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2 Sheets-Sheet 1

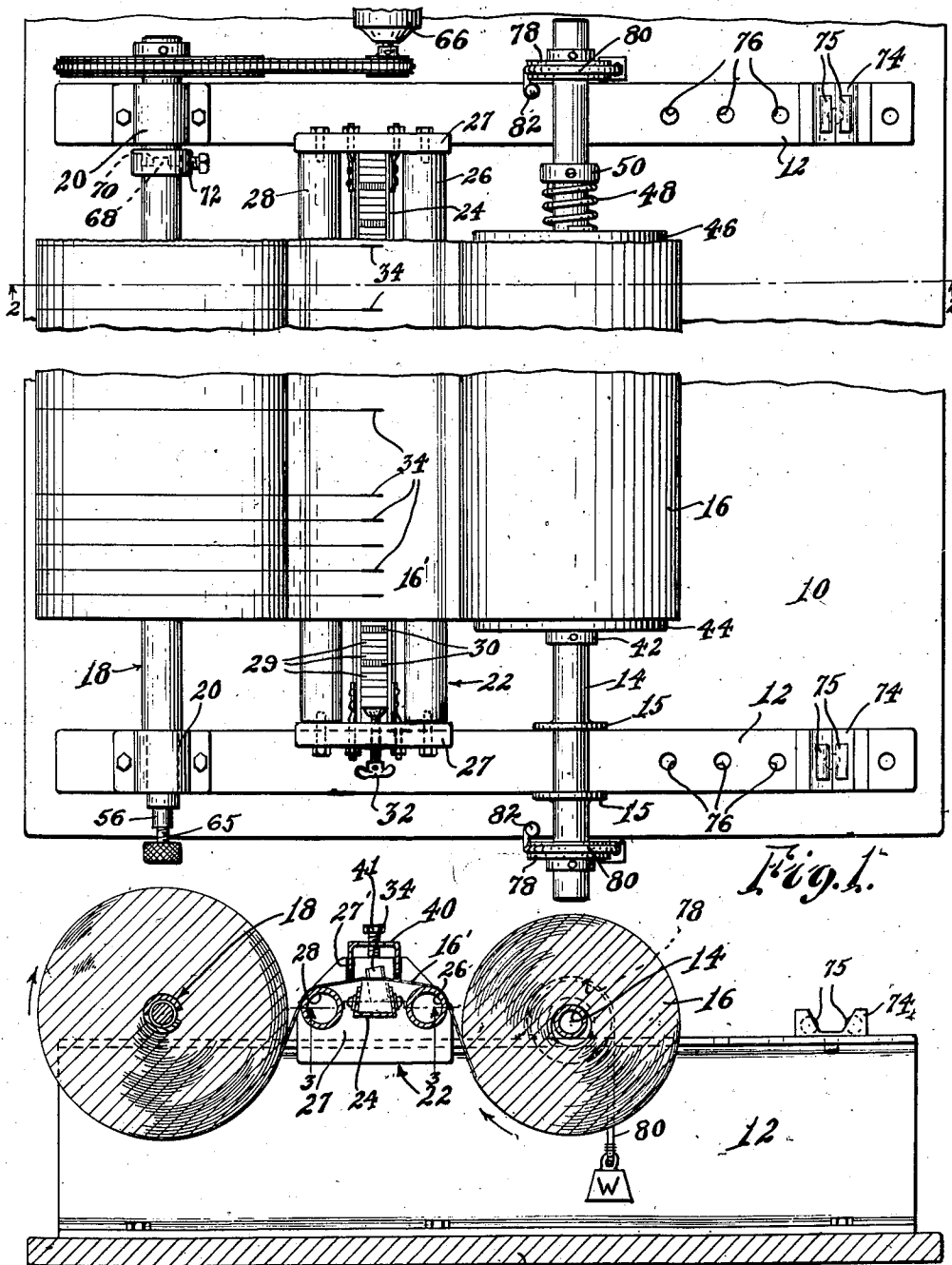


Fig. 2.

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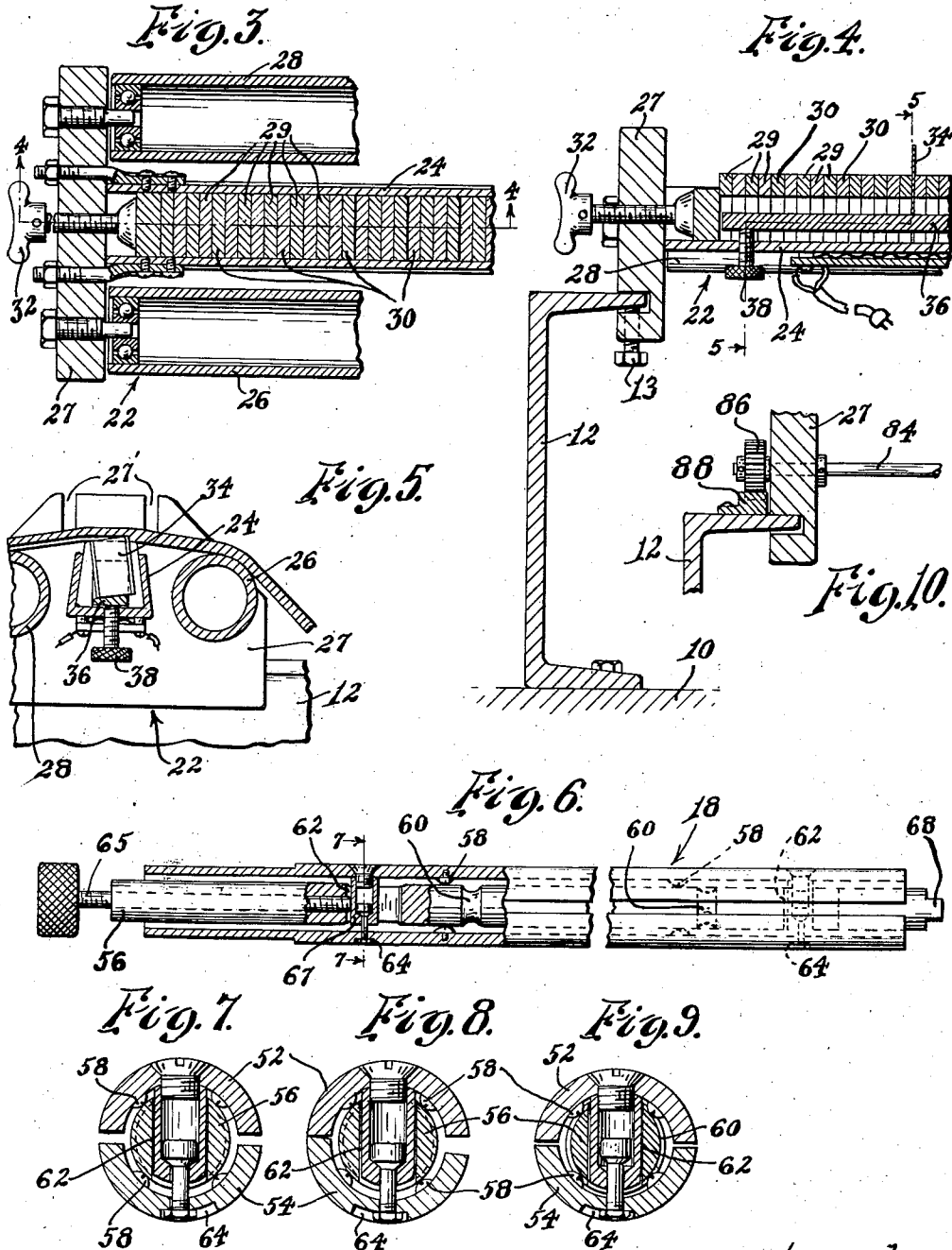
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MACHINE FOR CUTTING FLEXIBLE SHEET MATERIAL

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12 Claims. (Cl. 164—36)

This invention relates to improvements in machines for cutting flexible sheet materials.

More particularly it relates to machines for multiple straight cutting of leather, imitation leather, fabrics, paper, plasticized flexible sheets, and the like, thereby to provide multiple lengths of a particular material of predetermined exact width or widths cut from a roll of suitable greater width. Or, if desired, the multiple cutting may leave the sheet unsevered, each cut going only partially through the sheet material.

It is among the objects of the invention to provide so that a roll of flexible sheet material of any length and diameter of roll, and thus of any width of the material, may be quickly converted into a multiplicity of strips having like or different widths, which strips may be re-wound simultaneously with the cutting.

A feature is that the sheet material which is being cut may be spread out over a suitably broad area between the supply roll and the cutters, to permit inspection of the goods as the material advances to the cutters.

Another object is to provide a cutter carriage in which the cutters may be selectively spaced apart along the carriage, with a single clamp for securing the multiplicity of cutters, a feature being that the cutters periodically may be adjusted in the clamp to ultimately utilize the full extent of each cutting edge.

It is a feature that the cutter holder comprises multiple elements of predetermined width, some of which may be visually distinctive from others, whereby the holder can serve as an integrating means facilitating the setting of the cutters for particular widths of cutting.

Still another object is to provide so that the cutter carriage may be automatically adjusted to accommodate the growing rolls of cut material on a wind-up shaft beyond the carriage.

Yet another object is to provide a collapsible wind-up shaft, whereby the cut goods may be wound tightly directly on the shaft, and yet can be slipped from the shaft by collapsing the latter.

A further object is to provide for heating the cutters to improve the cutting of particular kinds of material.

Another feature is to provide so that the multiple cutters each can cut less than through the full thickness of relatively thick sheet material.

Still another feature is that means is provided for simultaneous raising or lowering of the several cutting blades.

It is, moreover, an important feature that

the said wind-up shaft may be driven from any suitable source of power, thereby to draw the sheet goods past the cutters, with precise and uniform cutting of predetermined widths of the material.

The mentioned objects and results may be attained by providing a delivery shaft on which the roll of material which is to be cut may be slipped loosely. Feed of the material preferably will be from the under side of the roll; and a wind-up shaft is spaced from the delivery shaft and may be driven from any suitable source of power, preferably in clockwise direction, so that the material will approach this shaft at its under side. A collapsible construction of the shaft may be employed and may provide a clamp for the leading edge of the material, so that rotation of the shaft draws the material from the delivery roll, as it is being wound on the shaft.

Between these two shafts is mounted a multiple-cutter carriage comprising a multiplicity of block elements movable into mutually compressive relation under the influence of a single end clamp. Thin cutting blades may be selectively arranged in cleavages between particular ones of said block elements projecting little or much above the tops of said blocks, so that a part of a cutting edge of each blade is exposed in direction toward the supply roll. Guide rollers may be mounted one at each side of the row of block elements, for guiding the sheet material respectively to the cutters and to the wind-up shaft. The cutter carriage, including the said guide rollers, is slidably mounted for movement toward and away from the wind-up shaft, thereby to permit the carriage to stand always close to the periphery of the wound-up material, and to be gradually pushed forward as the diameter of the wound-up mass increases. Thus the guide roller which is toward the wind-up shaft prevents lateral creeping of the cut strips.

The block elements of the cutter clamp may constitute integrating means for facilitating setting of blades for particular widths of cutting, either by marking them as a scale or by making blocks defining particular widths visually distinctive from others of the blocks.

Some goods can be cut with cleaner edge if the cutting is accompanied by heat, as in the case of sheets impregnated or coated with a substance which softens in the presence of heat. The present cutters may be suitably heated by an electric heating unit on the cutter carriage,

thereby to attain a flow condition which tends to fuse or seal each cut edge.

It is intended that the patent shall cover, by suitable expression in the appended claims, whatever features of patentable novelty exist in the invention disclosed.

In the accompanying drawings:

Figure 1 is a top plan of a machine embodying features of the invention, a mid-portion of the machine being broken away for conservation of space;

Figure 2 is a side elevation, in section on 2—2 of Figure 1;

Figure 3 is a top plan on a larger scale showing one end portion of the carriage, in section on 3—3 of Figure 2;

Figure 4 is a side elevation of the elements shown in Figure 3, in section on 4—4 of Figure 3 but having a heating unit added, and means for adjusting the vertical positions of blades;

Figure 5 is an elevation in section on 5—5 of Figure 4;

Figure 6 is an elevation with mid-part broken away and partly in medial section, showing features of the collapsible wind-up shaft;

Figure 7 is a cross-sectional view at 7—7 of Figure 6, on an enlarged scale;

Figure 8 is a similar view with parts in clamping relation;

Figure 9 is a similar view showing the shaft collapsed; and

Figure 10 is a detail fragment similar to Figure 5, showing a rack and pinion control of the cutter carriage.

Referring to the drawings, the table top 10 may be considered representative of any suitable support upon which the machine may be mounted. Also the two channel iron members 12, 12, one at each end of the table, are merely illustrative of fixed, parallel supporting guides which may be of any suitable size and shape, and spaced apart to suit requirements of machines designed to accommodate rolls of material of different lengths.

Laid loosely across from one to the other of the guides 12, 12, at the front of the machine, is a supply or delivery roll shaft 14 which preferably has fixed thereon the parallel faced elements 15, 15 for engaging opposite side edges of a guide 12 thereby to maintain shaft 14 approximately perpendicular to the guides 12, 12. The shaft 14 may be lifted and thrust through the axial hole of a roll of material 16, and be then laid back on the guides 12, 12, with the roll preferably arranged for take-off of the material from the under side of the roll.

Toward the rear of the machine a wind-up, power driven shaft 18 extends across from one to the other of the guides 12, 12, having its ends mounted in bearings 20, 20 on the guides. This shaft preferably will have a collapsible structure which is described in detail hereinafter. But whatever structure may be employed, means will be provided for securement to the shaft of the leading end of the sheet material 16' so that, as the shaft is rotated, the material will be drawn from the roll 16 and will be rewound, after having been cut, on the shaft 18.

Between the two shafts 14, 18 is a multiple-cutter carriage 22 extending across from one to the other of the guides 12, 12 and mounted slidably at each end on the said guides. The carriage comprises a block-filled channel 24 and two guide rollers 26, 28, each close up to the channel, one in front and one in rear thereof, 75

and both held at each end by the uprights 27, 27, which latter have tongue and groove sliding connection to the guides 12, 12, as seen in Figure 4.

The blocks 29, 30 which fill the channel 24 may be as thick or as thin as may be desired. They may be all of the same thickness as here shown, or they may vary in thickness. Also, by having particular ones of the blocks, such as those represented at 30, visually distinctive, the row of blocks can constitute integrating means which facilitates location of cutters for cutting desired widths of material.

The blocks stand on edge, face to face, in channel 24, nicely but slidably fitting the cross-sectional shape of the channel trough, with the top of each standing a little above the top edge of the channel. A clamp 32 at one end of the channel may be quickly adjusted to clamp the blocks tightly together, or to relieve pressure between them for insertion of cutting blades in cleavages between blocks, where they are securely held when the clamp is tightened.

It is a feature of the invention that thin blades 34 may be distributed at selected intervals along the channel 24, for simultaneous cutting of material. Obviously the blades may be set as near or as far apart as may be desired, and many blades as desired may be employed.

As only one point on the cutting edge of a blade engages and cuts the material in any particular setting of a blade, a dulling of cutting edge from continuous use can be quickly remedied by slight raising or lowering of the blades in their clamp to present a fresh portion of each blade edge for the cutting. The entire length of blade edge may be used by such periodic adjustments of blade. And, in case double edge blades are used, each blade may be turned around to use its other cutting edge in like manner, after the first edge has been suitably utilized.

The blades may be quickly adjusted individually by hand, but, if desired, a lifting and lowering bar 36 may engage under the series of blades so that all may be adjusted together by lifting or lowering the bar 36, while the clamp is loose, by means of the thumb screws 38, 38, one toward each end of the channel. The blocks 29, 30 in such case will be notched deeply at their under edges to accommodate the bar 36, as shown in Figures 4, 5.

As a measure of protection, a channel bar 40 may be arranged over the series of exposed blades, suitable notches 27' being formed in the uprights 27, 27 for retaining the bar covering the blades, but elevated slightly above the blocks to permit free passage of the sheet material to and from the cutters. A set screw 41, one at each end, provides for its adjustment.

Figure 2 shows the sheet material feeding from the under side of roll 16 up over the guide roller 26 and over the tops of the blocks 29, 30, where the blades 34 do their cutting, and thence over guide roller 28 to the under side of wind-up shaft 18 on which the cut material is wound directly.

In use the roll 16 of material may be spaced a considerable distance forward of the cutters, so that the operator will have a suitable spread area of the advancing material for inspection for flaws or irregularities. As represented in Figure 2, however, it is close up to the cutter carriage where it naturally is drawn unless held forward by the operator or in some other way. But in Figure 2 the spread area of material at 16' between roll 16 and the cutters can be inspected by the operator as the feed proceeds.

It is desirable in most cases to positively position the supply roll 16 on its shaft 14, as by a collar 42 which may be suitably fixed on the shaft for constituting an abutment at one end of the roll 16, preferably with facing disk 44 intervening between the collar and the end of roll 16. At the other end a similar facing disk 46 may engage the end of the roll, pressed yieldingly against it by a spring 48 based against an adjustable collar 50. In this manner the roll is maintained in proper shape, and the delivery of the sheet to the cutter carriage is maintained uniformly even and regular.

Referring now to Figures 6-9, shaft 18 is shown as collapsible. It comprises two semi-cylindrical sections 52, 54 and an axial rod 56, the latter being a support for the sections 52, 54, as in Figures 6-8, and being shiftable axially for permitting collapse of the shaft by closing of the sections 52, 54 toward each other, as in Figure 9.

As illustrated, the sections 52, 54 have interiorly spaced-apart annular rows of screw heads 58 constituting in effect annular ridges interiorly of the sections. Rod 56 has similarly spaced-apart annular grooves 60 which normally stand to one side of the screw heads 58, so that the screw heads engage the periphery of rod 56, as in Figures 6 and 7, with the sections 52, 54 spread apart. One or more elongated slots 62 may be provided in rod 56, for accommodating means tying the sections 52, 54 loosely together, so that the rod 56 may be shifted axially a needed amount without interference from the tie. Also an annular groove 64 is provided exteriorly of the section 54 at the tie, so that the sections may be rotated a little relatively, to bring adjacent ends of the sections, at one side of the shaft, into clamping relation, as in Figure 8, for pinching the leading end of the sheet material.

After the material has been wound on shaft 18, it may be easily slipped off by shifting rod 56 to bring its grooves 60 into register with the screw heads 58, thus permitting the sections to close toward each other as in Figure 9. However, Figure 9 shows the sections slightly spaced in their closed position of Figure 9, so that the leading end of the sheet material is released.

Collapsing of the shaft may be effected by shifting rod 56 in any desired manner. As illustrated, a thumb screw 65 is threaded into one end of rod 56 to engage a rigid part 67 of one of the tie means, whereby the rod 56 may be shifted for collapsing the shaft by turning screw 65.

Drive of shaft 18 may be accomplished in any desired manner, as by chain and sprocket drive from a motor 66. As illustrated, the shaft 18 has its split portion separable from its portion at the extreme drive end, a key lug 68 fitting in a groove 70 within a collar 72 for getting a separable driving connection. The motor may have variable speed.

If desired, the supply roll shaft 14 may be mounted in bearing elements 74 adjustable along the guides 12, 12, as seen in Figures 1 and 2, preferably with roller bearings 75 in each element 74. Holes 76 may be provided for receiving a suitable lug on the under side of each element 74. However, in Figures 1 and 2 the roll 16 is close up to the cutter carriage and requires no such bearing elements.

In some cases it may be desirable to have braking means acting on shaft 14, to ensure tight winding of the cut material. This may be accomplished by providing a pulley 78 at each end of the shaft about each of which may be trained

a weighted cable 80 having one end anchored, as at 82 on a guide 12.

Also it may be desirable in some cases to ensure that both ends of the cutter carriage shall have precisely the same movement as the carriage shifts from or toward the wind-up shaft 18. In Figure 10 a shaft 84 extends from end to end of the carriage and has fixed on each end a pinion 86 which meshes with a rack 88 on the top of each guide 12. By this means the carriage may be set parallel to the wind-up shaft 18, and continue so; or it may be set a little out of parallelism with shaft 18 and continue in that relation as it moves toward and away from the shaft. This latter relation may be desirable in case a sheet is thicker at one side region than at the other.

The carriage 22 may have at each end a set screw 13 (Figure 4) for securing it in a particular position along the guides 12, 12.

The mentioned pinion and rack control of the carriage has the further advantage that relatively small sheets may be cut by clamping one end at the wind-up shaft and spreading the body of sheet forward over the cutter carriage, causing the cutters to puncture the sheet close up to the wind-up shaft 18. Then, by pushing the carriage forward, the sheet may be cut into strips, excepting the part adjacent to the wind-up shaft. And, after removal of the material, the cuts may be easily extended through this initially uncut region.

I claim as my invention:

1. In a machine for cutting sheet material, a cutter holder past which the sheet material in spread relation is to be drawn for the cutting, comprising a channel extending across and adjacent to the course of the sheet material; a multiplicity of elements resting on the bottom of the channel and slidable along the channel, said elements projecting uniformly out of said channel for constituting collectively a support for the sheet material at the region of cutting; clamping means for clamping said elements in mutually engaging relation in the channel; and cutter blades intervening between selected ones of said elements and clamped thereby close to the line of cutting by each blade, each blade having at least a part of a cutting edge toward the supply of material and projecting into the course of said material.

2. In a machine for cutting flexible sheet material, a support for rotatably holding a supply roll of the material which is to be cut, and a rotatable support parallel to the first said support for winding the cut material thereon, combined with a cutter-holding carriage over which the material is drawn by the wind-up support from the supply support; said carriage being between and parallel to said supports and slidable toward and away from the second said support, and comprising a channel and a multiplicity of elements slidable along the channel; there being means for clamping said elements in mutually engaging relation in the channel; and cutting blades intervening between selected ones of said elements, each blade having at least a part of a cutting edge toward said supply support and projecting into the course of the said sheet material.

3. In a cutting machine, the combination as in claim 2 in which the support for rotatably holding a supply roll of material is a shaft having a relatively fixed abutment thereon for engaging one end of the roll of material, and having a spring-pressed abutment for engaging the other

end of the roll thereby to stabilize the roll against lateral creeping of the sheet material.

4. In a cutting machine, the combination as in claim 1, in which the cutter blades are adjustable in and out relative to their clamping elements thereby to set different points on the cutting edges in the line of cutting.

5. In a cutting machine, the combination as in claim 2 in which the support for rotatably holding a supply roll of material is a shaft, and there is a braking means operative on the shaft for ensuring tension in the sheet material at the location of cutting, and tight winding of the cut material on the wind-up support.

6. In a cutting machine, the combination as in claim 2 in which said elements have plane faces set across the direction of extent of the channel, and said blades are thin straight edge cutters clamped between said plane faces of said selected ones of said elements.

7. In a cutting machine, the combination as in claim 2 in which said elements are aligned in the channel and there is a relatively fixed abutment at one end of the line of elements, and said clamping means engages the other end of the line of elements.

8. In a cutting machine, the combination as in claim 2 in which the channel extends from end to end of the machine, and there is a pair of rollers, one extending parallel to the channel forward thereof and the other extending parallel to the channel rearward thereof, for guiding the

sheet material to and from the region over the channel.

9. In a cutting machine, the combination as in claim 2 in which there is adjustable means for engaging the under edges of said blades for simultaneously raising and lowering the blades with respect to the course of said sheet material.

10. In a cutting machine, the combination as in claim 2 in which heating means extends along the under side of the channel for heating the cutting blades.

11. In a cutting machine, the combination as in claim 2 in which there is an inverted channel removably mounted on the cutter-holding carriage and covering projecting portions of the blades, the sides of the inverted channel extending close to the course of the sheet material, one forward of and the other rearward of the blades, and constituting spaced abutments restraining the sheet material against spreading away from the clamping elements during the cutting.

12. In a cutting machine, the combination as in claim 2 in which a pair of rollers extend parallel to the channel, one forward thereof and the other rearward thereof, the latter said roller having predetermined dimensions whereby a particular length of material passes over the shaft per each rotation of the shaft.

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