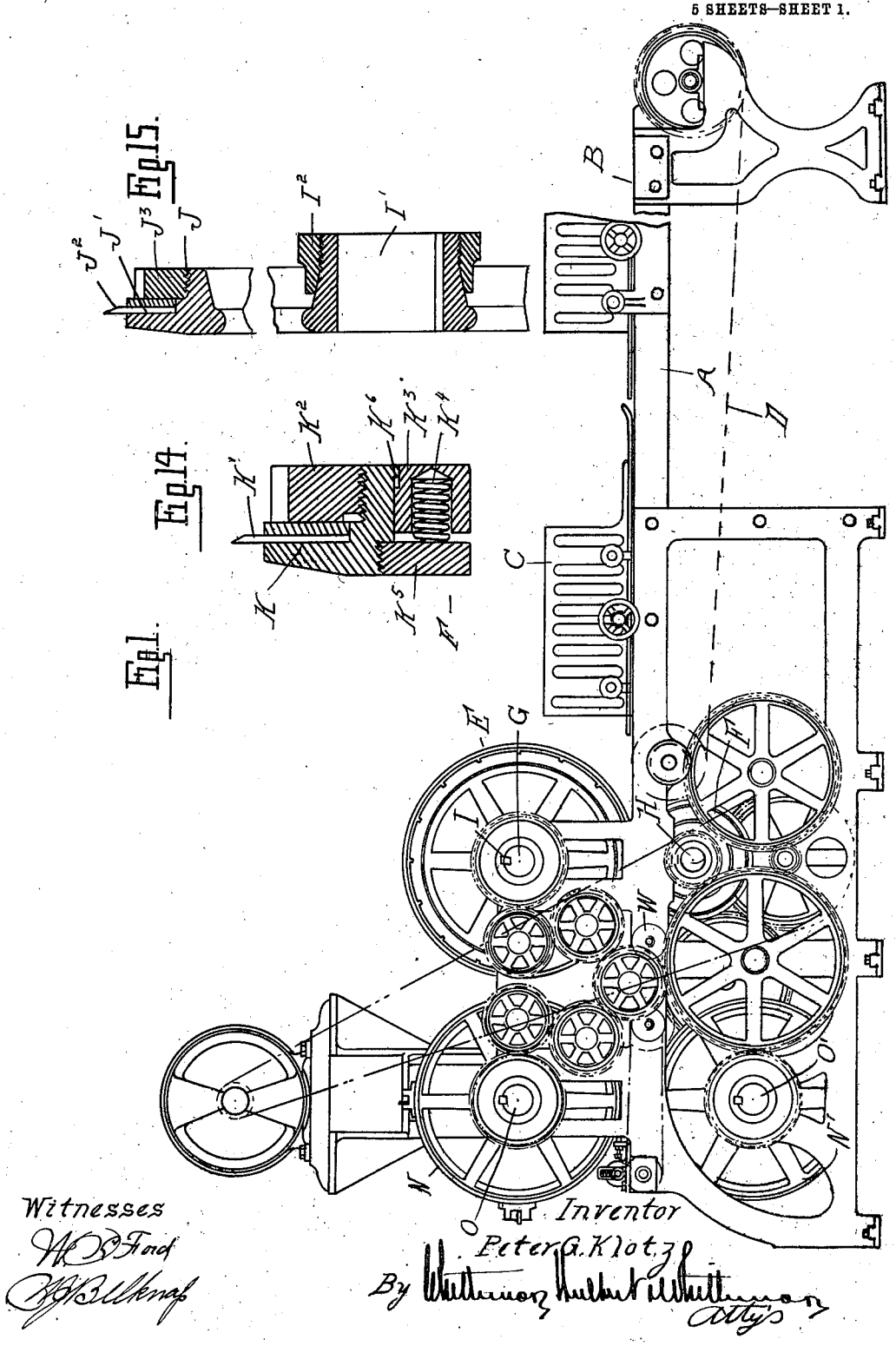
P. G. KLOTZ.

MACHINE FOR MANUFACTURING PAPER BOXES AND CARTONS.

APPLICATION FILED MAR. 12, 1910.

1,046,078. **Patented Dec. 3, 1912.**

5 SHEETS—SHEET 1.



Witnesses

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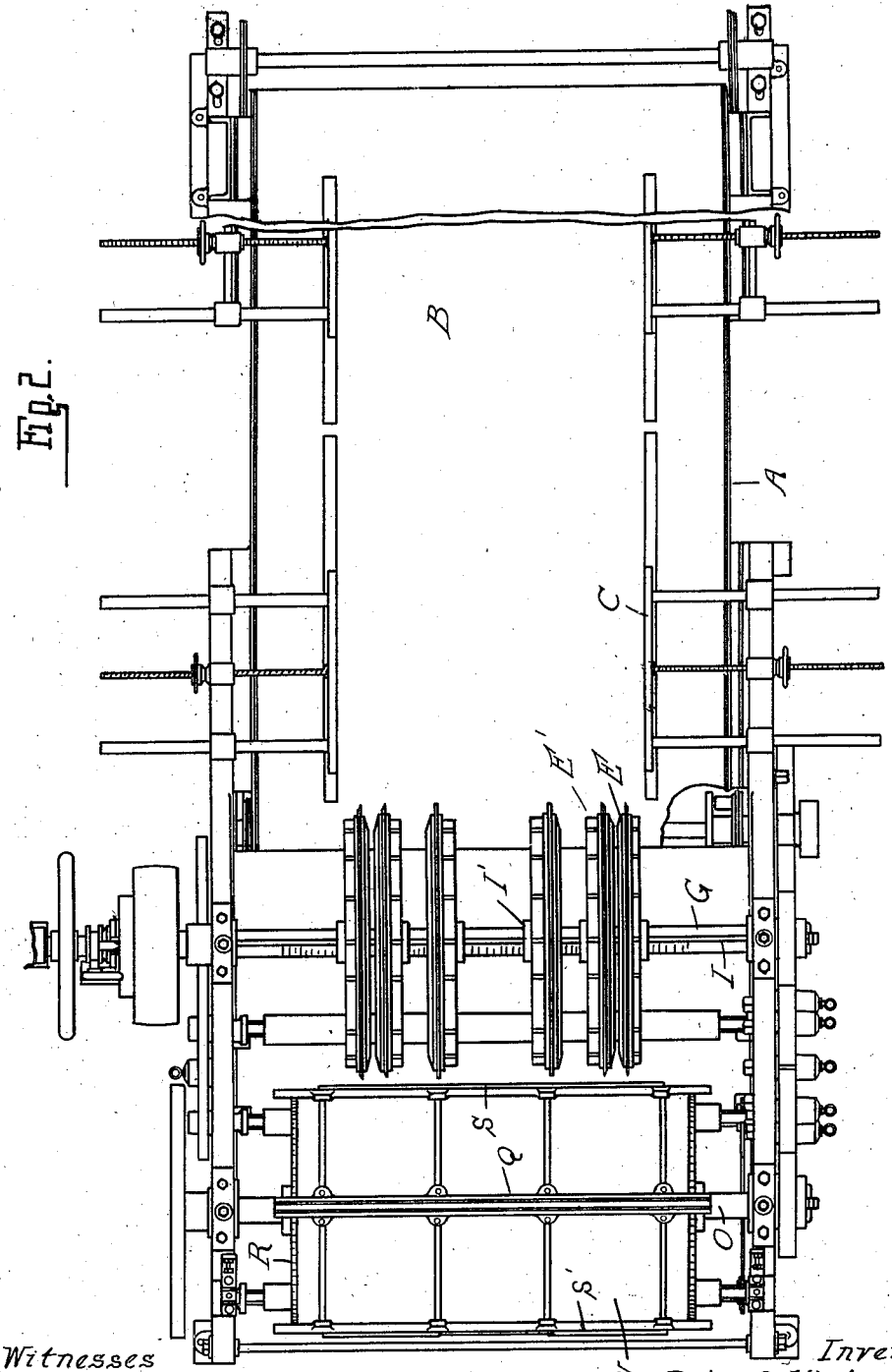
Fig. 2.



Witnesses

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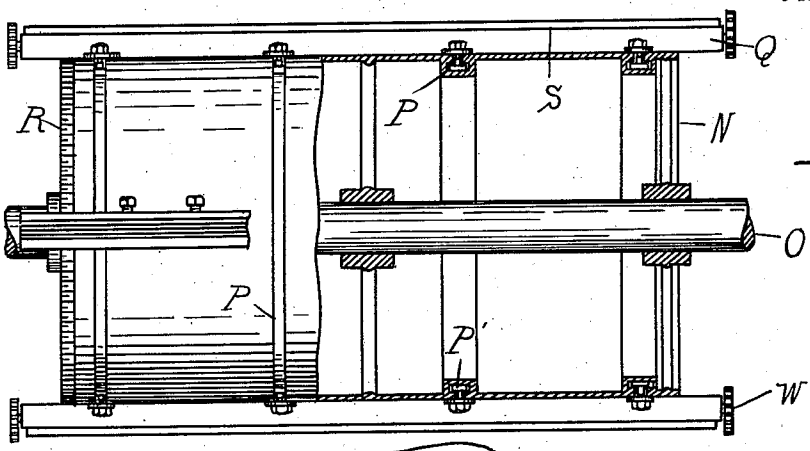

Fig 3.

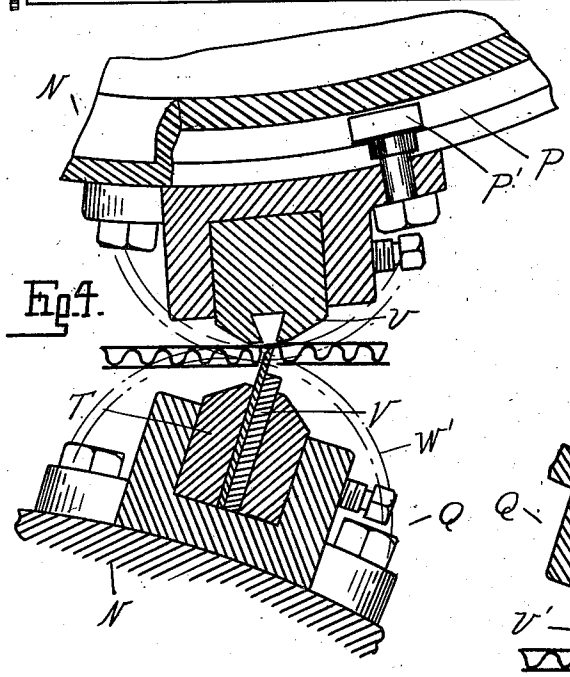

Fig 4.

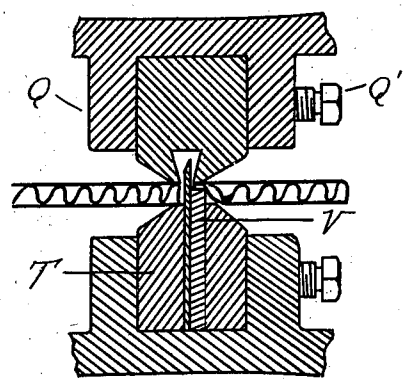

Fig 5.

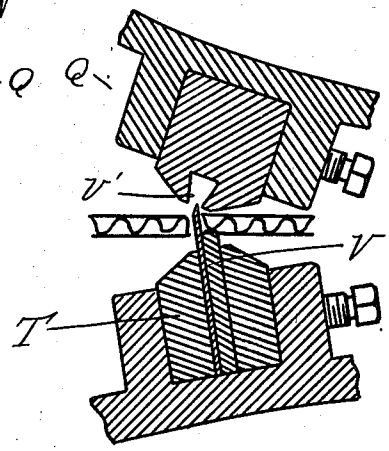

Fig 6.

Witnesses

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Fig. 7.

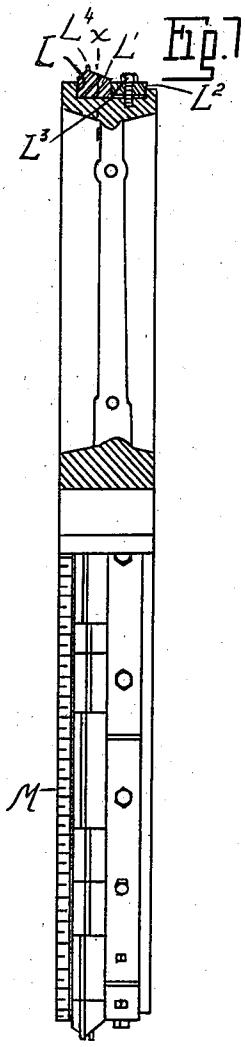

Fig. 8

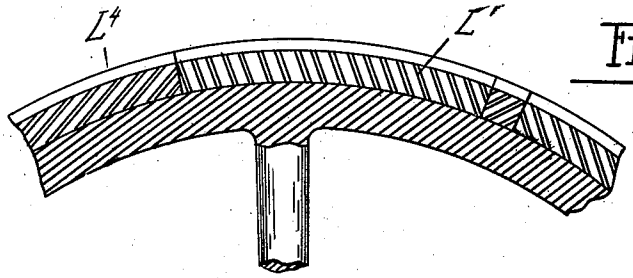

Fig. 9.

Fig. 10.

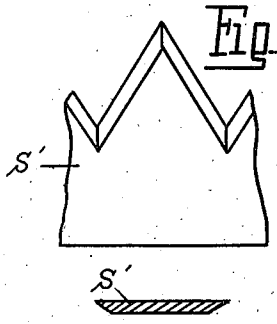

Fig. 12

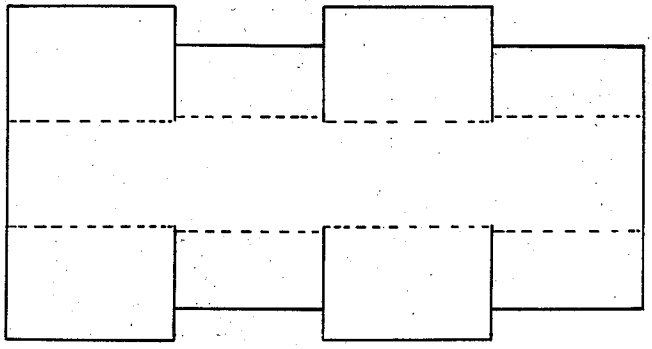

Fig. 11.

Witnesses

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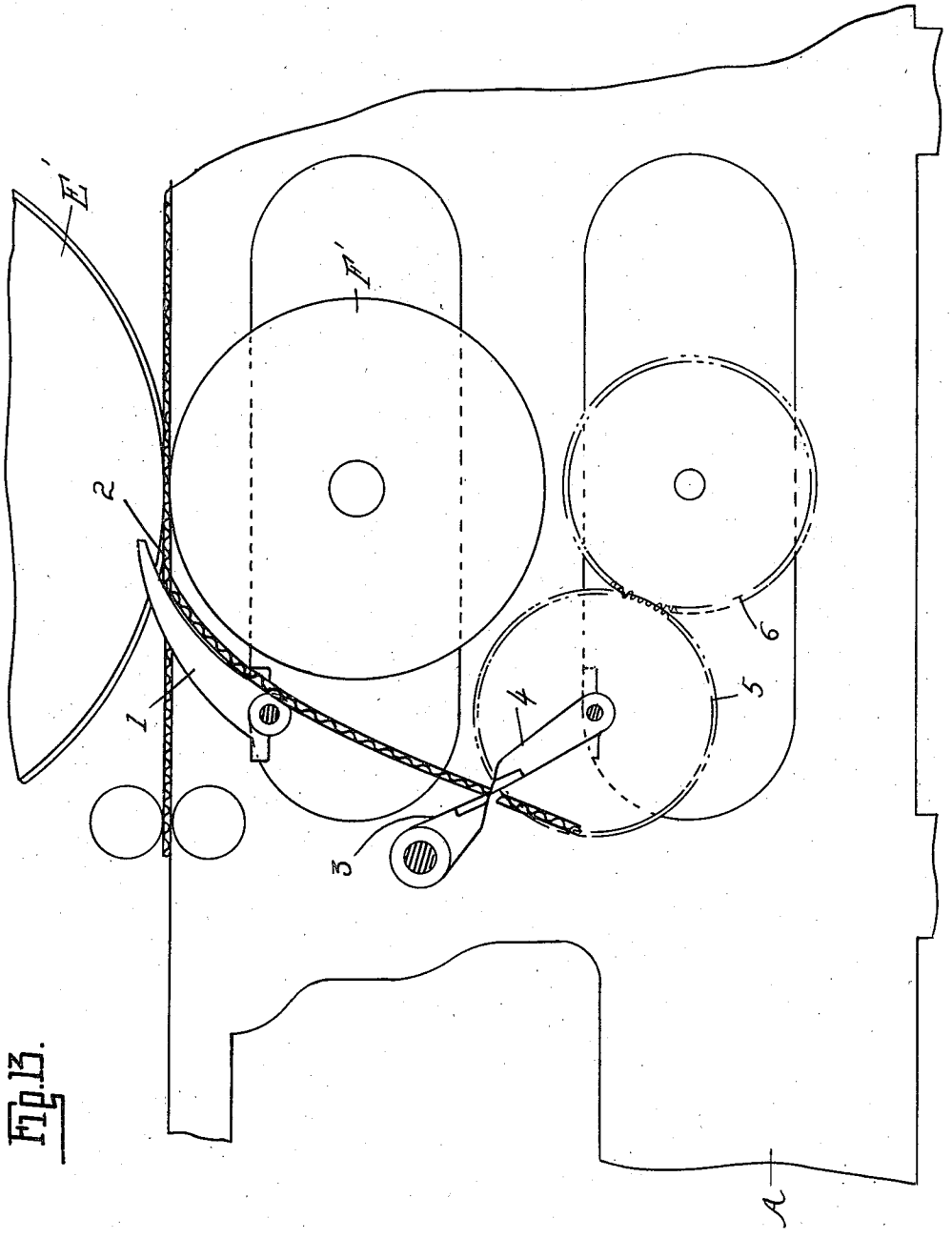

Fig. 13.

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W. F. Bellamy

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Atty's

UNITED STATES PATENT OFFICE.

PETER G. KLOTZ, OF SANDUSKY, OHIO, ASSIGNOR TO THE HINDE AND DAUCH PAPER COMPANY, OF SANDUSKY, OHIO, A CORPORATION OF OHIO.

MACHINE FOR MANUFACTURING PAPER BOXES AND CARTONS.

1,046,078. Specification of Letters Patent. Patented Dec. 3, 1912.

Application filed March 12, 1910. Serial No. 548,907.

To all whom it may concern:

Be it known that I, PETER G. KLOTZ, a citizen of the United States of America, residing at Sandusky, in the county of Erie and State of Ohio, have invented certain new and useful Improvements in Machines for Manufacturing Paper Boxes and Cartons, of which the following is a specification, reference being had therein to the accompanying drawings.

The invention relates to machines for making paper boxes or cartons, and of the type in which a flat blank of paper board is fed through the machine, and is slitted and scored in transverse directions to form a series of foldable sections which may be bent to form a box of rectangular form.

It is the particular object of the present invention to obtain a construction in which adjustment may be quickly and accurately made to adapt the machine to a large variety of work.

It is a further object to improve the construction and facilitate the operation of the various parts of the machine, and the invention therefore consists in certain features of construction as hereinafter set forth.

In the drawings—Figure 1 is a side elevation of the machine; Fig. 2 is a plan view thereof; Fig. 3 is a sectional elevation of one of the rotary drums; Fig. 4 is a transverse section therethrough; Figs. 5 and 6 are views similar to Fig. 4, showing the parts in different positions of adjustment; Fig. 7 is a sectional elevation of one of the longitudinal scoring disks; Fig. 8 is an enlarged section on line X—X, Fig. 7; Fig. 9 is an elevation of one of the slitting knives; Figs. 10 and 11 are respectively an elevation and a section of one of the teeth of said knife; Fig. 12 is a plan view of a slitted and scored blank forming the product of the machine; Fig. 13 is an elevation of the auxiliary cutter; and Figs. 14 and 15 are sections respectively through the lower and upper slitting cutters.

A is the frame of the machine upon which is mounted the feed table B. C are laterally adjustable guides above this table between which the blank to be operated upon is placed.

D is a carrier for feeding the blanks from the table and into engagement with the slitting and scoring devices arranged in rear thereof. These slitting and scoring devices are adapted to trim the blank to the proper size and divide the same into foldable sections.

As has been stated, it is one of the objects of the invention to adapt the machine to a large variety of work, varying not only in size of the blank, but in the dimensions and proportion of the foldable sections thereof. This frequently necessitates a complete change in adjustment of the various elements of the slitters and scoring members, and without special provision such adjustment would require the expenditure of considerable time, as well as skilled accuracy and calculation on the part of the operator. I have avoided such difficulty—first, by providing means for quickly releasing and resetting the various elements; second, by providing exchangeable and interchangeable units; and, third, by graduations in the various members to facilitate accuracy in setting.

The slitting and scoring of the blank longitudinally thereof is accomplished by a series of pairs of wheels or disks E, E′, F, F′, etc., which are secured respectively to transversely-extending shafts G and H mounted on the frame above and below the plane of feed. These disks or wheels are longitudinally adjustable upon their respective shafts, but are rotatively fixed thereon preferably by a key or feather I engaging corresponding keyways in the hub I′ of the wheels. These hubs are also preferably split and are provided with tapering clamping rings I^2, having a threaded engagement thereon by means of which the hub may be quickly clamped or released. The end disks of the series carry slitters for trimming the blank to the proper width, while intermediate these trimmers are disks carrying longitudinal scoring devices. There are also disks provided with segmental slitting blades for use in the manufacture of special forms of boxes or cartons, having sections of different widths. The detailed construction of these devices is preferably as follows: E is the upper trimmer, the rim portion of which is provided with a threaded section J and an outwardly-extending flange J′. J^2 is an annular slitting blade adjacent to the flange J′, and J^3 is a clamping collar engaging the threaded portion J and securing a slitter to the flange. The cooperating lower slitter F is of a similar

construction, having an outwardly-extending flange K and an annular slitter cutter K′, and a third clamping collar K^2. Both the slitter and its clamping members are laterally yieldably secured upon the disk, so as to maintain the blade in contact with that of the upper member. Thus the flange K is a separate member from the rim K^3 of the disk, which rim is provided with recesses containing springs K^4 bearing against an inwardly-extending portion K^5 of the flange, while shoulders K^6 serve to limit the movement of the flange on the rim.

Intermediate the end slitting cutters are the segmental slitting and scoring devices. The former are used only where there are sections of the blank of lesser width than the main section, and are similar to the construction already described, with the substitution of the segmental blades for the annual continuous slitter blades. The scoring members are also formed in segments for the purpose of producing offset scores in the blank to compensate for the thickness of the material and to permit one section in folding to overlap another. The construction which I preferably use comprises a rim member L having an undercut flange or bearing thereon forming a seat for one side of the segmental scoring members L′ which are clamped by segmental blades L^2 secured by tap bolts L^3 or other suitable means. The segmental members L′ are provided with outwardly-extending flanges or beads L^4 which are offest from the central plane of the member. This offset is of sufficient extent to produce the desired offset in the scoring when the members L′ are reversed in position on the rim L, and thus the same element may be used for forming either one of the offset scores. The segmental members L′ are preferably also formed in short sections, which will permit of obtaining almost any desired effect by combining a sufficient number of said sections arranged in either one or the other of their reverse positions. The scoring members just described are secured upon the upper shaft G, and the coöperating member upon the lower shaft H may be merely a disk or wheel having a plain rim for supporting the work during the scoring operation.

Both the segmental slitting cutters and the segmental offset scoring members must be accurately set in relation to the feed mechanism for the blank. This is facilitated by providing graduations upon the rim of the disk or wheel, as indicated at M, in Fig. 7. The shaft or arbor G, upon which the disks are adjustably secured, is also preferably provided with gradations extending longitudinally thereof to assist in adjusting and setting for different kinds of work.

In rear of the longitudinal slitting and scoring devices are transverse slitting and scoring members comprising a pair of drums N N′ of similar construction mounted upon shafts O and O′ above and below the plane of feed. Each of these drums is formed with a plurality of circumferentially-extending undercut grooves P for receiving the heads of the clamping bolts P′ engaging holders Q for the slitting and scoring blades. These holders preferably extend the entire length of the drum, and may be adjusted to any position desired by loosening the nuts of the bolts P′ and moving the latter around the slots P. Graduations R are placed upon the drums preferably at opposite ends thereof to assist in accurately positioning the holders Q, the graduations of one drum running in opposite direction from those of the other. In the holders the slitting blades and scoring bars are clamped preferably by set screws Q′, and the arrangement permits of adjusting the blades longitudinally into any position required. One blade S extends continuously the entire width of the blank and is used for trimming the blank to the proper length. Shorter blades S′ are used for slitting in from the sides of the blank to divide between sections which fold in different directions, and these blades, as well as the blades S, are secured between clamping blades T within the holders Q.

The blades S S′ are preferably of the construction shown in Figs. 9, 10 and 11, and each is provided with a series of V-shaped teeth, the sides of which are sharpened, as indicated in Fig. 11. Thus when the edge of the blade is forced through the stock the point will first be inserted and the cutting will be effected in opposite directions by the sharpened sides of the teeth until the stock is completely severed. This construction reduces the resistance which would be offered by a blade having a straight edge.

Coöperating with the blades are shearing edges, which are secured in the holders Q of the lower drum. These coöperating members U are preferably formed with an undercut groove U′ therein, the mouth of which is of sufficient width to receive the blade, while the lower portion is of greater width to permit the change in angularity of the blade due to the rotation of the drums. The effect of the construction is that the stock is supported upon both sides of the cutter, which prevents tearing or distortion. The scoring transversely of the blank is accomplished by score bars V, which are clamped in the holders Q, and where slits and scores in the blank are in alinement, the same holder Q and clamping plate T are used for holding the score bars V and blades S S′.

In operation, paper board blanks of suitable size are successively placed upon the table B, from which they are periodically

fed by the carrier D between the disks or wheels E and F. The slitting blades upon the end wheels will trim the blank to the proper width and size, and the score bars will effect the crushing down or creasing of the material along the lines which are to be subsequently bent. The segmental blades S′ will also operate to trim certain sections to a lesser width where boxes or cartons of this type are manufactured. After passing by the disks E and F a blank passes between intermediate pairs of feed rolls W, and is advanced thereby into engagement with the transverse slitting and scoring devices upon the drums N N′. These operate as has been described, scoring the blank transversely, and also slitting the ends thereof between sections that fall in opposite directions, and finally trimming off the end to reduce the blank to the proper length.

Whenever the size or form of the box or carton is changed, adjustment is made first by loosening the disks E and F upon their respective shafts by unscrewing the clamping nuts I^2. The disks are then properly spaced and set by the assistance of the longitudinal gradations upon the shafts G and H, and are clamped by again tightening the nuts I^2. The next adjustment is that of the score members L′, which are set with reference to the gradations M upon the rim L. If longer or shorter segments are needed than those previously used the clamping plate L^2 is detached to permit of exchanging or reversing one or more of the members L′. The segmental slitting blades S′ are also set by the assistance of the gradations upon the rim of the wheel or disk carrying the same. Thus all of the members operating longitudinally upon the blank are properly positioned.

The transverse scoring and slitting devices are next positioned by loosening the holders Q and adjusting the bolts P′ around the slots P, and then setting the holders with reference to the circumferential gradations R at the ends of the drums. It is important that the slitting blades should be accurately positioned with respect to the cooperating members U on the lower drum, and to avoid possibility of these parts getting out of alinement they are preferably provided with intermeshing pilot gear segments W′. These are secured at the ends of the holders Q, and during the rotation of the drums will engage with each other slightly in advance of the operation of the slitters and remain in engagement until the completion of the slitting and the withdrawal of the blade.

To suit the requirements of the different sizes of work, exchangeable score bars and slitting blades are provided, for which suitable selection may be made, and at any time one bar or blade may be replaced with another by merely loosening the set screws Q′. Thus, without the necessity of special calculation or high degree of skill on the part of the workmen, the machine may be adapted for any kind of work to be performed.

To avoid the clogging of the machine by the strips of stock trimmed from the edges of the blanks, I preferably provide the machine with means for cutting these strips up into short lengths that they may be more readily disposed of. As shown, 1 is a deflecting finger arranged in the path of the trimming strip 2 to direct the latter downward. 3 is a stationary knife adjacent to the path of movement of the strip, and 4 is a rotary knife coöperating with the knife 3 to intermittently shear the strip into sections. The rotary knife is driven by any suitable train of mechanism, such as the intermeshing gear wheels 5 and 6.

What I claim as my invention is:

1. In a machine of the character described, the combination with adjacent rotary members, of a slitting blade carried by one of said rotary members, a scoring blade clamped adjacent to said slitting blade, a coöperating member carried by the other of said rotary members, and having an undercut groove therein for registration with said blade providing clearance for the angular adjustment of the blade between engagement and disengagement, said grooved member also constituting an abutment for coöperating with said scoring member.

2. In a machine of the class described, the combination of sheet feeding means, a rotatable shaft disposed transversely of and adjacent to the line of feed, a disk member mounted upon said shaft and provided with a peripheral abutment, segmental scoring blocks adapted to lie with one side against such abutment, and radially adjustable clamping members adapted to press against the opposite sides of said blocks to hold the same in place.

3. In a machine of the class described, the combination of sheet feeding means, a rotatable shaft disposed transversely of and adjacent to the line of feed, a disk member mounted upon said shaft and provided with a peripheral abutment having an undercut face, segmental blocks for operating upon the work having faces complementary to that of such abutment whereby they are adapted to lie with one side thereagainst, and radially adjustable clamping members adapted to press against the opposite sides of said blocks to hold the same in place.

4. In a machine of the class described, the combination of sheet feeding means, a rotatable shaft disposed transversely of and adjacent to the line of feed, a disk member mounted upon said shaft and provided with a peripheral abutment, segmental blocks for operating upon the work adapted to lie with

one side against such abutment and segmental clamping members adapted to press against the opposite sides of said blocks, said members being adjustable both radially and in a direction parallel with the axis of the disk.

5. In a machine of the class described, the combination of sheet feeding means, a rotatable shaft disposed transversely of and adjacent to the line of feed, a disk member mounted upon said shaft and provided with a peripheral abutment having an undercut face, segmental blocks for operating upon the work having faces complementary to that of such abutment whereby they are adapted to lie with one side thereagainst, segmental clamping members adapted to press against the opposite sides of said blocks, and set screws adapted to draw said members radially inward and thereby hold said blocks in place, said members being transversely adjustable with respect to said screws for blocks of different widths.

6. In a machine of the class described, the combination of sheet feeding means, a rotatable shaft disposed transversely of and adjacent to the line of feed, a disk member mounted upon said shaft and provided with a peripheral abutment, segmental blocks for operating upon the work adapted to lie with one side against such abutment, said blocks each comprising a body portion and a beaded portion alined, but not central, with respect to such body portion, and radially adjustable clamping members adapted to press against the opposite sides of said blocks to hold the same in place.

7. In a machine of the class described, the combination of sheet feeding means, a rotatable shaft disposed transversely of and adjacent to the line of feed, a disk member mounted upon said shaft and provided with a peripheral abutment having an undercut face, segmental blocks for operating upon the work each having a body portion with faces complementary to that of such abutment whereby it is adapted to lie with one side thereagainst and having a beaded portion alined, but not central with respect to such body portion, and radially adjustable clamping members adapted to press against the opposite sides of the body portions of said blocks to hold the same in place.

8. In a machine of the character described, the combination with blank feeding means, of a rotatable shaft disposed transversely of and adjacent the line of feed, a disk upon said shaft, a blade carrying section having a portion extending above and below the periphery of the disk and provided with a transverse section having a limited relative free lateral adjustment in relation to the disk periphery, and a spring carried by the rim of the disk and bearing upon the portion of the blade carrying section extending below the disk periphery.

9. In a machine of the class described, the combination of sheet feeding means, a rotatable shaft displaced transversely of and adjacent the line of feed, a disk member mounted upon said shaft having a peripheral abutment, reversible segmental blocks for operating upon the work adapted to be secured to said disk against the abutments, each of said blocks comprising a comparatively wide bearing portion, and a narrow beaded portion alined with the blocks at one side of the center.

In testimony whereof I affix my signature in presence of two witnesses.

PETER G. KLOTZ.

Witnesses:

J. J. DAUCH,

SIDNEY FROHMAN.