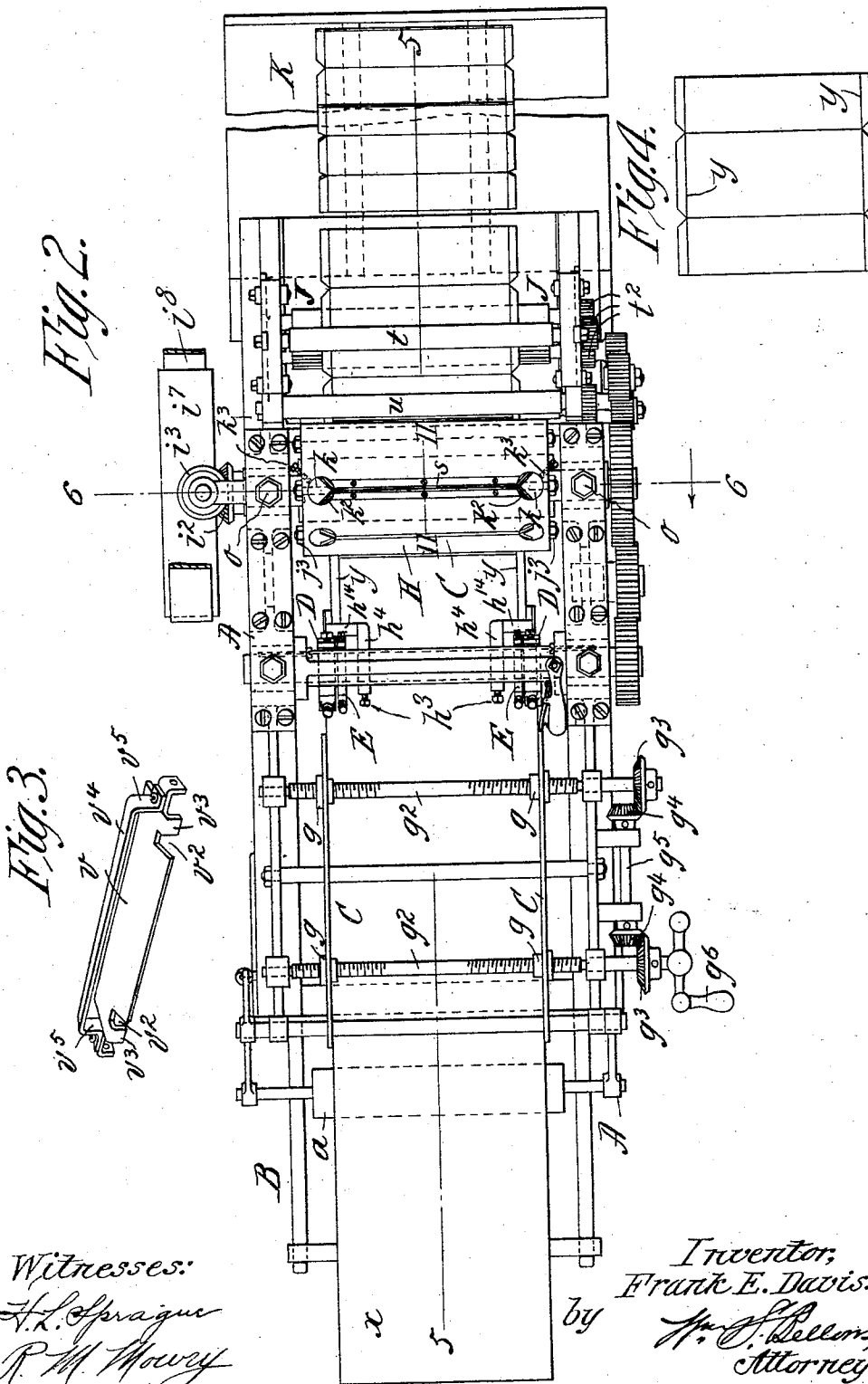


907,011.



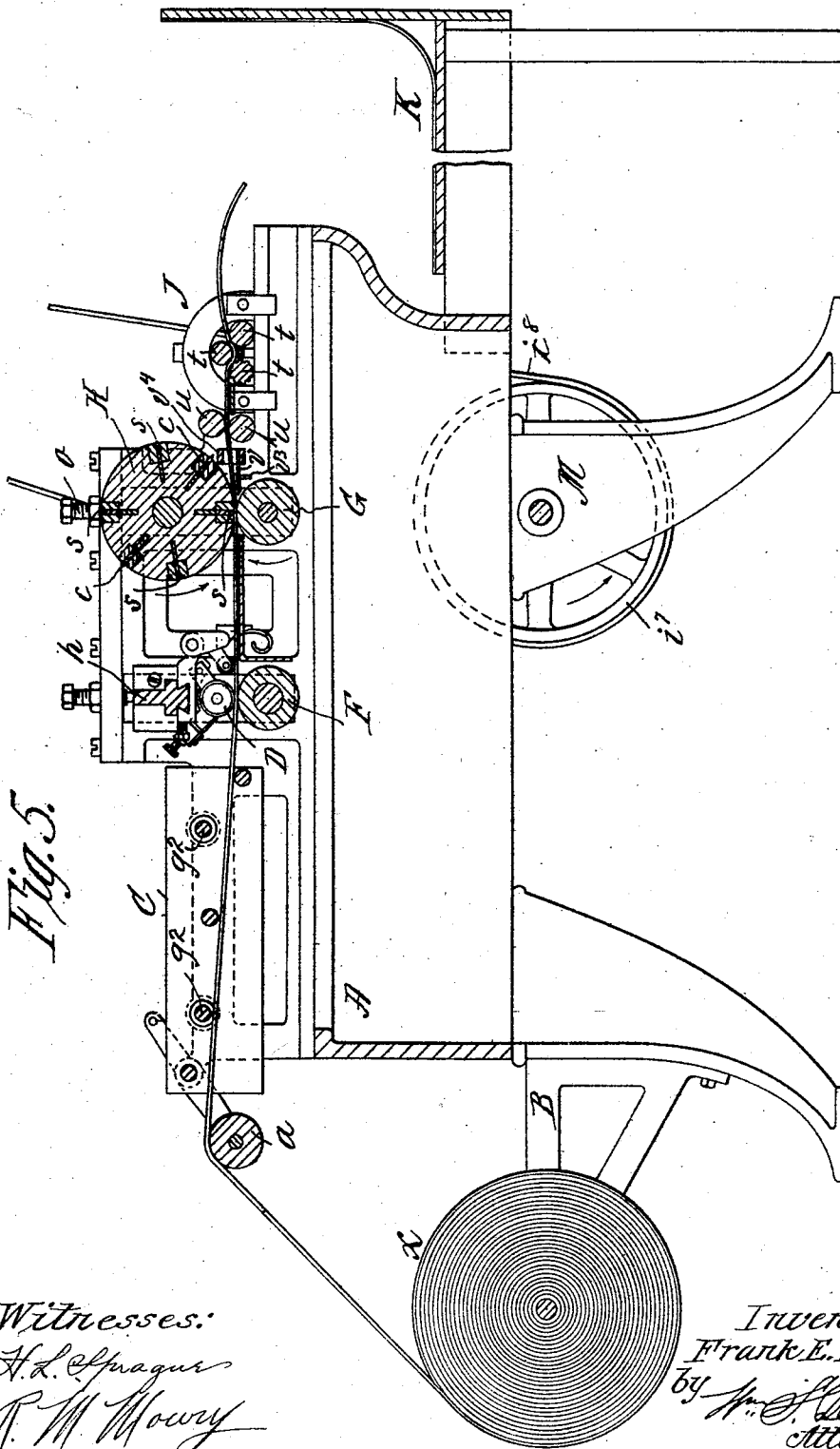
Witnesses:
H. L. Sprague
R. M. Mowry

Inventor,
Frank E. Davis.
by
H. J. Bellows
Attorney.

F. E. DAVIS.
PAPER BOX BLANK MAKING MACHINE.
APPLICATION FILED FEB. 24, 1908.

907,011.

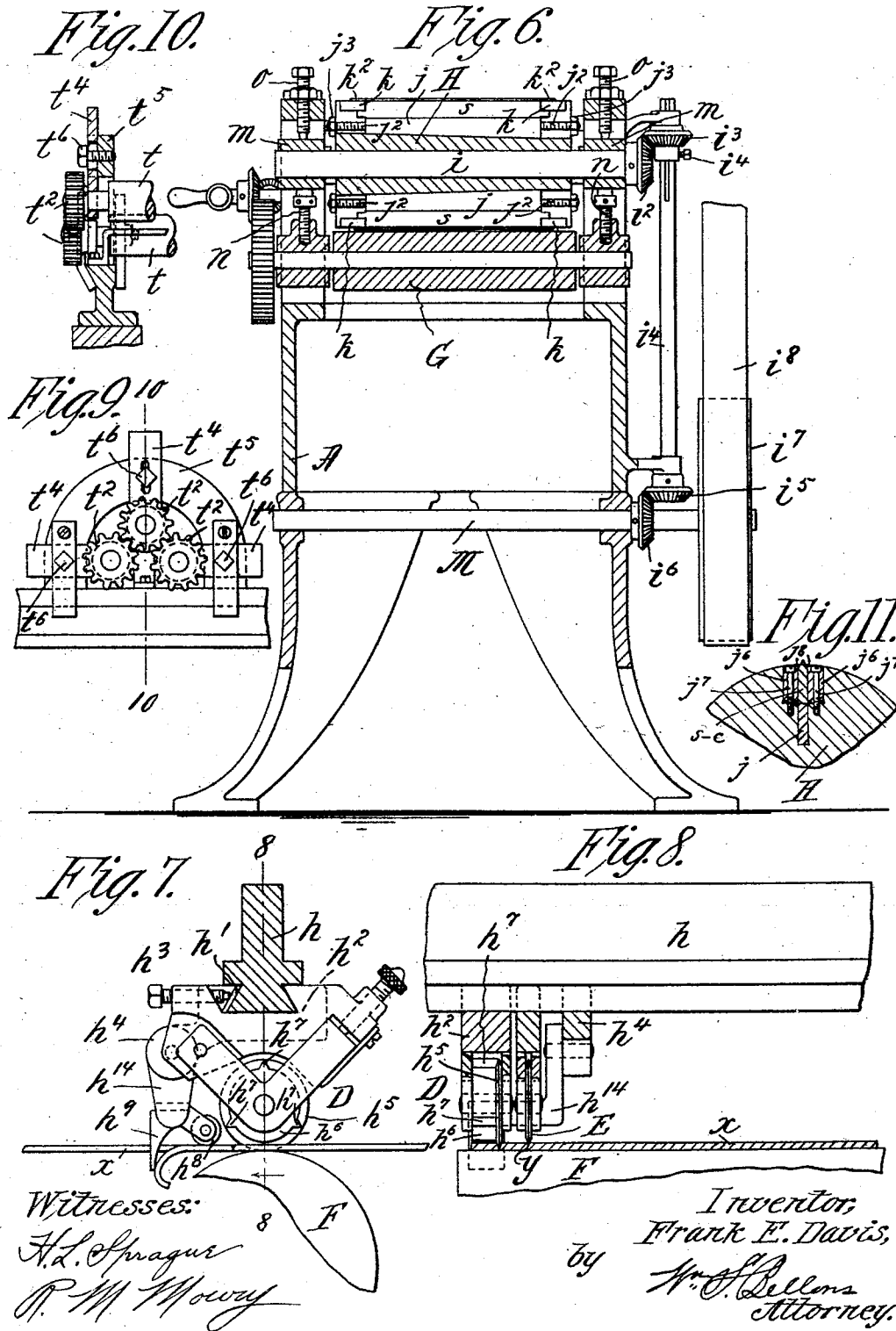
Patented Dec. 15, 1908.
4 SHEETS—SHEET 3.



F. E. DAVIS.
PAPER BOX BLANK MAKING MACHINE.
APPLICATION FILED FEB. 24, 1908.

907,011.

Patented Dec. 15, 1908.
4 SHEETS—SHEET 4.



Witnesses:
H. L. Sprague
R. M. Moway

Inventor,
Frank E. Davis,
by W. H. Bellows
Attorney.

UNITED STATES PATENT OFFICE.

FRANK E. DAVIS, OF NASHUA, NEW HAMPSHIRE, ASSIGNOR TO WILLIAM H. CAMPBELL, OF NASHUA, NEW HAMPSHIRE.

PAPER-BOX-BLANK-MAKING MACHINE.

No. 907,011.

Specification of Letters Patent.

Patented Dec. 15, 1908.

Application filed February 24, 1908. Serial No. 417,435.

To all whom it may concern:

Be it known that I, FRANK E. DAVIS, a citizen of the United States of America, and resident of Nashua, in the county of Hills-boro and State of New Hampshire, have in-
vented certain new and useful Improvements in Paper-Box-Blank-Making Machines, of which the following is a full, clear, and exact description.

10 This invention relates to improvements in a machine for producing, from proper stock such as pasteboard, millboard, or the like, forwardly drawn off from a supply roll, blanks, for constituting the bodies of boxes,
15 which are scored longitudinally relatively to the running length of the stock at short distances from their edges, and also scored transversely relatively to such running line, and have triangular pieces or miters cut
20 from the blanks at the ends of the transverse scoring lines,—the form of blank being represented in Fig. 4 of the drawing forming part of this specification.

Inasmuch as it is impracticable, generally,
25 to obtain stock in large heavy rolls from the mill of exactly the width corresponding to that of one of the blanks, this invention comprises means for longitudinally slitting or removing the narrow surplus edge portions
30 of the board preparatory to the subjecting of the latter to the action of the scoring and mitering rolls, which latter also cut the running stock transversely at regular intervals into properly dimensioned portions for the
35 box blanks. And in order that the narrow, trimmed-off edge portions of the running board may be prevented from being forwardly fed from the part of the machine at which the trimming is accomplished, to the
40 scoring mitering and cutting-off rolls, whereby, especially if such trimmed-off stock became doubled on itself as it has the tendency to do, the machine would become clogged and injured, the improved machine
45 includes means associated with the trimming tools or disk cutters for cross scoring or cutting the narrow trimmed-off strips into short lengths and for guiding the trimmed and cross severed material downwardly to
50 the floor near the points of the trimming and severing operations.

The machine, furthermore, has combined therein opposite adjustable side guides for the running strip, and means for simultane-
55 ously adjusting both of such guides whereby

they will have positions either nearer to or further from each other, accordingly as comparatively narrow or wide strip material is fed into and through the machine.

The machine furthermore comprises im-
proved cross scoring, edge mitering and
cutting-off mechanism having in operative
relation thereto new and advantageous
guards and guides for causing the triangular
miters or cut-out pieces of the stock to pass
60 forwardly and downwardly from the scoring and mitering rolls, and also a set of rolls operative for causing the made and cut-off blank in its passage therethrough to
65 be subjected to a temporary bending action whereby the natural curvature of the stock which is inherent therein by reason of having been wound into the form of the supply roll and having remained in such wound condition, is removed, with the result that
70 the delivered blanks will be forwardly thrown and piled up on a receiving table in satisfactorily flat condition, instead of being delivered in crowned or arched forms; and
75 in order that the relations of the straightening rolls may be varied accordingly as to whether the stock may require a gentle or a very decided straightening action, such rolls
80 are mounted in adjustable journals or carriers therefor, enabling the changed rela-
85 tions thereof to be accomplished without affecting, or being affected by, the driving gearing therefor. And the invention consists in the combinations and arrangements
90 of parts and the constructions of certain of the parts all substantially as hereinafter described in conjunction with the accompanying drawings and set forth in the claims.

In the drawings,—Figure 1 is a side elevation of the improved paper box blank making machine; Fig. 2 is a plan view of the same; Fig. 3 is a perspective view showing the details of construction of a guard and guiding device which is provided slightly
95 in advance of the cross scoring mitering mechanism; Fig. 4 is a plan view of one of the blanks, which is of a common form, such as produced in this machine; Fig. 5 is a central vertical longitudinal section of the machine as taken on line 5—5, Fig. 2. Fig.
100 6 is a vertical cross sectional view as taken on line 6—6, Fig. 2. Fig. 7 is a side view on a larger scale showing the aforementioned device for edge trimming the supply strip for cross scoring or cross cutting the
110

trimmed-off surplus and for guiding the same downwardly; Fig. 8 is an elevation of the same. Fig. 9 is an elevation showing the adjustable mounting for the straightening rolls; Fig. 10 is a sectional view on line 10—10, Fig. 9. Fig. 11 is a partial cross sectional view through the scoring cylinder, showing certain structural details herein-after referred to.

In the drawings,—A represents the frame of the machine of design and dimension having fitness to the purpose, B represents a bracket support for the supply roll α of the cardboard from which the blanks are to be produced, C C represent the upright, longitudinally ranging and parallel, transversely adjustable guide plates for the supply strip to the rear of which is a guide roll a ; D D represent the devices for trimming the surplus from the edges of the generally too wide supply strip for bringing the strip to the exact width from which box blanks of predetermined size will be produced, this device also having the capability of cross scoring or breaking the narrow edge waste portions of the material into short lengths, and guiding the same downwardly; and alongside the latter are the scorers E for producing the scoring lines y longitudinally in the running strip at short distances within their edges; F indicates the first bed roll, that is the one on which the devices D D and E E have their coaction; G represents the second bed roll at the level, and in advance of, the first bed roll F, peripherally coacting with which is the roll or cylinder H, having at its periphery and parallel with its axis scoring ribs s , mitering dies or triangular cutting tools k^2 , and blades c for cutting off the trimmed longitudinally scored, mitered and cross scored blanks; at J will be seen the adjustable, geared together, straightening rolls for taking out the curvature natural in the stock, by reason of the same having been in wound condition for a considerable time in the supply roll; and K represents the delivery table onto which the blanks are thrown by the momentum acquired in their passage through the feed roller devices of the machine.

The aforementioned side guiding plates C C have hub enlargements g which are screw threaded and are in substance nuts engaging through which are right and left hand screw threaded shafts g^2 , both of which at one side of the machine are equipped with bevel gear wheels g^3 , meshing with which are bevel gear wheels g^4 , on longitudinal shaft g^5 ,—one of the shafts g^2 also having at an end thereof a crank handle g^6 for conveniently turning it.

The guide plates C C being originally adjusted at equal distances from the central longitudinal line of the machine, it is only necessary, in order to widen or decrease the

space between them to accord with the width of the strip material to be passed and guided through the machine, to turn the crank handle g^6 in the proper direction, whereupon the plates will be simultaneously moved at equal speeds and distances either towards or away from each other.

The bed roll F is properly forward of the edge guide plates C C, and above this bed roll is a girder-like cross bar h on which are mounted the means of my devising, and generally represented by D, for cutting off narrow edge portions of the supply strip, cross cutting the same at short intervals, and having adjacent thereto devices serving as guards and guides for directing the waste cuttings downwardly onto the floor at the intermediate part of the machine and behind the scoring and mitering mechanism. Each one of these duplicated devices D, as particularly shown in Figs. 7 and 8, comprises a bracket like fixture h^2 secured by set screw h^3 and gib h^4 on the dove-tail shaped lower portion of the supporting cross bar h ; and this fixture or bracket h^2 has thereon a rotary element comprising a disk slitter h^5 , and a hub h^6 outside of said slitter made with a plurality of cross cutting or stock breaking ribs h^7 .

The slitting disk-like edge has a running bearing circumferentially on the bed roll f and the transverse cutting or stock breaking ribs h^7 likewise successively come to proximity or actual contact against the bed roll F next outside of the trimming slitter h^5 , and the trimmed off and cross creased or broken waste runs forwardly, a short distance only, whereupon it comes to contact with a small roller h^8 and is directed downwardly by the guide piece h^9 having a forwardly and downwardly curved face, as shown in Fig. 7. Next within the above described trimming slitters and waste breaking devices, and adjustably mounted on the cross bar h are a pair of the well known "Robinson scoring attachments" E, E, which impart the scorings y in the running length of the supply strip at short distances within the concurrently trimmed edges.

The roll h and curved faced guard and guide h^9 at each side of the machine are as to each set of such roll and guide guard carried on a separate bracket h^4 sustained by the cross bar h transversely inside of the location of each Robinson scoring attachment, said bracket arm being made with an outwardly projecting horizontal arm h^{14} which extends horizontally crosswise forwardly of the trimming slitter and cross breaking ribbed wheel h^5 , h^6 , and h^7 , and supports the roll h^8 and curved faced guard and guide forward of and in the longitudinal vertical plane of rotation of the said slitting or waste trimming and cross breaking device.

The scoring and cutting off roll H is car-

ried on a shaft i and positively driven by the bevel gear wheel i^2 which meshes with a bevel gear wheel i^3 adjustable by reason of a spline engagement along the vertical shaft i^4 on which such bevel gear wheel i^3 is secured, when adjusted, by the set screw i^5 . The said shaft i^4 is by bevel gearing i^5 i^6 driven from the driving shaft M of the machine by pulley and belt i^7 and i^8 . The said roll or cylinder H carries scoring ribs s s and cut-off ribs or blades c c , the latter being diametrically opposite, while the arrangements, around the circumference of the roll H of the scoring ribs is such as to give the scorings transversely of the line of travel of the strip at the proper distances from the edges of the blank as determined by the cutting-off blades; and as the machine is constructed and here shown, the one cylinder has a pair of the scoring ribs at each half thereof between the diametrically opposite cutting-off blades so that during each complete rotation of the cylinder two complete blanks are scored and severed.

The cylinder as shown in Figs. 5 and 6, is made with deep grooves or channels from end to end, the bases of which in extending from one end of the cylinder to the other are inclined slightly towards the axis of the latter.

The scoring and cutting-off blades or plates having inner and outer parallel edges are bottomed upon different plates j , the outer edges of which are parallel with the axis of the roll, while the inner edges thereof are inclined or tapered corresponding to the inclination of the bases of the channels in the cylinder. The said bars or plates j have screw threaded stems j^2 at their opposite ends which protrude outwardly beyond the ends of the cylinder and receive adjusting nuts j^3 thereon so that by loosening the nut at one end and turning up the nut at the other, the tapered edge bars may be drawn endwise within the channel therefor and cause an adjustment either in an inward or outward direction of the blade.

The scoring blades s as shown in Fig. 6 are made step-shaped at their end portions and the cylinder, near the opposite ends of each blade receiving channel is made with a cylindrical socket, in which is received a correspondingly shaped block or plug k having the mitering or V-shaped die k^2 at its outer surface and which plug or block bottoms on the outer step-shaped end of the scoring blade and is held in its adjustment, and also serves to hold the blade in its place in the cylinder by the obliquely applied set screw k^3 , Fig. 2, inserted from the end of the cylinder.

The scoring blades and the cutting off blades are similarly held in the grooved cylinder by means particularly shown in Fig. 11. The grooves are made widened and

with step-shaped seats between their bases and mouths, and on such step-shaped seats, and at each side of the scoring or cutting blade are disposed a pair of retaining strips j^6 , j^6 , which have inturned beveled lips or flanges j^8 approached at their outer edges to engage the V-shaped edge of the inwardly and outwardly adjustable scoring or cutting blade s or c . These strips are held in place by headed screws j^7 , the shanks of which pass loosely through them with screw engagements into the body of the cylinder at the step formed or shouldered portions thereof.

The shaft i on which the cylinder h is carried is supported in journal boxes m , as shown in Figs. 1 and 6, and such blocks are adjustably supported and confined between screws n on which the blocks rest and which screws engage into side members of the frame and the screws o which also engage through side members of the frame above the journal boxes, have bearings by their lower ends against the tops of the boxes. The cylinder carrying shaft i may, therefore, be adjusted in proper relation to the bed roll g with which it coacts so that the cut-off blades c c and the mitering dies k^2 in their revolutions will come to actual contact against the bed roll for entirely severing the stock, while the scoring blades s s which protrude slightly less beyond the perimeter of the cylinder do not quite bottom against the bed roll, but approach the latter sufficiently near to produce the suitably deep scorings in the stock.

With the vertical bodily adjustment of the cylinder relatively to the bed roll and the capabilities for adjustment of the scoring blades above described, the machine may be expeditiously placed in proper condition of adjustment for the accomplishment of entirely satisfactory scoring, mitering and cutting off of the blanks.

Inasmuch as the machine is required frequently to be adapted for the production of blanks the sizes of which vary within a considerable range, it is quite often necessary to substitute one scoring and cutting cylinder H , carrying as a permanent appurtenance thereof the bevel gear wheel i^2 , for another of different diameter, but similarly equipped with the bevel gear wheel at its one end; and in order that the driving bevel gear wheel on the vertical shaft i^4 may always properly mesh with the bevel gear wheel i^2 at the end of the cylinder, the spline engagement and set screw confinement of the gear wheel i^3 on the shaft i^4 is a measure of considerable practical convenience.

The straightening rolls, the location of which is indicated at J , comprises a set or series of three axially parallel and transversely mounted rolls t t t , and in triangular arrangement, a line between two of the rolls forming the base while the third roll is at

a higher point and in a vertical line between two base rolls; and these rolls which are geared together at their ends by the spur gear wheels t^2 and driven from a train of gearing t^3 from the bed roll G have their journals at each end fitted through blocks or bars t^4 which are adjustable, two thereof horizontally and in line with each other, and the third one in line at right angles thereto through slideways therefor in a semicircular bracket t^5 mounted at each side of the machine suitably forward of the scoring mechanism.

The bars or straightening roll carriers t^4 are held in confinement by the set screws t^6 ; and as manifest it is an easy matter to adjust the two lower rolls towards or further from each other and to adjust the third or apex roll so that the lower surface thereof is much or little, as desired, below the level of the upper surfaces of the base rolls to insure a comparatively slight or extreme bowing of the blanks fed forwardly through the straightening rolls, reversely of the bowing which the blanks have by reason of having been in wound condition on the supply roll x .

Between the scoring and cutting-off mechanism comprised by cylinder H and bed roll G and the straightening rolls is a pair of feed rolls $u u$ operated by gears in the train t^3 between the bed roll and straightening rolls; and just to the rear of the said feed rolls $u u$ is an appliance such as represented in section in Fig. 5 and in perspective in Fig. 3, the same consisting of a plate v extending from one side of the machine to the other, the rear edge of which, except at its extreme end portions, is in proximity or actual contact with the bed roller near the point where the cylinder is peripherally in contact therewith, but at the end portions this plate is slitted, as shown at v^2 , and outside of the slit it has down-turned members v^3 , the positions of which are opposite the points of operation of the mitering dies k^2 , k^2 , and thus the blank is guided properly horizontally forwardly with free spaces adjacent the edges of the blank for the clearance of the small triangular bits of cardboard which are cut out by the mitering dies. And in order to prevent the blank from unduly rising so that it would not properly proceed to the nipping action of the rolls $u u$, the appliance aforementioned, as shown in Fig. 3, comprises a crosswise extending bar v^4 sustained by right angular risers or end members v^5 held by screws to the plate b which latter in turn is screwed or clamped on the opposite side members of the frame.

I claim:—

1. In a machine for making paper box blanks, in combination, a frame, a support at the rear thereof for a supply roll of strip material, cross scoring and cutting off rolls,

mounted at a forward portion of the machine, a bed-roll transversely mounted to the rear of the scoring and cutting-off rolls, and a transverse supporting bar above the bed roll, and edge-trimming slitters mounted on and depending below said bar, coacting with said bed roll at opposite sides of the machine and having at the outer side thereof ribs also coacting with the bed roll for transversely breaking the trimmed-off edge portions of the strip material.

2. In a machine for making paper box blanks, in combination, a frame, a support at the rear thereof for a supply roll of strip material, cross scoring and cutting off rolls, mounted at a forward portion of the machine, a bed-roll transversely mounted to the rear of the scoring and cutting off rolls, and a transverse supporting bar above the bed roll, brackets mounted on and depending below said bar at the opposite side portions of the machine, carrying rotative elements coacting with the bed roll, each thereof comprising a circular, edge-trimming, slitting edge, and a cylindrical hub outwardly beyond such slitting edge having transverse, radially projecting, ribs at intervals around its periphery.

3. In a machine for making paper box blanks, in combination, a frame, a support at the rear thereof for a supply roll of strip material, scoring and cutting off rolls, mounted at a forward portion of the machine, a bed roll transversely mounted to the rear of the scoring and cutting off roll, and a transverse supporting bar above the bed roll, edge trimming slitters mounted on and depending below said bar, coacting with the bed roll at the opposite side portions of the machine and having cylindrical hubs at the outer sides thereof provided with radial ribs also coacting with the bed roll for transversely breaking the trimmed off portions of the strip material, disks for longitudinally scoring the traveling strip material sustained by said transverse bar inside of the edge trimming slitters, and depending brackets mounted on said transverse bar, inside of the scoring disks, having lower members horizontally and outwardly extending adjacent but forward of the edge trimming slitters and ribbed hubs, and provided with guards h^9 having downwardly and forwardly inclined guiding faces.

4. In a machine for making paper box blanks, in combination, a frame, a support at the rear thereof for a supply roll of strip material, scoring and cutting off rolls, mounted at a forward portion of the machine, a bed roll transversely mounted to the rear of the scoring and cutting off rolls, and a transverse supporting bar above the bed roll, edge trimming slitters mounted on and depending below said bar, coacting with the bed roll at the opposite side portions of the

machine and having cylindrical hubs at the outer sides thereof provided with radial ribs also coacting with the bed roll for transversely breaking the trimmed off portions of the strip material, disks for longitudinally scoring the traveling strip material sustained by said transverse bar inside of the edge trimming slitters, and depending brackets mounted on said transverse bar, inside of the scoring disks, having lower members horizontally and outwardly extending adjacent but forward of the edge trimming slitters and ribbed hubs, and provided with guards ^h having downwardly and forwardly inclined guiding faces, and a roll supported by each said horizontal member between said radially ribbed hub and the inclined faced guard.

5. In a paper box blank making machine, the combination with a rotary bed roll, of a scoring roll or cylinder having deep longitudinal grooves opening to its periphery, having inclined bases, and made with outwardly opening sockets near the ends of the grooves, bars having inclined inner edges, sunk within said grooves and provided with screw threaded projections endwise extending beyond the ends of the cylinder, nuts screwing on said projections and engaging against the ends of the cylinder, scoring blades, having step shaped ends, disposed in the said grooves, bottomed against the said bars and edgewise protruding beyond the periphery of the cylinder, blocks sunk in said sockets, bottomed on the step shaped ends of the scoring blades, and having mitering dies at their exposed outer portions, set screws penetrating end portions of the cylinder and engaging against said blocks, and cutting off blades longitudinally carried by the cylinder at suitable positions between the lines of the scoring blades and mitering dies.

6. In a paper box blank making machine, in combination, a transversely arranged bed roll, a cylinder having scoring blades, mitering dies at the ends thereof and cutting off blades, and provided with end journals, with a bevel gear wheel on one thereof, supports for said journals, a vertical shaft, and means for rotatively driving it, and a bevel gear wheel to mesh with said cylinder bevel gear wheel, spline engaged and adjustable axially on said shaft, and a set screw for confining it in its adjusted position on the latter.

7. In a paper box blank making machine, in combination, a transversely arranged bed roll, a cylinder having scoring blades, mitering dies at the ends of such blades and cut-

ting-off blades, provided with end journals, with a bevel gear wheel on one thereof, journal boxes for said journals, means for vertically adjusting them, a horizontal driving shaft, a vertical shaft at the side of the machine bevel geared to the driving shaft and having at an upper portion thereof a bevel gear wheel, to mesh with the cylinder bevel gear wheel, spline engaged, and adjustable axially on said vertical shaft, and a set screw for confining the latter named bevel gear in its adjusted position on said vertical shaft.

8. In a paper box blank making machine, the combination with a bed roll and a scoring, mitering and cutting-off cylinder adjacent and coacting therewith, of a pair of feed rolls forward of the said bed roll and cylinder, and a horizontal transversely extending plate having its rear edge in proximity to the bed roll slightly near the upper surface thereof and having recesses in the rear end portions thereof adjacent the paths of revoluble movement of the mitering cutters.

9. In a paper box blank making machine, the combination with a bed roll and a cylinder having scoring blades, endwise located mitering dies and cutting-off blades, of a pair of feed rolls forward of such roll and cylinder and a plate transversely extending from side to side of the machine, having its location near the level of the upper surface of the bed roll and having near its end portions longitudinal slits extending to its rear edge and having portions ^v thereof outside of said slits downwardly turned.

10. In a box blank making machine, the combination with the bed roll and a scoring, mitering and cutting off cylinder, of triple blank straightening rolls forward of the bed roll and cylinder, which in their transverse aspect are arranged in triangular form, opposite side supporting brackets and carrier bars in the inner ends of which said straightening rolls are journaled, two of which carrier bars are adjustable horizontally and longitudinally in alinement towards and from each other, while the third carrier bar is adjustable vertically nearer or further from the axes of the two lower rolls, and means for confining said carrier bars in their adjusted positions in the side brackets.

Signed by me at Nashua, N. H., this 12th day of February 1908.

FRANK E. DAVIS.

Witnesses:

IVORY C. EATON,
LENA F. PRICHARD.