June 26, 1951 C. TYLER 2,558,398

PAPER CUTTING MACHINE

Filed July 13, 1946 3 Sheets-Sheet 1

Fig. 1.

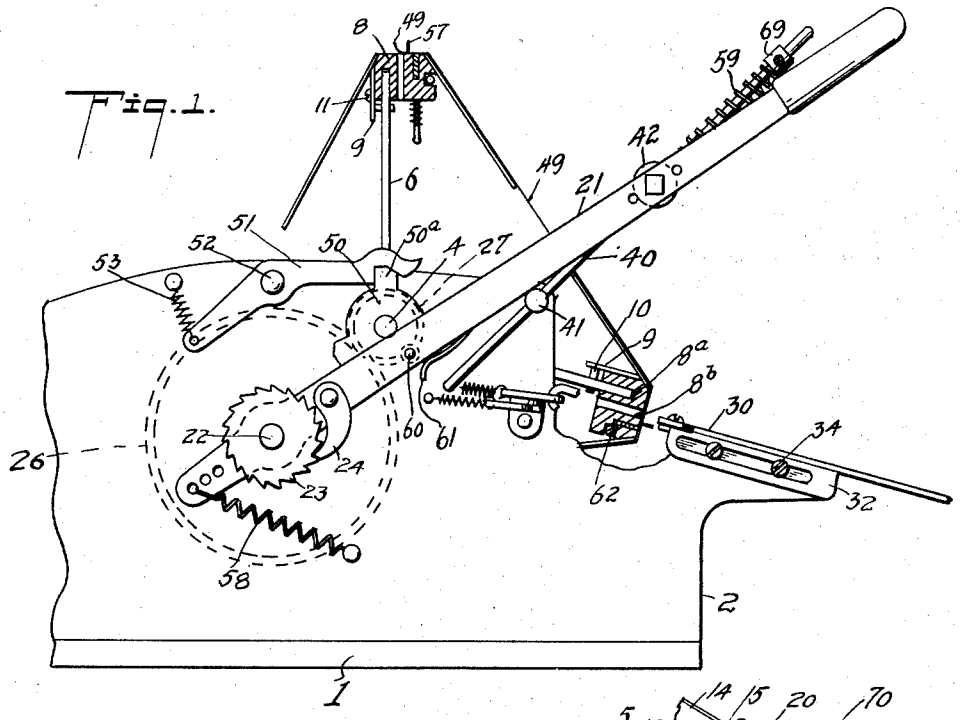
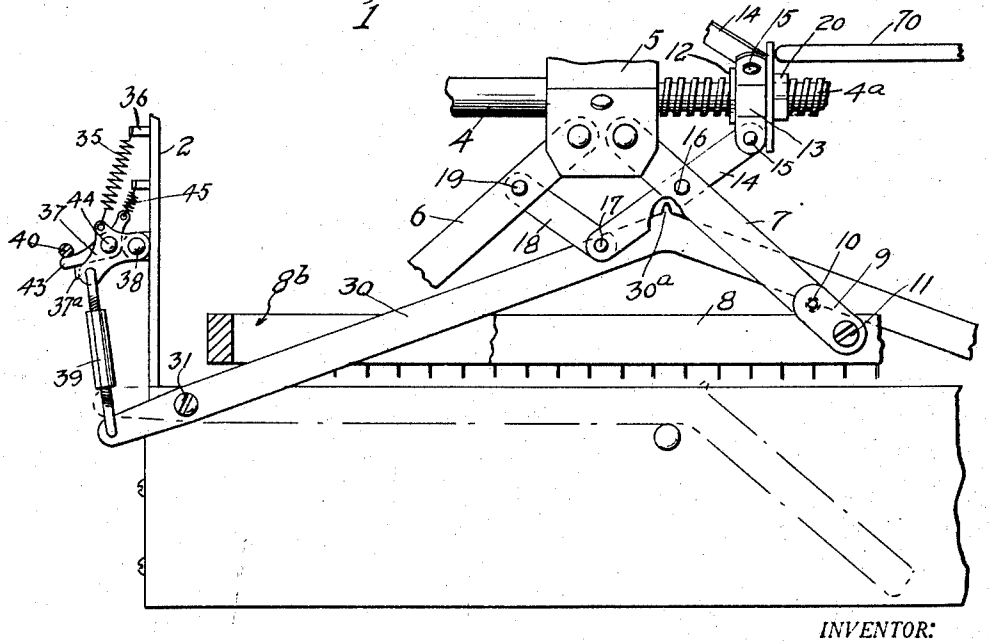


Fig. 4.



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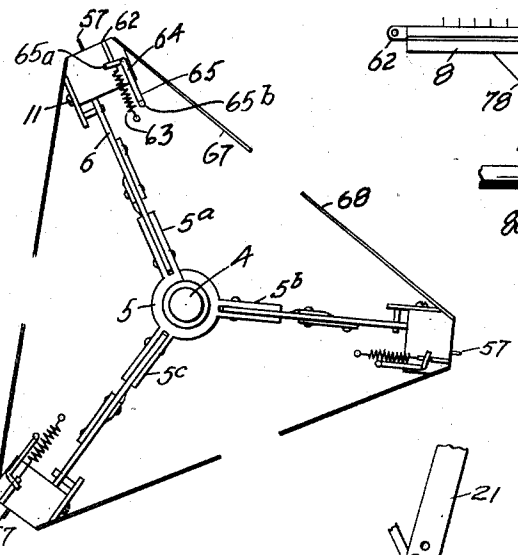


Fig. 5.

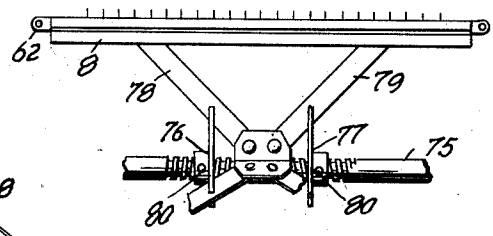


Fig. 6.

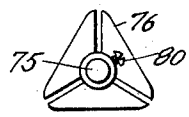


Fig. 7.

Fig. 2.

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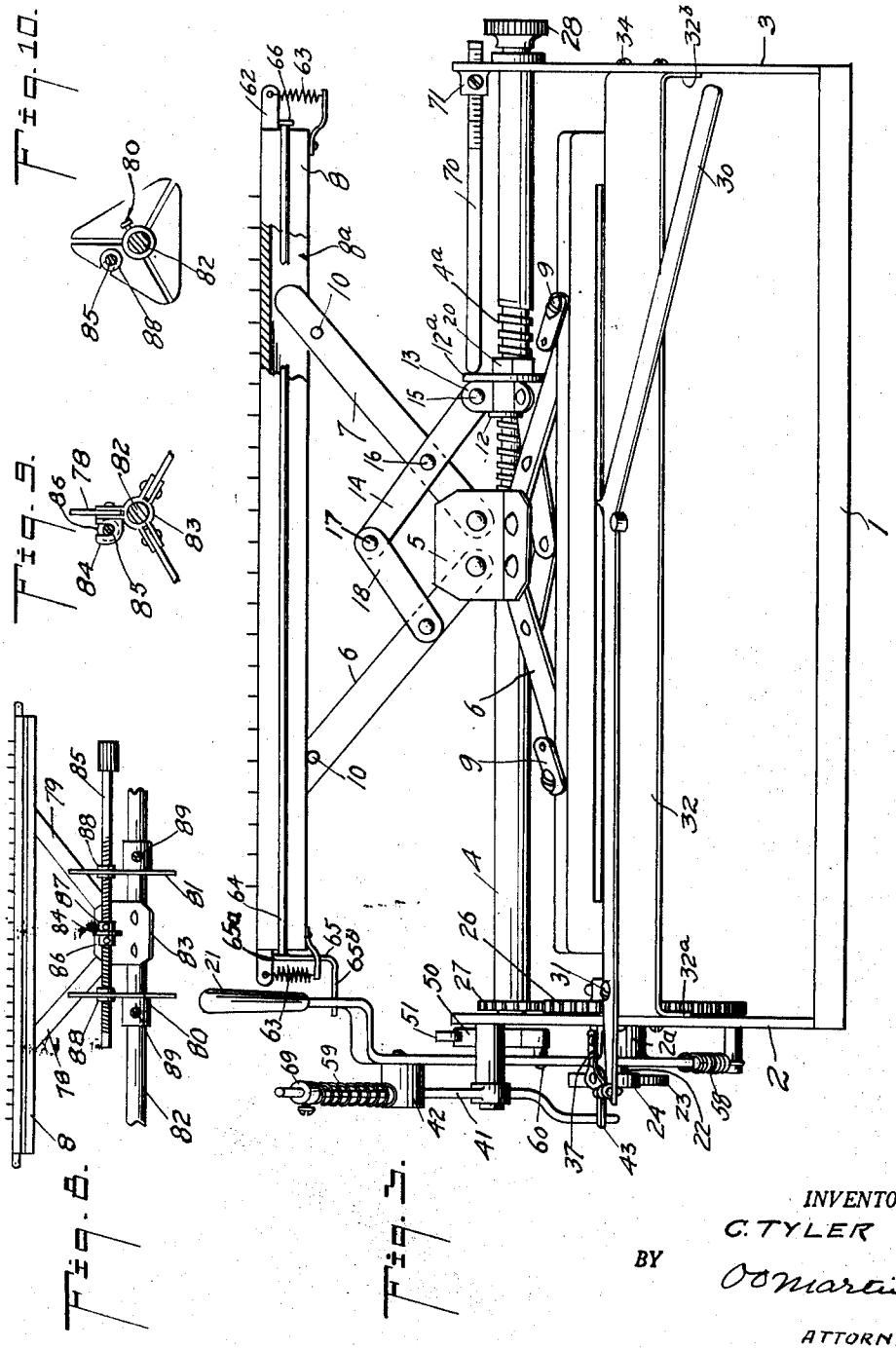


Fig. 10.

Fig. 3.

Fig. 5.

Fig. 4.

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2,558,398

PAPER-CUTTING MACHINE

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7 Claims. (Cl. 164—42)

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This invention relates to a device for cutting a web of material such as paper, fabric and the like into sheets of predetermined uniform length.

It is the general object of the invention to provide a simple and inexpensive machine which will speedily and effectively cut sheets of material to uniformly exact size. It is a further object to provide a device which may be quickly and conveniently adjusted to vary the size of sheets to be cut. Another object is to provide means for automatically releasing each sheet of material from the machine upon completion of the cutting operation for convenient removal by the operator of the machine. These and other objects of the invention will be better understood upon perusual of the following detailed description and by referring to the accompanying drawings, of which:

Fig. 1 is an end view of a device embodying the invention and with parts thereof broken away for the sake of clearness;

Fig. 2 is a substantially corresponding view showing the device in a different position of adjustment;

Fig. 3 is a front view of the device when the parts thereof are in the position indicated in Fig. 1;

Fig. 4 is a fragmentary view of the front portion of the device as viewed from the upper right-hand corner of Fig. 1, and showing parts of the device in a different position of adjustment;

Fig. 5 is an end view of the spider wheel as it appears when removed from the machine; and

Figs. 6 to 10 are fragmentary views of features of the device illustrating a modification of some of the parts thereof.

On a base 1 are mounted end plates 2, 3, in which a shaft 4 is rotatably supported and a fulcrum frame 5 is rigidly secured to this shaft at the center thereof. This frame includes three bifurcated projections 5^a, 5^b, 5^c which extend radially from the shaft axis and are equidistantly spaced apart. In each projection is mounted pivots on which a pair of arms 6, 7 are hung to swing, and the outer ends of each pair of arms are adjustably seated in a groove 8^a of a bar 8. As shown in Figs. 1, 2, and 3, plates 9 are each fitted with a stud 10 which extends through a perforation of each of the arms 6, 7 and a setscrew 11 engages a threaded perforation of each plate to lock these arms in position on the bar 8, after adjustment has been made in the manner which will now be described. The shaft 4 is, at one side of the fulcrum frame 5, shown made with screw threads 4^a on which a threaded hub 12 is seated to support a sleeve 13 which, like the

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frame 5, is made with equidistant, bifurcated arms for receiving links 14, and the latter are pivotally held in position therein by pins 15. These links extend across and are pivotally mounted on the adjacent lever 7 by means of pins 16, and the outer ends of the links are at 17 pivotally joined to short links 18 which, in turn, are pivotally secured to the other set of arms 6, at 19.

A lazy tongs arrangement is in this manner provided by means of which, in response to rotation of the shaft 4, the three bars 8 may be adjusted radially relative to the axis of the shaft and in parallel relation thereto. In order to effect such adjustment it is, of course, necessary slightly to unscrew the setscrews 11 which, upon completion of the adjustment, are again tightened to lock the arms rigidly in position on the bars. A lock nut 20 is provided for locking the hub 12 rigidly in position on the shaft upon completion of the above described adjustment. The combination just described constitutes the spider wheel of the machine, on which paper is supported in the manner which will be described presently.

An operating lever 21 is hung on a stub shaft 22, which is journaled in a bearing 2^a of the end plate 2, and fitted at the outer end thereof with a ratchet wheel 23. To the inner end of this shaft is secured a relatively large gear wheel 26 which is in mesh with a smaller gear wheel 27, secured to the shaft 4. The operating lever 21 is, in such manner, connected quickly to rotate the shaft 4 in counterclockwise direction through an arc of 120°. It may be found desirable to mount a knob 28 on the opposite end of the shaft 4 for fine adjustment thereof.

The cutting mechanism of the device may be constructed as follows. A knife 30 is by means of a stud 31 mounted on a plate 32 which, in turn, is supported on the end plates 2 and 3 for radial adjustment relative to the axis of the shaft 4. The plate is for this purpose made with flanges 32^a, 32^b, having elongated perforations therein, and one or more screws 34 extend through these perforations to lock the plate in adjusted position on the end plates of the machine. The knife 30 is normally held in the retracted position indicated in Figs. 1 and 3 by means of a spring 35 which extends from a stud 36 of the end plate 2 to a bell crank 37, and the latter is shown pivotally mounted on a bracket 38 of the end plate. A link 39 operatively connects the end of this bell crank with the end of the knife 30.

Means is provided for moving the knife as

required for the cutting operation, against the tension of the spring 35, and such means is in the present disclosure shown to include a trigger rod 40 which extends through and is rigidly held in a stud 41 and the latter is seated for rotating movement in the end plate 2. A stud 42 is seated for rotation in the operating lever 21 and it is perforated slidably to receive the rod 40 in order to render it possible for the rod to adjust itself to the swinging movement of the operating lever. The lower end of the rod 40 is positioned to engage the outer end of a pawl 43 which is pivotally mounted on the bell crank 37 and, when the operating lever is moved counter-clockwise on the return stroke thereof, to swing the bell crank and the knife into the position indicated in Fig. 4, continued movement of the lever causes the end of the rod to pass beyond the outer end of the pawl, thereby to release the bell crank and the knife for return movement by the spring 35. The bell crank is made with a downwardly directed lip 37a, see Fig. 4, properly to position the pawl on the bell crank for the purpose of this advance movement of the knife, and it is held in this position by means of a spring 45. Upon the subsequent forward movement of the operating lever, it is seen that the lower end of the rod 40 swings the pawl in the opposite direction, against the tension of the spring 45, until it passes the pawl which thereupon by its spring is again returned to its initial position. But different operating connections may be substituted if desired.

The return stroke of the operating lever may be effected manually or by means of a spring 58, the preferred method of operation being manually to advance the lever and to release it for quick return movement by the spring. It is well to provide buffer means for the lever, and such means may take the form of a spring 59 which is placed on the upper end of the trigger rod 40. This spring is adjusted by moving a stop collar 69 axially on the rod until sufficient tension is obtained to stop the lever smoothly on its return stroke.

The bars 8 are made with elongated perforations 8b, parallel with the arms 6, 7, and these perforations are brought into alignment with the knife 30 each time the operating lever is swung forward into the position indicated in Fig. 1. Since it is essential correctly to align these perforations with the knife, it becomes necessary to provide means for checking the rotation of the shaft 4 at the end of the forward movement of the operating lever. Such means is, for convenience of illustration, shown to include an index wheel 50 which is secured to the projecting end of the shaft 4 and made with three equidistant projections 50a. A latch pawl 51 is hung on the end plate 2 at 52 and the forward end of this pawl is grooved to fit over the ends of these projections substantially as indicated in Fig. 1. A spring 53 maintains this pawl yieldingly in engagement with the projections. The end of the pawl is shown upwardly slanting in order to permit the projections of the member 50, during the advance movement of the shaft 4, to raise the end of the pawl sufficiently to cause the projection to come to rest therein and thereby to bring the slot 8b into correct alignment with the knife.

A web of paper 49 is, in Fig. 2, shown fed to the machine from a roll 55 which, for simplicity, in the drawings is shown mounted on an arbor 56 and the latter is seated in grooves of the end plates 2 and 3. But I wish it understood that the roll of paper may be placed in any other desired position. From the outer surface of each bar 8 projects a series of pins 57, which serve to maintain the web of paper in position on the bars during the operation of the machine. The free edge of the paper web is in the first instance manually mounted on the pins of one of the bars, and the shaft 4 is then rotated by the operating lever to bring the end of the paper web into the position shown in Fig. 1, in which position it is noticed that the knife 30 is aligned with the perforations 8b of the bars.

It was above described that the operating lever on the return stroke thereof moves the trigger rod to swing the knife on its pivot 31 and during this movement to cut the web of paper, whereupon the knife is instantly released for return movement by the spring 35. The sheet of paper which in this manner has been severed from the web may now be removed by the operator. Before the machine again can be operated to cut off the next sheet of paper it becomes necessary to release the index wheel from the latch pawl 51 and this may be done by mounting on the operating lever a stud 60 which, when the operating lever approaches the limit of its return stroke, contacts the bottom edge of the pawl 51 and raises the pawl clear of the index wheel. When thereupon the operating lever is again started in forward direction, it is to be noted that the pawl 24 engages the ratchet wheel 23 to commence the movement of the index wheel in counter-clockwise direction, before the latch pawl reaches the projection 50a of the index wheel. This intermediate position of the machine is substantially indicated in Fig. 2. In order to make certain that the index wheel in this manner is released for rotation, I have found it advisable to mount a spring 61 on the end plate 2 in position to engage the adjacent projection 50a of the index wheel, and which is powerful enough to commence this forward rotation of the index wheel the moment the latch pawl has been raised out of engagement therewith.

It was above stated that the operator is free to remove the sheet of paper after it has been severed from the web. This operation may be greatly facilitated by providing means for lifting the sheet of paper away from the pins 57, illustrative of which paper releasing means I have shown a release rod 62 seated in a groove which is sunk in the outer surface of the pin bars 8 in close proximity to the pins 57. The ends of this release rod project beyond the ends of the pin bar, and springs 63 are provided for the purpose of normally maintaining the release rod in retracted position within the pin bar. A bail 64 is seated for rotation within a groove sunk in the rear side of the pin bar and this bail is shaped at one end to form a bell crank 65, which is shown made at the top thereof with an arm 65a reaching under the projecting end of the release rod 62. The bell crank extends downward from the axis of the bail to terminate at the bottom in an outwardly projecting arm 65b. This arm is contacted by the operating lever as the latter approaches the end of its return movement, thereby to swing the bell crank until the arm 65a contacts and elevates the release rod 62 sufficiently to disengage the sheet of paper from the pins 57. The opposite end of the bail is formed with an arm 66, which is identical with the arm 65a, and as both arms form integral parts of the bail,

it is seen that both ends of the release rod are operated upon at the same time to impart parallel outward movement to the rod.

The mechanism by means of which the spider wheel is adjusted to vary the size of the sheet of paper to be cut is above described, and it is therein explained that the support **32** for the knife **30** is mounted for radial adjustment on the end frames of the machine correctly to position the knife for the cutting operation. In order to effect such adjustment, it is required to adjust the length of the link **39** correspondingly, and this may be done by making the link in the form of a turnbuckle, substantially as indicated in Fig. 4, but other adjusting means may be substituted if desired. It is important to provide support for the sheet of paper which has been cut off, and such support may take the form of plates **67, 68** which are rigidly secured to the sides of the pin bars and cover the greater portion of the distance between these bars. Unless such supports are provided, it is seen that the detached sheet will drop into the spider wheel and become entangled therein, making it difficult for the operator to withdraw it.

In order to be able to construct the machine as lightly as possible and yet to retain sufficient rigidity for rapid operation, it may be advisable to provide guiding means for the arms of the spider wheels. Illustrative thereof, the shaft **75**, of Fig. 6, is shown fitted with right and left screw threads, on which guide frames **76, 77** are seated. These frames are slotted, as best indicated in Fig. 7, to guide and to maintain the arms **78, 79** firmly in position.

When the shaft is rotated to adjust the size of the spider wheel it is found that these frames are caused to move axially thereon in opposite directions. Upon completion of this adjustment, it is merely required to advance setscrews **80**, thereby to lock the frames in position on the shaft. The device is thereupon ready for operation in the manner above described. While this construction forms a more rigid device, it may be found that the expense of cutting the right and left screw threads on the spider wheel shaft adds to the cost of the device. It may, for this reason, be found preferable to substitute other means of moving the two guides in correctly spaced relation to each other.

Illustrative of such means, I have in Figs. 8 to 10 shown the guide frames **80, 81** slidable on a plain, uncut shaft **82**. To the fulcrum frame **83** is secured a grooved plate **84**, in which a rod **85** may be seated and the outer ends of this rod are then held supported within grooves of the guide frames **80, 81**, substantially as shown. Collars **86, 87** are secured to the rod in position to straddle the grooved plate **84** and so to prevent axial displacement of the rod. A pair of grooved sleeves **88** ride on right and left screw threads of the rod to straddle the guide frames and so to cause these frames to move axially in opposite directions in response to rotation of the rod for adjustment of the arms **78, 79**. When the adjustment of the spider wheel is completed, it is merely required to tighten the set screws **89** and to detach the rod.

Sheet cutting machines of the type illustrated may be used over long periods of time without having to readjust the spider wheels thereof. When it is considered that one of these attachments may serve a great number of machines, it is seen that a considerable saving may be effected in the cost of the machines.

Attention is directed to the shape of the knife **30**. It is noticed that this knife is sharply bent at or near the center thereof to provide point contact with the paper web at the beginning of the cutting operation. When, in addition, the edge of the knife at this point is formed with a sharp tooth **30a** which in the first instance punctures the web, it is found that the sheet will be cleanly and sharply severed therefrom.

In order to facilitate adjustment of the spider wheel, means should be provided for correctly positioning the sleeve **13**, and such means is in the drawing shown to comprise a gage bar **70**, which is slidably fixed in the end plate **3** and locked in adjusted position therein by a setscrew **71**. The bar should be suitably graduated to indicate the various sizes of sheets to be produced. When set to indicate the desired sheet size, it is merely required to unscrew the lock nut **20** and to rotate the shaft **4** until the flange **12a** of the hub **12** contacts the end of the gage.

While I have herein described a preferred form of the invention, it is not the intention thereby to be limited to the exact shapes, sizes, proportions and arrangements shown. It may, for example, under certain conditions, be found preferable to provide the spider wheel with two or with more than three pin bars. Further modifications may be embodied within the scope of the claims hereto appended.

I claim:

1. In a device for cutting sheets from a roll of material, a shaft, bars fitted to receive the web of material from said roll, arms radially extending from said shaft, means for adjusting the angular position of said arms on the shaft to support said bars in uniformly parallel spaced relation thereto, each of said bars having a passage exending lengthwise thereof and substantially radially directed therethrough, a knife on the device, lever operated means for rotating said shaft forwardly successively to bring each of said passages into alignment with said knife, and means associated with said lever means for actuating said knife for movement through said passage thereby to sever the web each time a passage is brought into alignment with the knife.

2. In a device for cutting sheets from a roll of material, a shaft, bars fitted to receive the web of material from said roll, arms radially extending from said shaft, means for adjusting the angular position of said arms on the shaft to support said bars in uniformly parallel spaced relation thereto, each of said bars having a passage extending lengthwise thereof and substantially radially directed therethrough, a knife mounted for swinging movement on the device, a hand lever, means interconnecting the lever with said shaft for rotating the shaft in one direction on the forward stroke of the lever successively to bring each of said passages into alignment with said knife, and means associated with said lever for actuating said knife on the return stroke of the lever to sever the web each time a passage is brought into alignment with the knife.

3. In a device for cutting sheets from a roll of material, a shaft, bars fitted to receive the web of material from said roll, arms radially extending from said shaft, means for adjusting the angular position of said arms on the shaft to support said bars in uniformly parallel spaced relation thereto, each of said bars having a passage extending lengthwise thereof and substantially radially directed therethrough, a knife on the device, a spring-held hand lever, means interconnecting said lever with the said shaft for rotat-

ing the shaft in one direction on the forward stroke of the lever against the tension of said spring successively to bring each of said passages into alignment with said knife, means associated with said lever for rotating said knife on its pivot on the return stroke of the lever thereby to sever the web each time a passage is brought into alignment with the knife.

4. In a device for cutting sheets from a roll of material, a shaft, bars fitted to receive the web of material from said roll, a row of pins radially projecting from each bar to maintain said material in position on the bars, means radially extending from said shaft to support said bars in uniformly parallel spaced relation thereto, each of said bars having a passage extending lengthwise thereof and substantially radially directed therethrough, said passages being positioned directly in front of each row of pins, a spring-held knife pivotally mounted on the device, lever operated means for rotating said shaft forwardly successively to bring each of said passages into alignment with said knife, means associated with said lever means for moving said knife against its spring tension through said passages thereby to sever the web each time a passage is brought into alignment with the knife, and means for lifting the forward end of the severed sheet away from the row of pins on which it is held.

5. In a device for cutting sheets from a roll of material, a shaft having screw threads intermediate its ends, bars fitted to receive the web of material from said roll, supports radially extending from said shaft to said bars to maintain the latter in uniformly parallel spaced relation to the shaft, means riding on said screw threads and operatively connected to move said bar supports in response to shaft rotations thereby to move the bars radially relative to the shaft, means for locking said means rigidly in position on the shaft, a hand lever operatively connected to rotate said shaft in one direction on the forward stroke of the lever, a knife, and means operatively connecting the handle with said knife to cause the latter to sever the web of material on the return stroke of said lever.

6. In a device for cutting sheets from a roll of material, a shaft, bars fitted to receive the web of material from said roll, supports radially extending from the shaft to said bars to maintain the latter in parallel spaced relation to the shaft, a lever manually operable to rotate the shaft in one direction on the forward stroke of the lever, a knife pivotally mounted on the device, a spring yieldingly maintaining said knife retracted, means associated with said lever for swinging said knife on its pivot against the tension of said spring to cause the knife to sever a sheet from said web, a spring for returning the lever, and means for cushioning the return movement of the lever.

7. In a device for cutting sheets from a roll of material, a shaft, bars fitted to receive the web of material from said roll, means radially extending from said shaft to support said bars in uniformly parallel spaced relation thereto, each of said bars having a passage extending lengthwise thereof and substantially radially directed therethrough, a knife on the device, lever operated means for rotating said shaft forwardly, means for correctly stopping the shaft at the end of each forward rotation successively to bring each of said passages into alignment with said knife, means associated with said lever means for actuating said knife for movement through said passage thereby to sever the web each time a passage is brought into alignment with the knife, and means movable with the lever for releasing the shaft for further advance movement after the web has been severed.

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