to be engaged by the foot of the operator and by pressure upon which he can regulate the tension of the belt as desired. It will thus be seen that the operator by proper regulation of the tension of the belt can cause the box-form to be rotated thereby, while its rotary movements can be regulated and retarded by means of pressure exerted upon the box-form by his hand as he applies the paper to the box, and the same can be wholly stopped by releasing the treadle 35. The operator thus has perfect control of the box and can permit the same to rotate rapidly when the application of the paper is proceeding with facility; but should he require a longer time to smooth the paper or for any other purpose he has only to press with more or less force upon the box and form to retard the movement of the same, causing a partial slipping of the belt 28, and if he should wish to reverse the movements of the box and form for any purpose he can easily do so upon releasing the treadle 35.

On account of the comparatively low rate of speed required it is very desirable to use a speed-reducing worm-gear for rotating the box-form in a box-covering machine; but the construction of the worm-gear is such that where the same is uninterruptedly connected with the box-form it is impossible to reverse the movement of the form.

By interposing between the worm-gear and the box-form the loose belt-driving mechanism and belt-tightener, as above described, I not only am able to obtain a speed of movement which can be varied at the will of the operator, but also permit the operator to reverse the movement of the box-form when he so desires.

As a preferred means for supporting the movable blade in the frame 8 I have shown the same pivotally mounted at its opposite ends upon screws 37, inserted through said frame into the respective ends of the blade-body and in a line with each other extending axially through the blade. The blade which is thus adapted to rock upon the screws 37 is provided with an arm 40, adapted to be engaged on its under side by one arm of the lever 41, fulcrumed at 42 upon said frame, and having its other end connected by spring 43 under tension with said frame. A stop-screw 44 is inserted through an overhanging plate 45, fixed to said frame in position to engage the arm 40 on said blade and limit the outward movement of said arm. The connection of the spring 43 through the lever 41 tends to yieldingly hold the arm 40 against the stop-screw 44. By varying the adjustment of the stop-screw the body of the blade can be supported at any desired angle upon its axial support formed by the screws 37. The movable blade can thus be adjusted to closely engage the ledger-blade during the shearing operation without danger of injury to either blade, as the movable blade is free to yield should any inequalities in the blades, or either of them, tend to cause them to too closely engage each other. Adjustment can also be made to compensate for wear and to renew the useful life of the blades from time to time without resharpening.

What I claim as new, and desire to secure by Letters Patent, is—

1. Cutting mechanism comprising in combination a pair of blades movable one toward the other on an axis extending longitudinally of the blades, and oppositely and equally inclined each relatively to the axial plane intersecting the middle portion of its cutting edge.

2. Cutting mechanism comprising in combination a pair of approximately straight-edged blades movable one toward the other on an axis extending longitudinally of the blades, oppositely inclined, each relatively to the axial plane intersecting the middle portion of its cutting edge, and having every part of the cutting edge of each blade equidistant from the axis of movement with the coöperating part of the cutting edge of the other blade.

3. Cutting mechanism comprising in combination a pair of approximately straight-edged,

relatively inclined blades movable relatively to one another on an axis extending longitudinally of the blades and having every part of the cutting edge of each blade equidistant from the axis of movement with the coöperating part of the cutting edge of the other blade.

4. In a cutting-machine and in combination, a supporting-frame; a form rotatively mounted upon said frame; cutting mechanism comprising a pair of blades one movable relatively to the other in the path of an arc of a circle, said blades being equally and oppositely inclined each relatively to the axial plane intersecting the middle portion of its cutting edge; and operating connections between said movable blade and said form, whereby said movable blade is operated by rotation of said form, substantially as described.

5. In a cutting-machine, the combination with a supporting-frame; and a form rotatively mounted upon said frame; of a stationary blade fixedly mounted upon the frame of the machine with its cutting edge horizontal and parallel with the axis of the form; a blade-supporting frame oscillatory upon an axis inclined in a vertical plane relatively to said stationary blade; and a coöperating blade so mounted upon said oscillatory frame that when the middle portions of said blades are in cooperative cutting engagement said movable blade will be inclined relatively to said stationary blade at double the angle of inclination of its axis of oscillation relatively to said stationary blade and operating connections whereby the oscillatory blade-supporting frame is operated by the rotary movements of said form.

6. Cutting mechanism comprising in combination a pair of shear cutting-blades movable one toward the other on an axis extending longitudinally of the blades and so arranged that an axial plane passed through any point of engagement of the two blades will bisect the shearing angle.

7. In a cutting-machine, the combination with an oscillatory frame, of a stationary blade having its cutting edge inclined relatively to a plane passing through the axis of oscillation of said frame and intersecting the middle portion of said cutting edge; a coöperating blade pivotally mounted in said frame to rock upon an axis extending longitudinally of said blade, and having its cutting edge oppositely and equally inclined relatively to a plane intersecting its middle portion and passing through the axis of oscillation of said frame; an adjustable stop adapted to limit the rocking movement of said coöperating blade; and means for yieldingly holding said blade against said stop.

In testimony whereof I have hereunto set my hand this 15th day of October, 1900.

CHARLES J. PRANKARD, JR.

Witnesses:

FRANK C. CURTIS,

E. M. O'REILLY.