(No Model.) 3 Sheets—Sheet 1.

R. T. SMITH.

CARD BOARD CUTTING MACHINE.

No. 434,958. Patented Aug. 26, 1890.

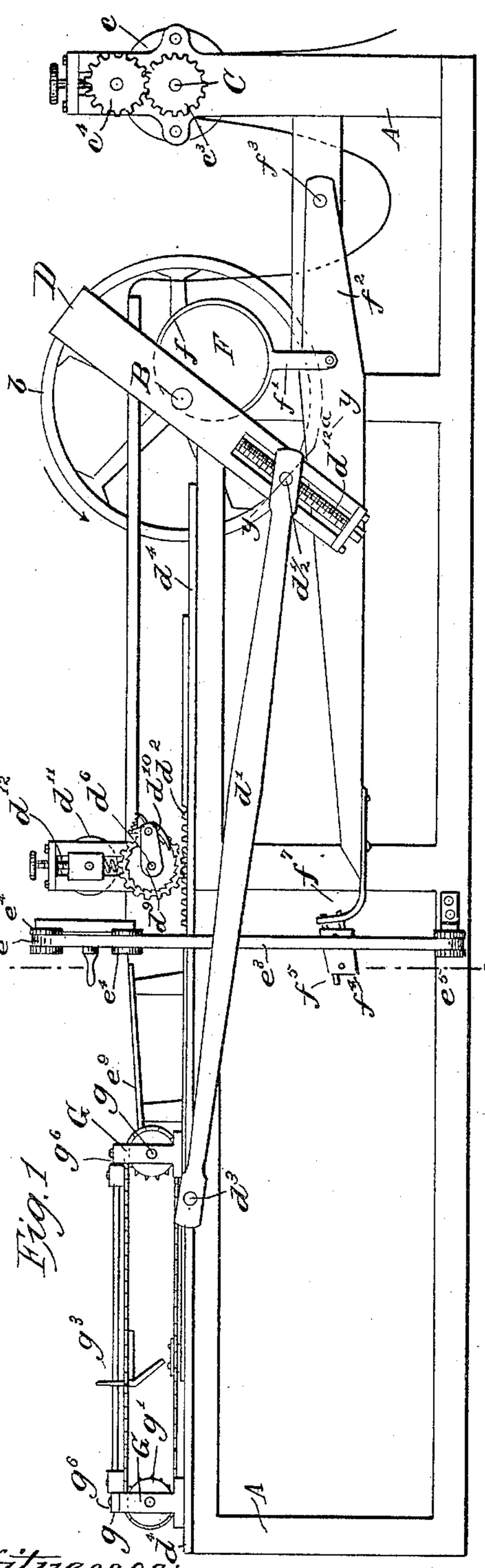

Fig. 1

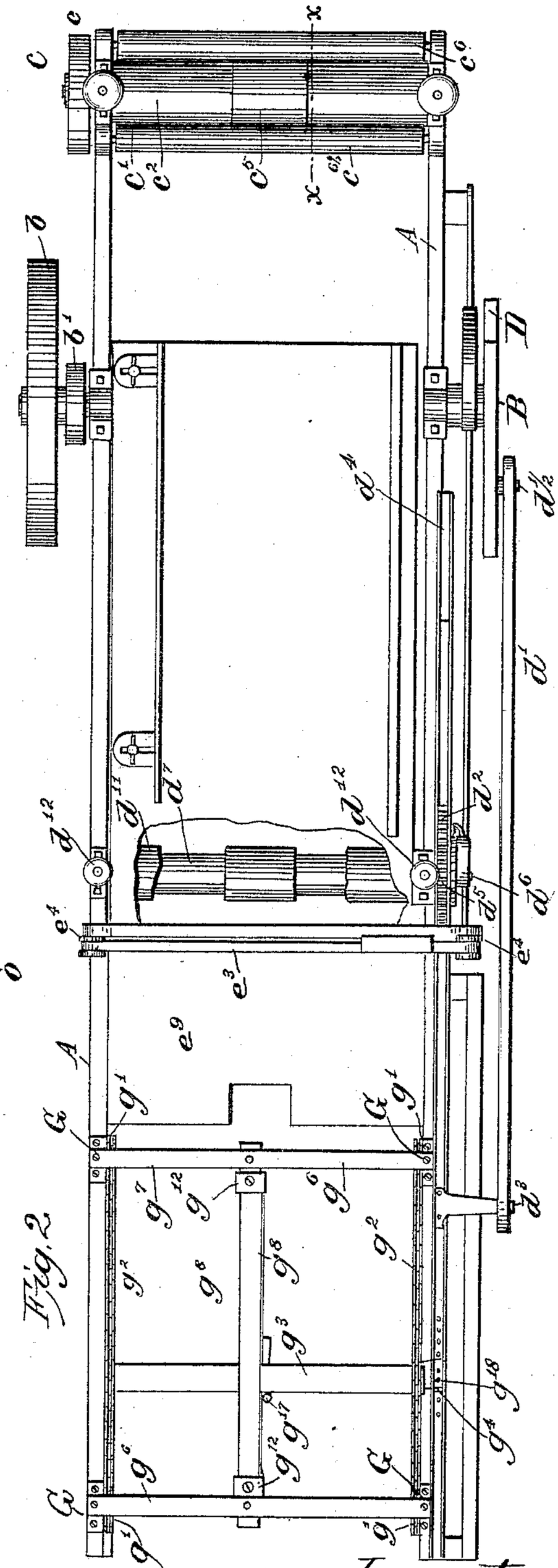

Fig. 2

Witnesses:
Lizzie Smith
S. J. W. Smith

Inventor.
Roswell T. Smith.

(No Model.) 3 Sheets—Sheet 2.

R. T. SMITH.

CARD BOARD CUTTING MACHINE.

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Fig. 3.

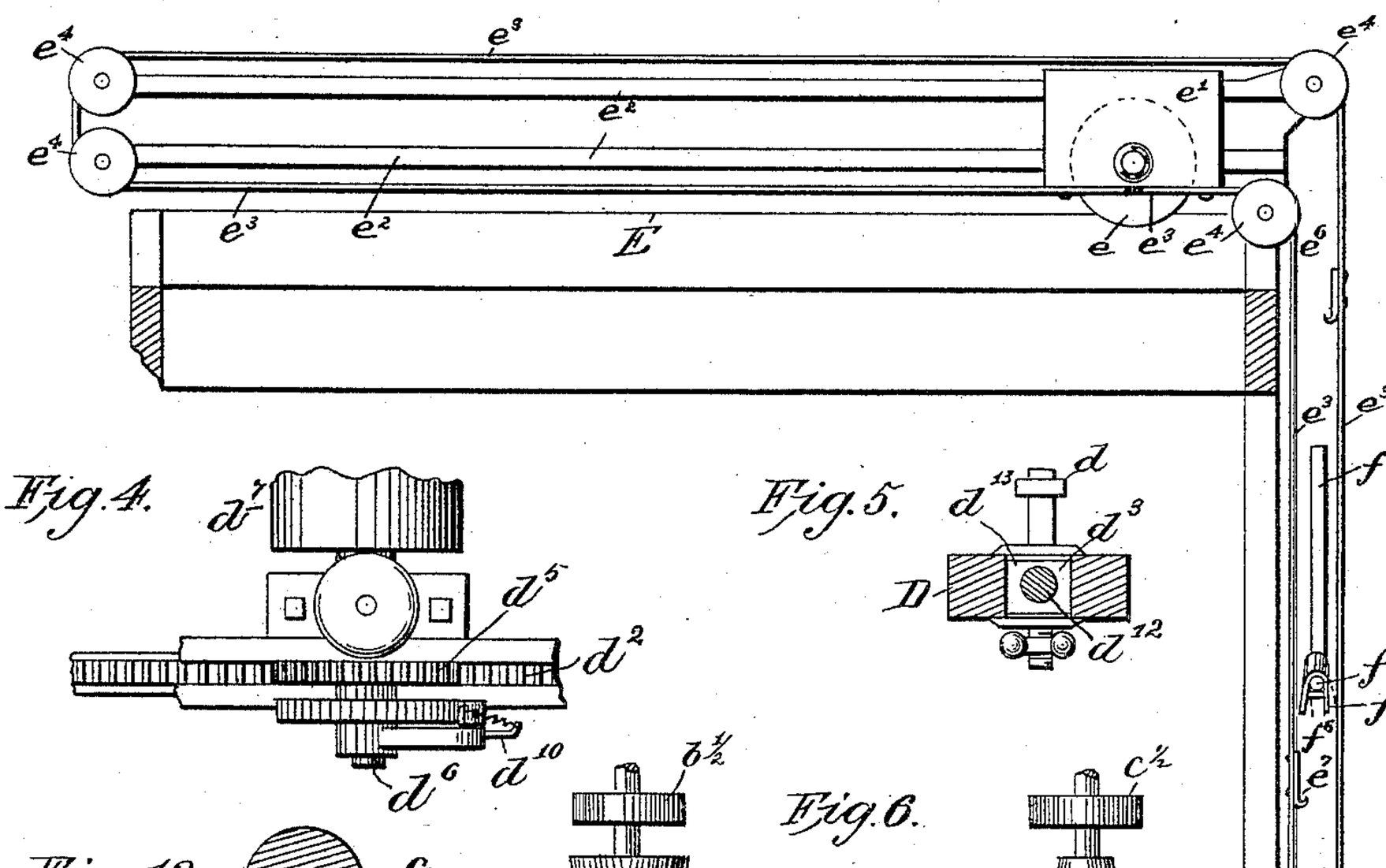


Fig. 4.

Fig. 5.

Fig. 12.

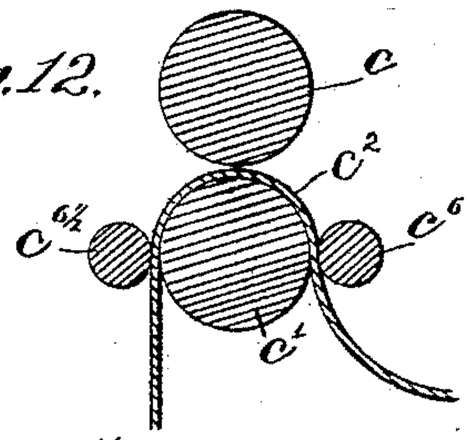


Fig. 6.

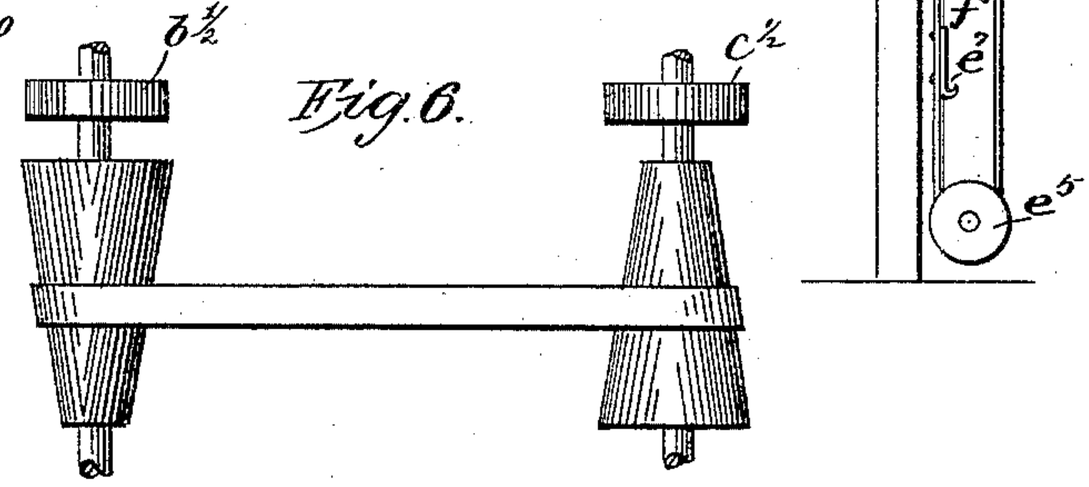


Fig. 7.

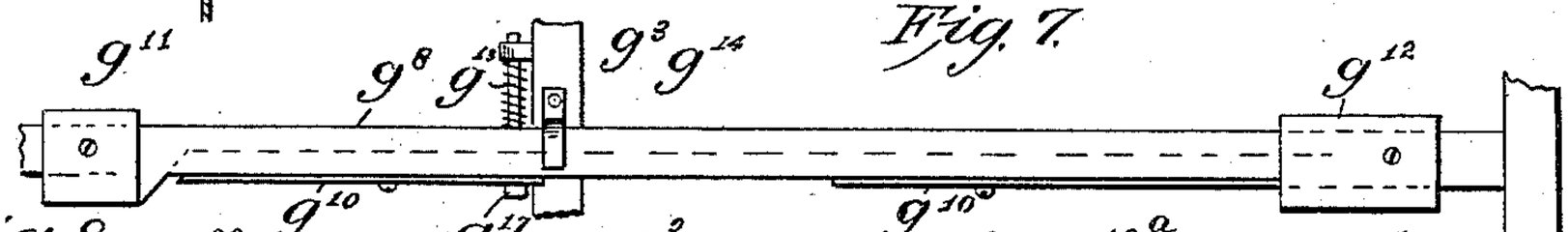


Fig. 8.

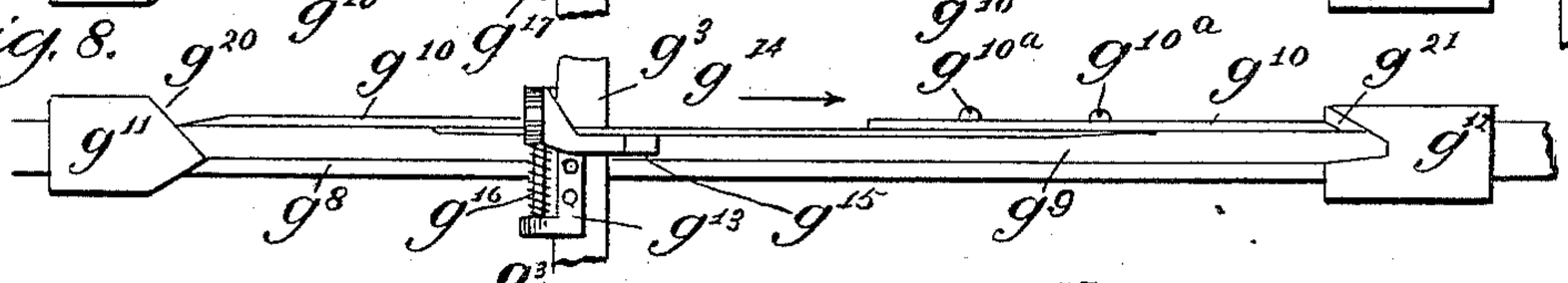


Fig. 10.

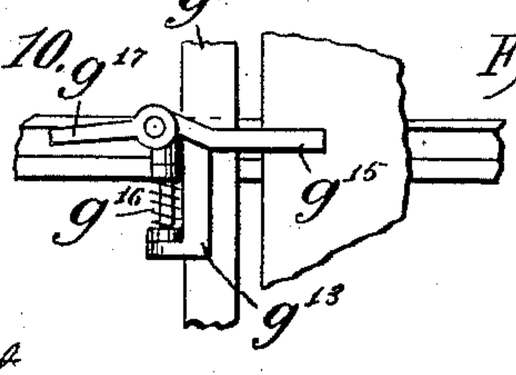
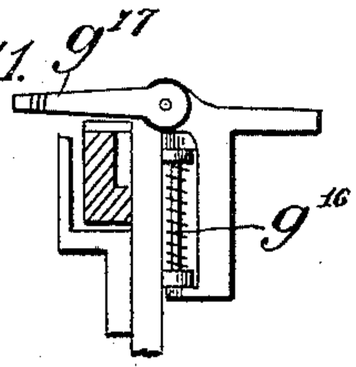


Fig. 11.



Witnesses.
Lizzie Smith
S. J. M. Smith

Inventor.
Roswell T. Smith.

(No Model.)

3 Sheets—Sheet 3.

R. T. SMITH.

CARD BOARD CUTTING MACHINE.

No. 434,958. Patented Aug. 26, 1890.

Fig. 14

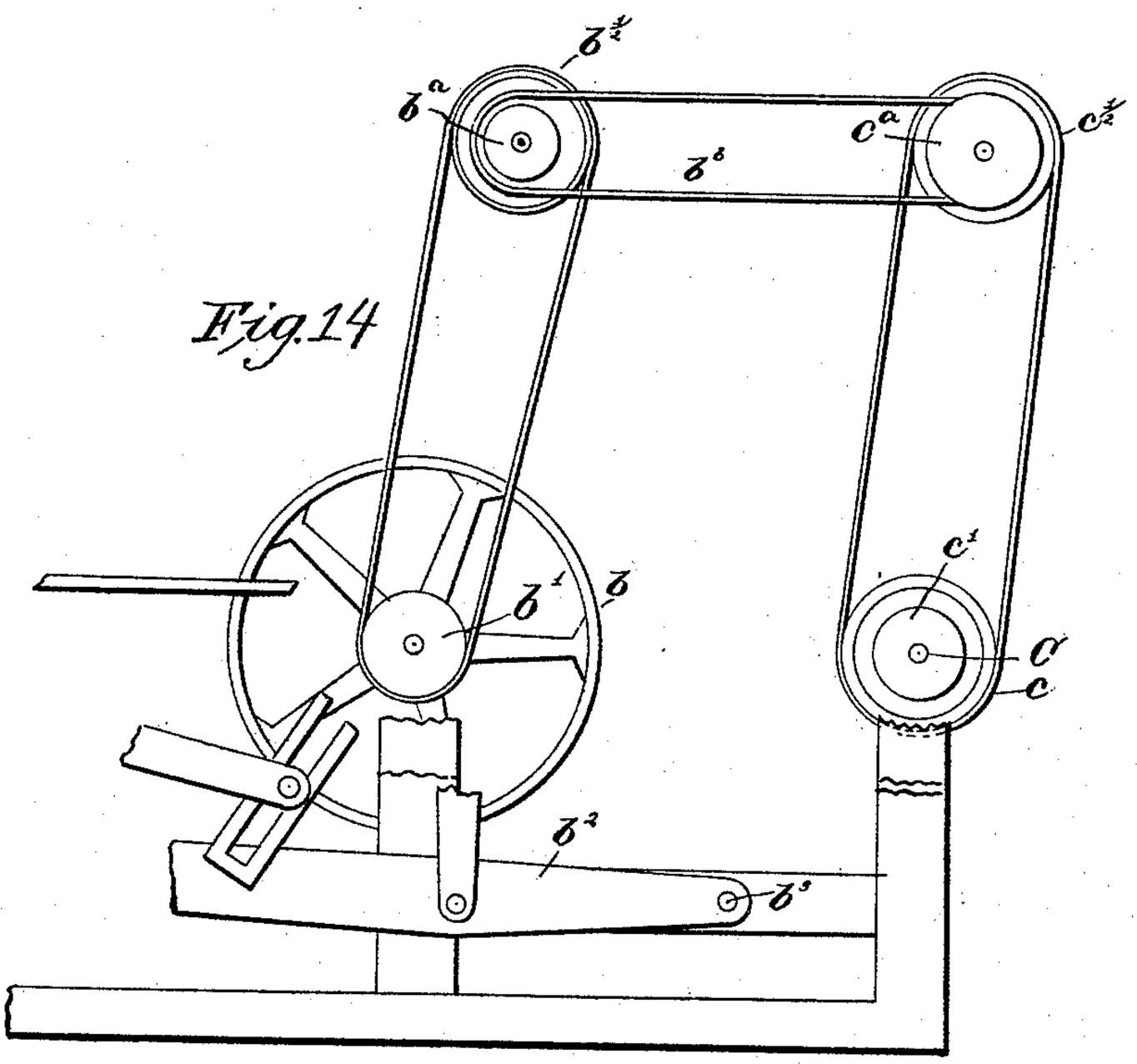


Fig. 13.

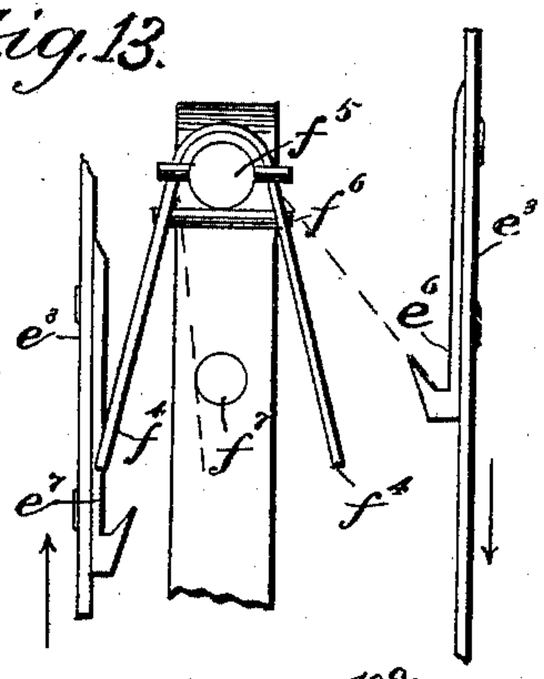


Fig. 15

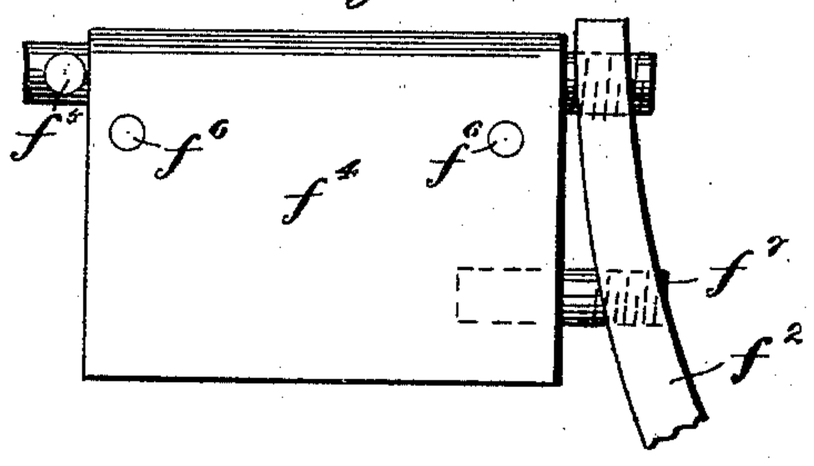
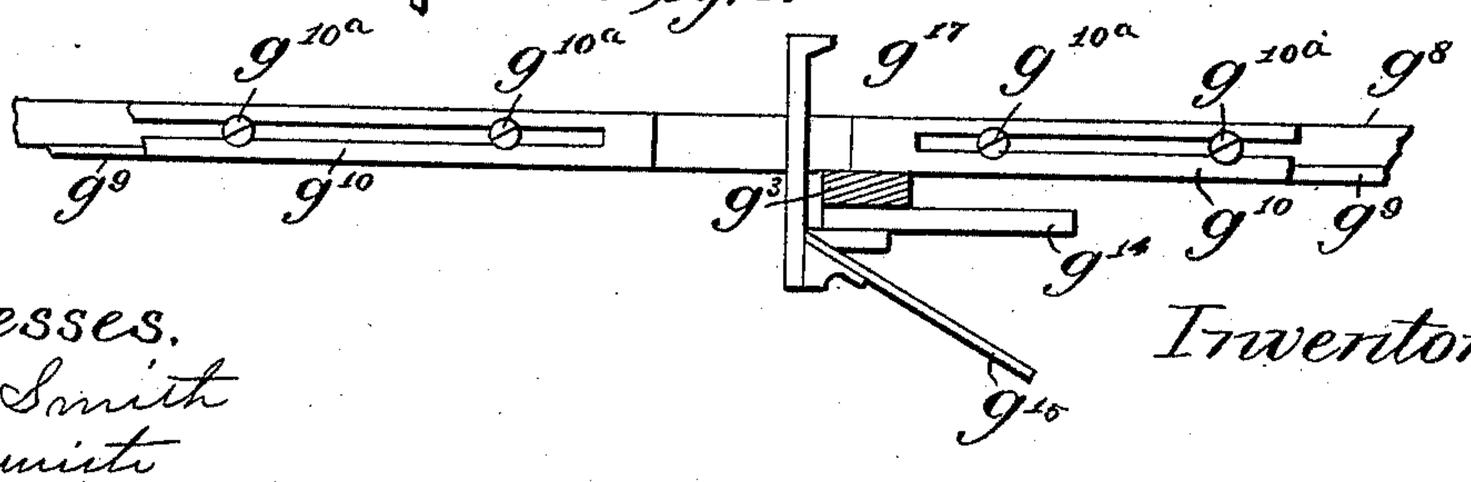


Fig. 9.



Witnesses.
Lizzie Smith
S. J. M. Smith

Inventor.
Roswell T. Smith.

UNITED STATES PATENT OFFICE.

ROSWELL T. SMITH, OF NASHUA, NEW HAMPSHIRE.

CARD-BOARD-CUTTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 434,958, dated August 26, 1890.

Application filed December 12, 1889. Serial No. 333,569. (No model.)

To all whom it may concern:

Be it known that I, ROSWELL T. SMITH, a citizen of the United States, residing at Nashua, in the county of Hillsborough and State of New Hampshire, have invented a new and useful Card-Board-Cutting Machine, of which the following is a specification.

My invention relates to improvements in machines for cutting card-board from a web into sheets and taking each sheet and placing it when cut from the web.

Card-board is usually made in the web and rolled upon a core.

The object of my invention is by a continuous movement to unroll the web, to take the curve out of the card-board, to present the same to the intermittent feeding device freed from tension and from curve, to furnish an intermittent feed for the card-board, an intermittent cutting device, and a device for taking the curved sheets, when cut, and depositing them in their proper place, making in all one continuous process from the web-roll to the package of sheets. I attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation. Fig. 2 is a plan. Fig. 3 is a section on line *o o*, showing the cutting device. Fig. 4 is a detail of intermittent feed movements. Fig. 5 is a detail of crank-pin on line *y y*. Fig. 6 shows cone-pulley for varying the speed of continuous speed. Fig. 7 is a plan of sheet-delivery. Fig. 8 is an under side view of the same. Fig. 9 is a side view of self-acting clamp. Fig. 10 is a view of same closed. Fig. 11 is a view of same open. Fig. 12 is a section of the supply-rolls and rolls for removing the curve from the web on line *x x*. Fig. 14 shows the right-hand end of Fig. 1, with parts removed, showing the cone-pulleys and their connecting-pulleys in position. Fig. 15 a plan view of the balance-catch. Fig. 13 is an end view of Fig. 15.

Similar letters refer to similar parts throughout the several views.

A represents the frame which holds the severrl working parts of my machine.

B is the driving-shaft, which receives power from the pulley *b*.

C is a shaft which, through power received from pulley *c*, revolves the roll c'. Geared to the roll c' by the gear c^3 c^4, and revolving with c', is the roll c^2. This roll has a raised portion c^5, preferably made of rubber. Each side of the roll c', I place the idle-rolls c^6 $c^{6\frac{1}{2}}$. These idle-rolls revolve through their contact with the card-board, which is forced along by rollers c' c^2, and are so placed as to compel the card-board to conform to the arc of the roll c^2, thereby removing from the card-board any strong tendency to curve in an opposite direction. These rolls c' and c^2 receive continuous motion from the pulley b' on shaft B, or from the shaft which imparts movement to said shaft B, in such a way as to secure a well-defined proportionate movement between B and C. This proportionate movement will need to vary as longer or shorter sheets are to be cut, and the device for accomplishing this result I will describe hereinafter.

Mounted upon the shaft B is crank-arm D. Extending from this arm is a pin $d'^{\frac{1}{2}}$, supporting the pitman d'. Connecting this pitman to the slide-rack d^2 is the pin d^3. The pin $d'^{\frac{1}{2}}$ is so made as to be adjustable upon the crank-arm D, as to distance from the shaft B, by means of a screw. In this way I may vary the length of the crank-arm and of the pitman-stroke, giving more or less movement to the rack. The slide-rack d^2 moves in the raceway d^4, and in its forward and backward movements revolves the gear-wheel d^5. This gear turns loosely upon the shaft d^6, which supports and moves the roll d^7.

Firmly secured to the gear d^5 is the ratch-wheel d^8, and they always move together and are both loose upon the shaft.

Rigidly secured to the shaft d^6 is the dog-arm d^9. Mounted upon this arm is the dog d^{10}, nominally impelled by a spring to engage the ratch d^8.

Lying above the roll d^7 is the roll d^{11}, which may be pressed down upon the roll d^7 by screw d^{12}.

It will be seen that when the slide-rack is impelled to the left the pinion revolves loosely upon its supporting-shaft; but when the slide-rack is impelled to the right the pinion becomes fixed upon the shaft and the rolls revolve with the pinion, and a sheet of card-board held between the rolls would be forced forward to the extent of said revo-

lution; and it is apparent that the extent of the revolution of the rolls will depend upon the length of the crank-arm, so that by varying the length of the crank-arm—that is, the distance between the pin and shaft B—I am able to control the length of feed of card-board, giving me a perfectly reliable measuring device. In the rear of these rolls I place the cutting device, which consists of the bed-cutter E, which is a fixed blade. Above this blade, passing from right to left and from left to right, is the revolving cutter *e*. This cutter is held by and moves in and with the carriage *e'*. Said carriage slides on ways e^2 e^2.

The revolving cutter is held against the fixed cutter-blade E by a spring, which is not shown. The cutter revolves as it passes along the fixed blade, and its cutting-edge, in connection with the fixed blade, acts like the two blades of the common scissors. This cutting device has been the subject of expired patents, and has been in general use for many years. The carriage has usually been propelled by hand.

To impel the carriage to make its vibrating movements, I secure to it the belt e^3. This belt I pass over the supporting idle-rolls e^4 e^4 e^4 e^4 and e^5, and I locate the rolls, as shown in Fig. 3, two at each end of the raceway e^2 and one at e^5 at a point near the floor. The belt e^3 is secured to the carriage only, and is entirely free to move upon its supporting-rolls to draw the carriage either to the right or left hand. By this arrangement of the rolls I secure a horizontal belt movement for sliding the carriage and a vertical movement for imparting power to the belt. Upon the vertical portion of this belt I place hooks e^6 e^7.

The advantage of securing a vertical vibration to the balance-catch f^4 and a horizontal movement to the carriage must be obvious, as the cam which drives the balance-catch works best upon a plane at right angles to the shaft which carries it, and said shaft would preferably be upon a horizontal plane.

Upon the shaft B, I place the cam F, with its line of projection at right angles with the center line of the crank-arm D, so that its outward movement will always be confined to one half of said crank-revolution and its return movement will be made during the other half-revolution of the crank.

Around the cam F, I place the band *f*, and from this band I extend the pitman *f'*. This pitman engages the lever f^2, which is fulcrumed at f^3, causing the free end of the lever to vibrate vertically, both up and down, at each revolution of the shaft B.

Upon the free end of the lever f^2, I place the balance-catch f^4. This catch is preferably made of sheet-steel, bent, as shown in Figs. 3 and 13, and supported by and free to turn upon pin f^5, and held from being lifted from said pin by rivet f^6.

As a guard to limit the revolving movement of the catch, I place the pin f^7, extending from the lever f^2, between the leaves of the catch, and limiting its revolving movement to the width of its opening. This catch f^4 has vertical vibration between the vertical portions of the belt e^2, and as it rises it swings upon the pivot f^5 and passes the upper hook, which is e^6, as shown, upon the belt, and in its downward movement, having through gravity returned to its normal position upon f^5, it engages said hook and forces it down to the limit of its own vibration. The drawing down of this hook draws the carriage *e'* to the left, bringing the hooks e^7 up, meeting the catch at half of its vibration, when the hook e^7 would engage the catch but for the turning of the catch upon its side as far as the pin f^7 will allow, as shown by dotted lines, Figs. 3 and 13. This turning of the catch is caused by the resistance to movement from the hook and belt. It is obvious that when the catch is turned, as indicated, the rising hook cannot engage the catch, but will freely pass it.

In Fig. 13 I show the right-hand portion of belt e^3 as farther removed from the pivot f^5 than the right-hand portion of said belt. This is because the force required to move the belt tends to swing the lever f^2 somewhat from its central position between the belts, and because the balance-catch is allowed by pin f^7 to swing to the right, so as to secure and hold its connection with the belt and hook.

After the sheet of card-board is cut from the web by the cutter *e* it rests upon the table e^9. In the rear of this table I mount upon the frame A the brackets G, which support shafts *g g*. These shafts extend from one side to the other of the frame and furnish support for the sprocket-wheels *g'*, upon which run the sprocket-chains g^2. These chains support and move the traveling cross-bar g^3, giving to it vibratory movement through connection of one of the chains with the sliding rack at g^4.

Extending from side to side of the machine and resting upon the brackets G' are the supporting-bars g^6, to which the guide-bar g^8 is secured at its ends. This slide-bar g^8 is upon its lower side rabbeted out, so as to form a channel g^9 in connection with the adjustable plates g^{10}, which form the other side of the channel and are made so that they may be adjusted to any desired length upon the slide-bar g^8. The plates g^{10} are preferably thin plates of metal having a slot, (see Fig. 9,) and which are held in place by screws g^{10a}. These screws are at a less distance apart than the length of said slot, so as to admit of longitudinal adjustment to the plate. I place the two boxes g^{11} g^{12}, made so that they can be moved and fixed, upon the slide-bar at any required distance, according to the length of card-board to be cut.

Upon the under side of the slide-bar g^3, and below where it crosses the bar g^8, I place the hinged bracket g^{13}, having a fixed clamp g^{14} and hinged clamp-jaw g^{15}, which is normally held open by a spring g^{16}.

Upon the back of the clamp-jaw g^{15}, I pivot

the arm g^{17}, so made that it may swing freely upon a plane at right angles to that on which the clamp-jaw moves. This arm projects normally upon a plane vertical to that of the bars g^8, as shown in Fig. 2.

The box g^{11}, Fig. 8, is made with an outward bevel part g^{20} and box g^{12} with an inward bevel g^{21}, so arranged that as the traveling bar g^3 brings the lever g^{17} against the box g^{12} and forces it by said contact from a vertical to a horizontal position, as shown in Fig. 10, in this way the clamp being closed the end of g^{17} is swung around into the groove g^9, where it remains until in its return movement it reaches the incline g^{20}, when it is thrown out of the groove by said incline, leaving the clamp free to open and release the sheet of card-board. The dotted lines, Fig. 9, show the clamp partly closed. I preferably make g^{14} and g^{15} springs, so as to avoid adjustment for card-board of different thicknesses. Fig. 8 shows the under side of Fig. 7 and the projection of box g^{12}, which trips the lever g^{17}. The incline g^{21}, the groove g^8, and the releasing incline g^{20} are shown therein.

The connection by which the sprocket-chain is secured to the slide-rack at g^{18} is adjustable, so as to accommodate any requirement as to sizes of card-board to be cut.

I call attention to the fact that by revolving the screw d^{12a} and sliding the block d^{13}, I can lengthen or shorten the distance the slide-rack d^2 will travel, and consequently am able to adapt it to the length of the sheet of card-board cut.

To feed the card-board to the cutting device, I use two sets of rolls. The first, on shaft C, are continuous in their movement; the second, on shaft d^6, are intermittent, feeding the card-board during one-half of the revolution of the shaft B and during the remainder of said revolution remaining stationary. Consequently if the rolls are timed right as to speed the card-board will feed through the two sets of rolls at the same rate; but as it is desirable to vary the length of card-board it becomes necessary to vary the speed of the constantly-running set of rolls. To this end I place upon the ceiling above the machine two cone-shafts. Upon one of these shafts I place the cone-pulley b^a and the pulley $b^{\frac{1}{2}}$. Upon the other shaft I place the cone c^a and pulley $c^{\frac{1}{2}}$. I arrange the cones upon the shafts in such a way that the base of each cone shall come in line with the apex of that of its fellow. I connect the two cones by a belt in the usual way, and the belt may be slid from one end of the cones by hand or by any convenient device. I connect the pulley $b^{\frac{1}{2}}$ with the pulley b by belt, and also pulley $c^{\frac{1}{2}}$ with the pulley c by belt. It is evident that by revolving b, I revolve c, and that the relative speed between b and c will depend upon the location of the belt b^6 upon the cones.

To operate my machine, I place a roll of card-board at the right hand of Fig. 1 and pass the end of it between the roll c' and c^6, c^2, $c^{6\frac{1}{2}}$, Fig. 2, taking the card-board from below instead of the top of the roll. I then revolve the rolls c' and c^3 until I pass through them enough of the card-board to reach the other set of rolls d^7 and d^{11}, and also an amount of slack that will reach nearly to the floor. I allow this slack in the card-board to prevent the probability of the intermittent rolls getting short of a supply of card-board to cut before an attendant would notice that the feed of the forward rolls was not sufficient. This passing of the card-board through the first set of rolls bends it in a direction opposite to its curve upon the roll, and leaves it with little, if any, tendency to curve.

Having secured the passage of sufficient card-board through the first set of rolls, I pass its end between the second or intermittent set of rolls. When the machine is ready for work, apply power to the driving-wheel b, which revolves the shaft B, the crank-arm D, and through the pitman d' slides the rack d^2 to the right hand and revolves the rolls d^7 through connection of the gear d^5, ratch d^8, dog d^{10}, and the arm d^9, which is rigid upon the shaft d^6. This action feeds the card-board forward to the full extent of the right-hand movement of the slide-rack, which will continue until the pitman and crank-arm are parallel to the slide-rack, at which time the cam F will be at its highest movement, and consequently the catch f^4 will reach its greatest elevation. It will be observed that I have given a definite length to the card-board so fed, and that each repetition of the same will give a feed to the card-board of exactly the same length as the first, making an exact measuring-machine. After the crank-arm has left its horizontal position the slide-rack begins to move to the left hand, the gear and ratch are left free to revolve upon the shaft d^6, and during the entire left-hand movement of the slide-rack the feed-rolls remain inactive, the cam F begins its downward stroke at the same time the rack begins its left-hand movement, and consequently the catch f^4 moves downward and engages the hook upon the belt e^3, which is uppermost, forces it down, and draws the cutter e, so as to cut the card-board projecting beyond the lower cutter. The same left-hand movement of the feed-rack, by its connection with the sprocket-chain g^2, brings the clamping device to the right and causes it to grasp the sheet as soon as it is cut, and when the process of feeding the sheet is repeated the right-hand movement of the rack forces the clamp holding the sheet to the left, where at the limit of said movement the clamp is opened and the sheet deposited. In this way I am able to cut sheets of card-board with great accuracy and rapidity.

I call attention to the fact that but a small central portion of the rolls d^7 and c^2 pass upon the web to feed it. This is because if the bearing was wide it would be impossible to bring the web into line as it fed along if once it got out of line, and also because the

edge of card-board as it comes from the web is usually fuller than the central portion, making it desirable to feed it by its more perfect or central portion. This element is necessary to the successful working of my machine.

Having described my invention, I claim—

1. In a card-board-cutting machine, in combination, an intermittent feeding device consisting of two rolls having limited contact in their central portion, and impelled to action by the movement of a rack when moving in one direction and free from action upon the return movement of the said rack, and a cutting device consisting of a cutter impelled to motion in two directions by a cam, lever, and belt-connection between the lever and the cutter, said cutter having a fixed and a revolving blade, being impelled to both movements through action of the cam-lever in its movement in one direction, said lever carrying a rocking catch adapted to form connections between the lever and belt, substantially as described.

2. In a card-board-cutting machine, the combination, with a cutting device consisting of a fixed and a movable blade, of an intermittent feeding device consisting of two rolls having limited contact in the central portion of the web, a toothed gear and ratch loosely mounted upon the shaft of one of the rolls, an arm rigidly fixed upon said roller-shaft and adapted to support a dog which may engage the said ratch and control its action in one direction, a rack-bar which shall engage the toothed gear upon the roller-shaft, a pitman giving vibratory action to the rack-bar, and a crank-arm to impel the pitman, substantially as described.

3. In a card-board-cutting machine, the combination, with a cutting device consisting of a fixed and a movable blade, of two rolls having limited contact in the central portion of the web, a toothed gear and ratch loosely mounted upon the shaft of one of the rolls, an arm rigidly fixed upon said roller-shaft and adapted to support a dog which may engage the said ratch and control its action in one direction, a rack-bar which shall engage the tooth-gear upon the roller-shaft, a pitman giving vibratory action to the rack, a crank-arm impelling the pitman, and a constant feeding device for the web, consisting of two rollers having limited contact in their central portion, substantially as described.

4. In a card-board-cutting machine, the combination, with a cutting device consisting of a fixed and a movable blade, of two rolls having limited contact in the central portion of the web, a toothed gear and ratch loosely mounted upon the shaft of one of the rolls, an arm rigidly fixed upon said roller-shaft and adapted to support a dog which may engage the said ratch and control its action in one direction, a rack-bar which shall engage the tooth-gear upon the roller-shaft, a pitman giving vibratory action to the rack, a crank-arm impelling the pitman, a constant feeding device for the web, consisting of two rollers having limited contact in their central portion, and the device for taking the curve out of the card-board, consisting of the two feed-rolls, which constitute the constant-feed device, and one or more supplementary rolls placed in such relation to one of said constant-feed rolls as to compel the card-board to conform to the arc of said roll, thereby reversing the curve left in the card-board when taken from a roll and leaving it essentially free from curve, substantially as described.

5. In a card-board-cutting machine, the combination, with a cutting device consisting of a fixed blade and a rotary cutter brought into action in two directions by a cam-impelled lever through belt-connections between the lever and the cutter, said cutter being drawn to both movements through action of the cam-lever in its movements in one direction, the connection between the lever and belt being formed by a balance-catch, of two rollers having limited connection in the central portion of the web, a toothed gear and ratch loosely mounted upon the shaft of one of the rolls, an arm fixed upon said roller-shaft and adapted to support a dog which may engage the said ratch and control its action in one direction, a rack-bar which shall engage the toothed gear upon the roller-shaft, a pitman giving vibratory action to the rack, and a crank-arm impelling the pitman, substantially as described.

6. In a card-board-cutting machine, the combination, with a cutting device consisting of a fixed blade and rotary cutter brought into action in two directions by a cam-impelled lever through belt-connection between the lever and the cutter, said cutter being drawn to both movements through action of the cam-lever in its movements in one direction, of two rollers having limited connection in the central portion of the web, a toothed gear and ratch loosely mounted upon the shaft of one of the rolls, an arm fixed upon said roller-shaft and adapted to support a dog which may engage the said ratch and control its action in one direction, a rack-bar which shall engage the toothed gear upon the roller-shaft, a pitman giving vibratory action to the rack, a crank-arm impelling the pitman, and a device consisting of a reciprocating clamp for taking and depositing the sheet when cut from the web, said clamp having a yielding or spring finger for grasping the sheet when cut, and to release it when it is brought to its proper place, substantially as described.

ROSWELL T. SMITH.

Attest:
JOS. C. WHEELER,
WM. H. FLINN.