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GUILLOTINES FOR SHEARING PLATE MATERIALS

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Fig. 1

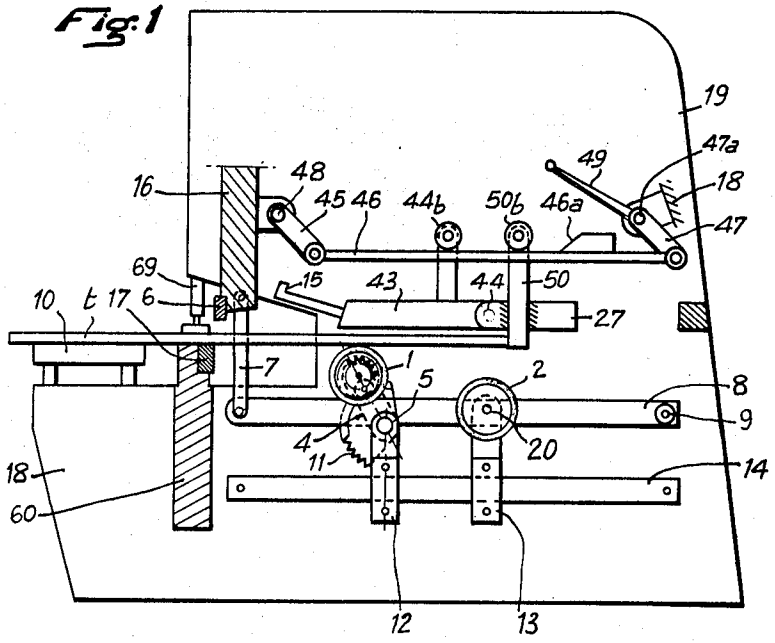
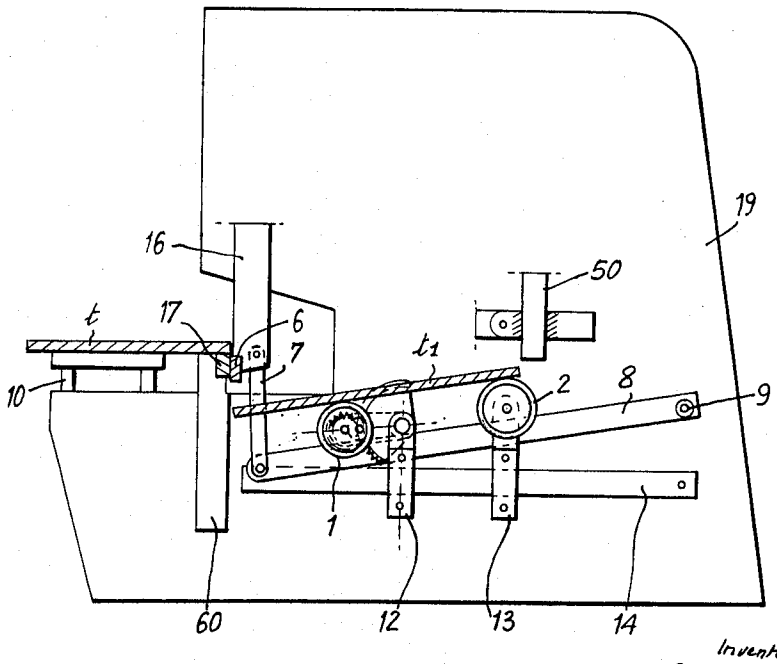



Fig. 2




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Fig. 3

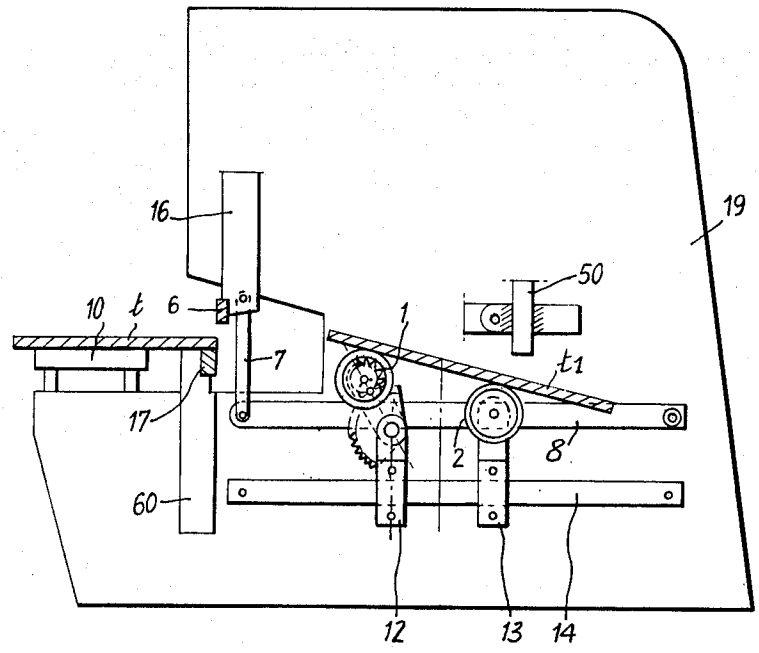
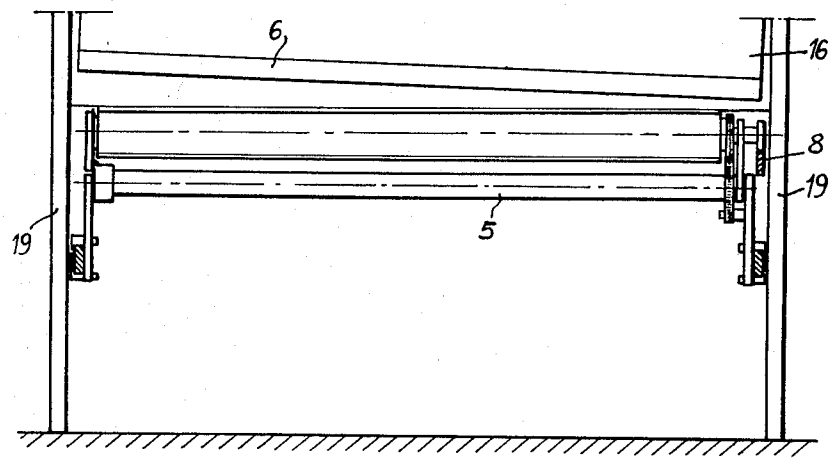



Fig. 4




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Fig: 5

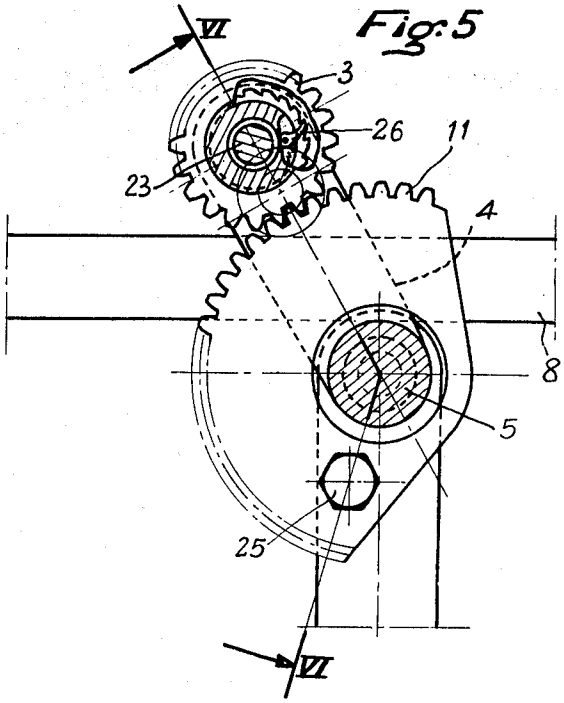
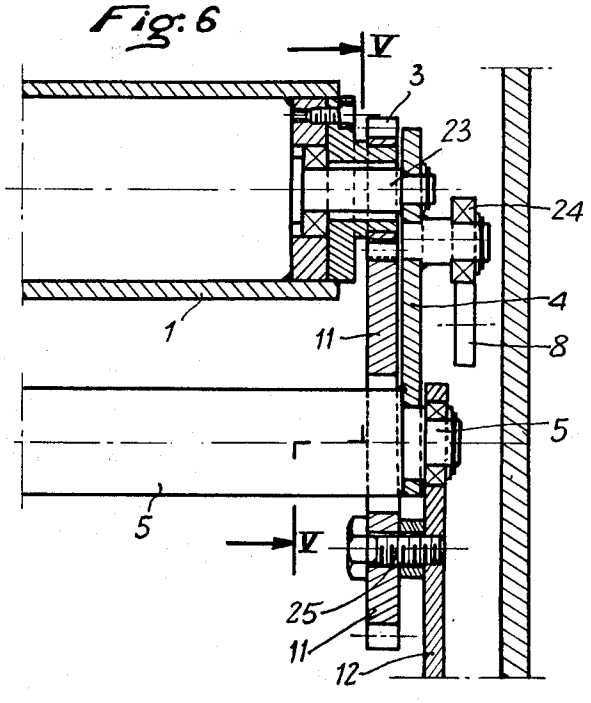



Fig: 6




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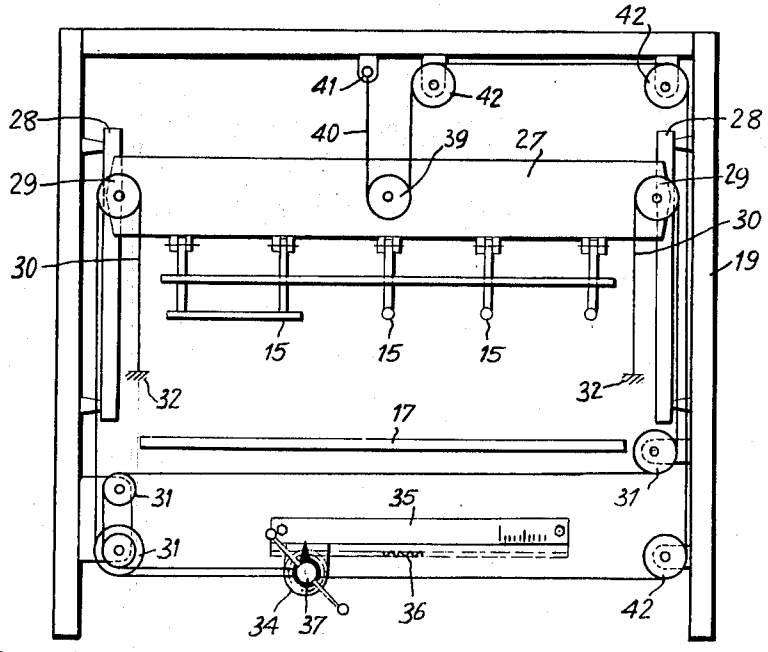
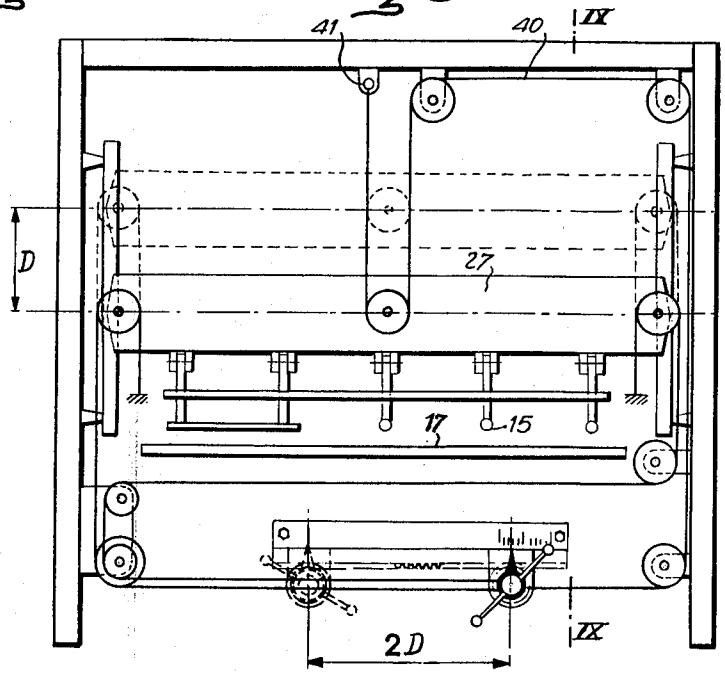



Fig: 7

Fig: 8




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Fig. 9

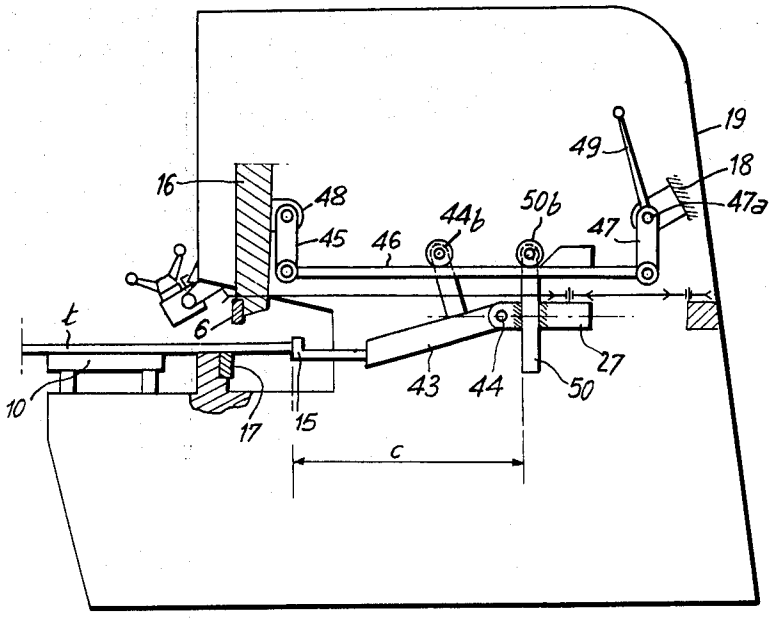
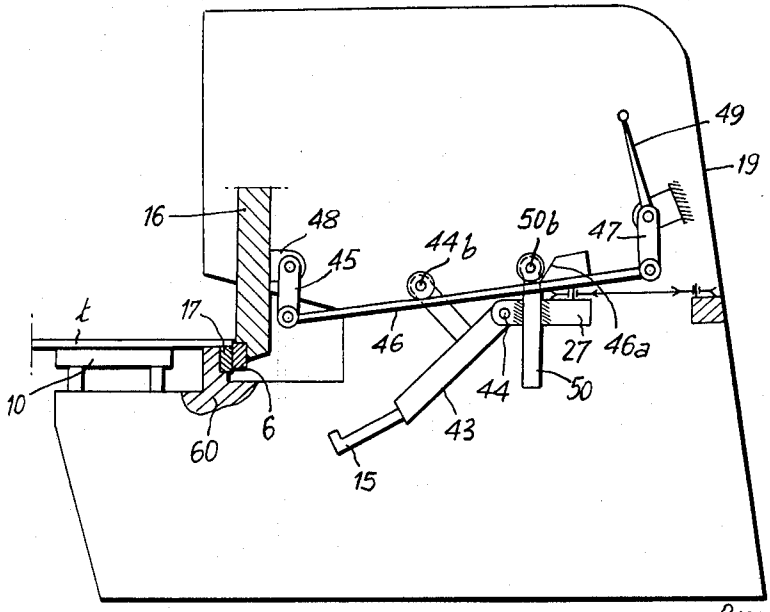



Fig. 10



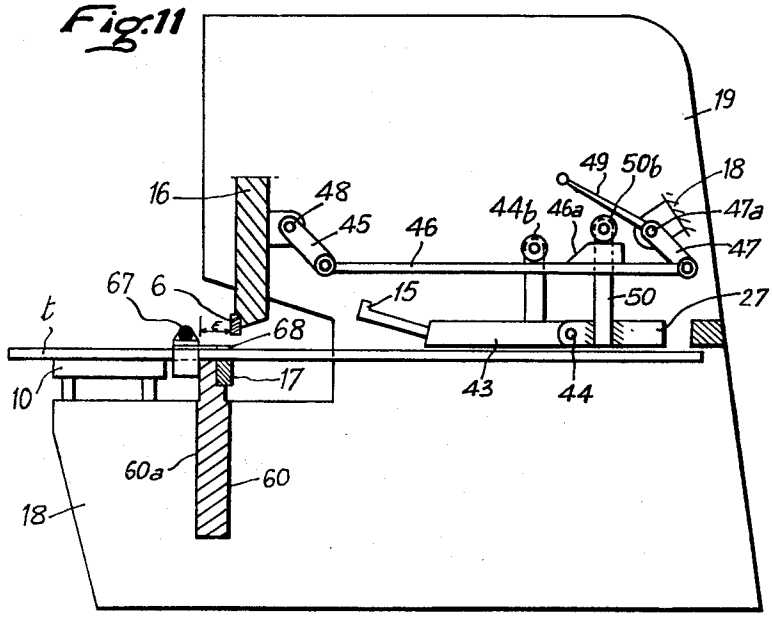

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Fig. 11




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Fig. 12

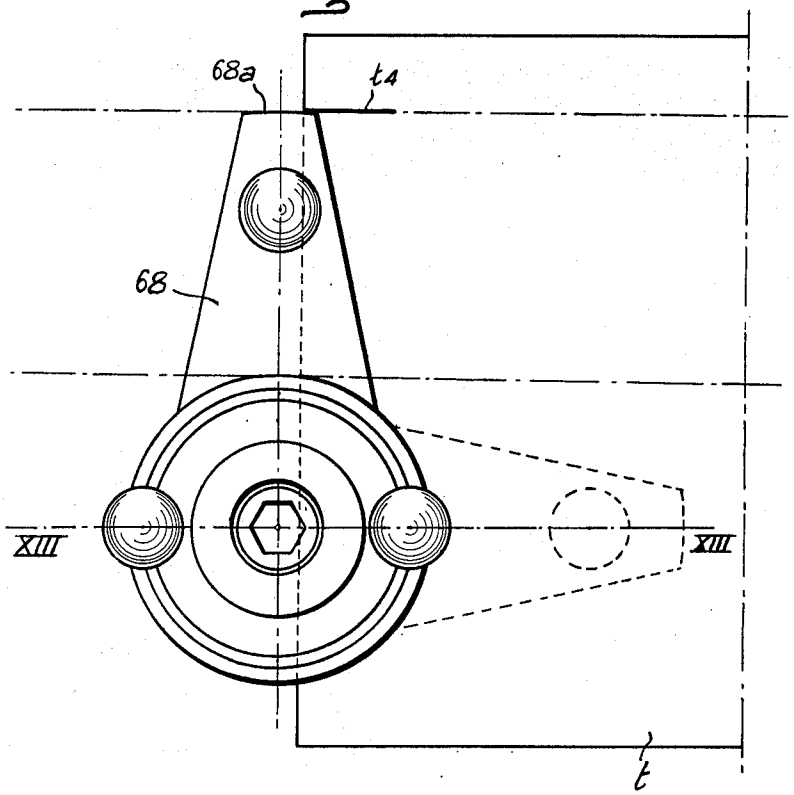
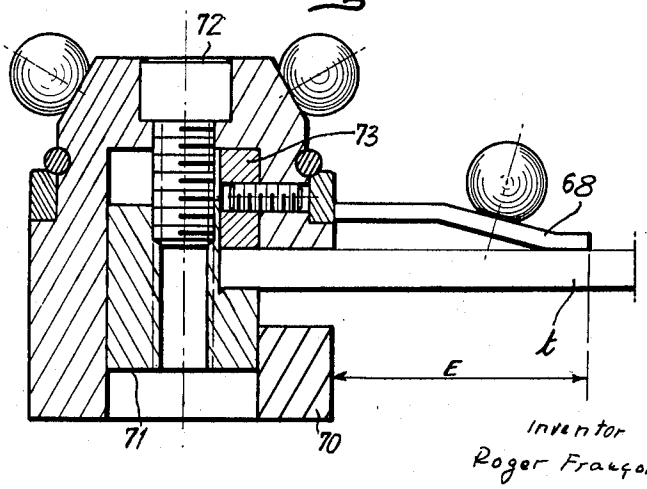



Fig. 13




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United States Patent Office 3,260,145 Patented July 12, 1966



3,260,145

# GUILLOTINES FOR SHEARING PLATE MATERIALS

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Claims priority, application France, June 8, 1962, 900,165; June 14, 1962, 900,719; Mar. 29, 1963, 929,738
10 Claims. (Cl. 83—391)

This invention relates to guillotines for shearing plate materials.

In a guillotine according to the invention a position adjustable back-stop or back-stops are located adjacent a pair of shearing blades comprising fixed lower and movable upper blades so that a plate to be cut can be located in a selected position between the blades by the abutment of its edge against the back-stop or back-stops and a roller or rollers are provided on the same side of the blades as the stop or stops for supporting that part of the plate projecting through the blades.

Preferably there are two or more rollers spaced apart in a direction extending away from the blades and means are provided for raising the roller nearest the blades after shearing has taken place so that the cut off portion of plate is tipped away from the blades. This can conveniently be effected by interconnecting the roller with a movable apron which carries the movable blade.

So that the invention will be better understood an example of a machine in accordance with it will now be described with reference to the accompanying drawings in which:

FIGURE 1 is a section of a shearing machine according to the invention, the section being perpendicular to the plane of shearing.

FIGURES 2 and 3 are sections similar to that of FIGURE 1 showing two portions of a support for the plate to be sheared during and after the shearing operation respectively.

FIGURE 4 is a view of the support device from the rear of the machine.

FIGURE 5 is a section of a part of the support device along line V—V of FIGURE 6.

FIGURE 6 is a section of the same part as in FIGURE 5 taken along line VI—VI of FIGURE 5.

FIGURES 7 and 8 are diagrammatic horizontal section views through the machine showing details of means for controlling the position of plate positioning stops.

FIGURES 9 and 10 are two sections similar to FIGURE 1 showing schematically two positions of the plate positioning back-stops.

FIGURE 11 is a section similar to FIGURE 1 showing means whereby a plate to be cut is maintained in position by means other than back-stops.

FIGURE 12 is a plan of stop-pliers for setting the position of a plate to be sheared; and

FIGURE 13 is a section along the line XIII—XIII of FIGURE 12.

Referring to the drawings, the shears shown incorporates a lower blade **17** fastened to a stationary apron **60**, and an upper blade **6** fastened to a movable apron **16**, both being mounted in a frame **18** comprising two laterally spaced uprights **19** and a latticed table.

The plate *t* to be sheared lies before shearing upon table **10** and upon a guide-roller **1** which prevents the plate *t* from yielding and thus passing back-stops **50** which are intended to limit the introduction of the plate *t* into the shears. Another guide-roller **2** is also provided. The rollers **1** and **2** preferably extend over the entire length between the two uprights **19**.

The roller **2** can be composed of several separate



rollers. In any case, the roller or the rollers **2** are mounted for free rotation upon a shaft **20**. Shaft **20** is supported by two supports **13** in the vicinity of its extremities. These supports **13** can be shifted on slide-bars **14** integral with the uprights **19** of the frame **18**.

Fastened at one extremity of roller **1** is a gear-wheel **3** (FIGURES 5 and 6). The roller **1** and the gear-wheel **3** form an integral assembly, which is mounted loosely upon two pivots **23** carried by levers **4**. Each gear-wheel **3** engages with a sector-gear **11** which is fastened by a screw **25** to a support **12** arranged so as to be displaceable on the slide-bar **14**. A ratchet **26** carried by the arm **4** co-operates with internal teeth of gear-wheel **3** thereby preventing the roller **1** from turning in one direction. The levers **4** are integral with a torsion-bar **5**, having its extremities mounted freely upon the supports **12**.

Supports **12** can be displaced on the slide-bars **14**, this permitting adjustment of the position of roller **1** with respect to the plane of shearing, so that the plate *t* tends, after being cut, to swing backwards in order to bear against roller **2**. Furthermore, the levers **4** bear a live-roller **24** which can roll on a bar **8**. The bar **8** is linked at one of its extremities to a pivot **9** carried by the frame **18**, while its other extremity is linked to the lower extremity of a connecting-rod **7**, having its other extremity linked to the apron **16**.

Before shearing, the plate *t* to be sheared lies upon the table **10**, apron **60**, lower tool **17** and roller **1**, and its position is determined by the "secondary" stops **50** (to be referred to later on) as seen in FIGURE 1.

During the shearing, the apron **16** moves down and causes, by means of the connecting-rod **7**, the tilting of the bar **8** in a counterclockwise direction. At the end of the shearing (i.e. position shown in FIGURE 2) the sheared portion $t_1$ of the plate *t* lies on the rollers **1** and **2**.

After shearing (FIGURE 3), the apron **16** moves upward, drawing the bar **8** with it which, in turn, causes the levers **4** and the bar **5** to pivot through the intermediary of the live-rollers **24**. The ratchet-wheel **3**, which engages with the sector-gear **11** communicates to the roller **1** a clockwise rotation. This rotation facilitates the removal of the sheared plate $t_1$.

The position of the rollers **1** and **2** with respect to the plane of shearing can be adjusted by sliding of the supports **12** and **13** on the slide-bars **14** and by clamping on the latter by any appropriate means.

The back-stops **15** are mounted upon a cross-bar **27** (FIGURE 7) extending across the width of the machine. Cross-bar **27** is guided by two slide-bars **28** which are attached to the frame **18**. It can be displaced towards the blade **17** by means of a pulley system of which the pulleys **29** are mounted upon the cross-bar **27** and of which the cables or chains **30** pass over the pulleys **29** and return pulleys **31**, and are attached at one of their extremities to the frame **18** at **32**, and at the other extremity to a carriage **34**. This carriage is movable along a graduate ruler **35** and a rack **36**, both integral with the frame, and for this purpose this rack engages with a pinion integral with a control-handle **37** carried by the carriage **34**.

The cross-bar **27** is drawn away from the blade **17** and the cables **30** are kept under tension by means of a pulley-block comprising a pulley **39** mounted in the middle of the cross-bar **27** and by a cable **40**, moored at one of its extremities to the frame **18** at **41** and at the other extremity to the carriage **34** throughout the intermediary of return-pulleys **42**.

The FIGURE 8 shows the cross-bar **27** bearing the stops **15** in an advanced position removed with respect to its rear position shown in FIGURE 7, a distance D, while the drawing-carriage **34** has been displaced, a distance 2D. This difference in distance results from an appropriate

selection of the pulley arrangement and provides for double the accuracy in setting the carriage and therefore the stops. It also halves the effort required in the displacement of cross-bar 27.

Referring now to FIGURE 9 the stop-holder device is essentially composed by arms 43 oscillating around a shaft 44 mounted in cross-bar 27. This shaft 44 is above the plane of shearing and is so arranged that during the cut, the gyration of the oscillating arms 43, as shown in FIGURE 1, and as explained hereafter, releases and frees the sheared portion $t_1$ of the plate $t$.

The oscillating arms 43 are hung on a live-roller 44*b* rolling on the member 46 of a parallelogram linkage which comprises members 45, 46, 47. This linkage is pivoted at 48 on the movable apron 16 and at 47*a* on the frame 18.

When the apron 16 moves down in the position shown in FIGURE 10, the member 46 moves down and permits the releasing of arm 43 and its associated stop 15 allowing it to pivot around shaft 44.

The cross-bar 27 comprises holes which are located rearwardly of the shaft 44 and through which holes secondary stops 50 pass. These stops 50 are used only if the width of the portion $t_1$ to be sheared is larger than the maximum stroke of the cross-bar 27.

Each of the stops 50 is hung on a live-roller 50*b* running on the member 46 of the parallelogram linkage 45, 46, 47. The linkage 45, 46, 47, may be raised to the position shown in FIGURE 1 by means of a control arm 49 integral with the member 47 (FIGURES 9, 10, 11) and when the linkage is raised the stops 15 are no longer effective for the positioning of the plate $t$, the sole means for positioning them being the secondary stops 50.

The position of the secondary stops 50 with respect to the cutting line is determined by the position of the cross-bar 27. Now, if for example we call "C" the distance between the stops 15 and 50 (FIGURE 9) it will be possible by appropriate design of the machine to butt the plate $t$ with the stops 15 when the width of the sheared portion $t_1$ of the plate $t$ is equal or inferior to "C," or with the stops 50 when the portion $t_1$ of the plate $t$ is comprised betwen "C" and "2C."

The shears of the invention can also be provided with means whereby the piece of plate to be sheared off can be greater than is allowed for by the stops 15 and 50. Such means can comprise a cam 46*a* mounted on member 46 whereby, by bringing the cross-bar 27 into its most remote position from the cutting line, and by maintaining the arm 49 in the position shown in FIGURE 1, the live-roller 50*b* passes on the cam 46*a*, this having the effect of causing the stop 50 to be withdrawn as seen in FIGURE 11. In these conditions, the plate $t$ no longer butts a stop and its position has to be adjusted by lining up the plate relatively to the blades normally having regard to a preliminary layout marked on the plate or by any other means such as the one described hereafter.

By construction, the thickness E (FIGURE 11) of the stationary apron 60, which bears the blade 17, is constant over its entire length. The cutting or working line of the shears is therefore a distance E from the other front face 60*a* of the apron 60. To set the plate it is first marked out with a line along which shearing is to take place and then stop-pliers 67 (FIGURES 12–13) are clamped to the plate as will be described hereinafter.

The stop-pliers 67 comprise an index 68 (FIGURE 13) having a length equal to E.

To use the stop-pliers 67, the extreme edge $t_2$ of the plate which extends at right angles to the line of shear is introduced between jaws 71 and 73 of the stop-pliers 67. The stop-pliers 67 is placed in such manner that the extremity 68*a* of its index 68 extends along line $t_4$ along which the plate $t$ is to be sheared, as represented in FIGURE 12. The stop pliers 67 is then locked upon the plate $t$ in this position by means of the screw 72 by clamping the plate $t$ between the jaws 71 and 73.



Another pair of stop-pliers 67 is similarly applied to the edge of plate $t$ opposite to $t_2$.

Thereafter the index 68 of the pliers is rotated through 90 to the position shown in dotted lines in FIGURE 12. The plate $t$ provided with its two stop-pliers is then brought into the shears so that the bodies 70 of the stop-pliers 67 butt against the front face 60*a* of the apron 60 and since the body 70 is circular the line $t_4$ must necessarily be in the correct place for shearing.

The plate $t$ is fastened by means of the hold-down jacks 69 (FIGURE 1) and the plate sheared.

What I claim is:

1. In a shearing apparatus, in combination, support means; a first shear blade having a cutting edge and being fixedly mounted on said support means; a second shear blade having a cutting edge and being mounted on said support means movable between an open position in which its cutting edge is spaced from said cutting edge of said first blade to define an opening between said cutting edges so that a blank to be sheared may be fed from one side through said opening with a portion of the blank extending to the other side of said opening, and an operative position in which said cutting edge of said second blade is moved beyond that of said first blade; stop means located at said other side and adapted to engage the leading edge of a blank fed through said opening to limit the feed of the blank through said opening; means mounting said stop means on said support means movable toward and away from said blades, said mounting means including a cross bar extending substantially parallel to said blades and a pair of elongated guide means fixed spaced from and substantially parallel to each other to said support means and respectively engaged by opposite ends of said cross bar for guiding the latter during movement thereof toward and away from said blades said stop means including at least one arm pivotally connected at one end thereof to said cross bar for tilting movement about an axis extending parallel to the elongation of said cross bar, said arm having at the free end thereof an abutment face adapted to abut against the leading edge of a blank fed through said opening between said blades; and moving means operatively connected to said mounting means for moving the latter toward and away from said blades and for maintaining the position of said mounting means and said stop means carried thereby at a selected distance from said blades.

2. A shearing apparatus as set forth in claim 1, wherein said stationary blade is the lower blade of the shearing apparatus and wherein said pivot axis of said arm is located at a higher elevation than the cutting edge of said lower stationary blade.

3. A shearing apparatus as set forth in claim 2 and including connecting means between said movable blade and said arm so that the latter tilts during movement of said movable blade.

4. A shearing apparatus as set forth in claim 3, wherein said connecting means include a pair of short links respectively pivotally connected at upper ends thereof to said movable blade and said support means, an elongated link extending between and pivotally connected at opposite ends thereof to the lower ends of said short links, respectively, and means slidably and tiltably engaging said elongated link and connected to said arm intermediate the ends thereof.

5. A shearing apparatus as set forth in claim 4 and including second stop means comprising an elongated member extending through an opening in said cross bar to be guided therein and having an upper end slidably engaging said elongated link to be carried thereby.

6. A shearing apparatus as set forth in claim 5 and including means cooperating with said upper end of said elongated member for moving the same between an operative position in which the lower end thereof is located in the plane of a blank moved through said opening

between said blades, and an inoperative position moved upwardly out of said plane.

7. A shearing apparatus as set forth in claim 6, wherein said means cooperating with said upper end of said elongated member comprise a cam on said elongated link, and means cooperating with one of said links for shifting said elongated link in a direction so as to move said cam into engagement with said upper end of said elongated member to move the latter from said operative to said inoperative position thereof.

8. In a shearing apparatus, in combination, support means; a first shear blade having a cutting edge and being fixedly mounted on said support means; a second shear blade having a cutting edge and being mounted on said support means movable between an open position in which its cutting edge is spaced from said cutting edge of said first blade to define an opening between said cutting edge so that a blank to be sheared may be fed from one side through said opening with a portion of the blank extending to the other side of said opening, and an operative position in which said cutting edge of said second blade is moved beyond that of said first blade; stop means located at said other side and adapted to engage the leading edge of a blank fed through said opening to limit the feed of the blank through said opening; means mounting said stop means on said support means movable toward and away from said blades, said mounting means including an elongated cross bar extending substantially parallel to said blades; and moving means operatively connected to said mounting means for moving the latter toward and away from said blades and for maintaining the position of said mounting means and said stop means carried thereby at a selected distance from said blades, said moving means including a first pulley system operatively connected to said mounting means at opposite ends of said cross bar and a second pulley system operatively connected to a substantially central portion of said cross bar, one of said pulley systems for moving said mounting means toward said blades and the other for moving said mounting means away from said blades.

9. In a shearing apparatus, in combination, support means; a first shear blade having a cutting edge and being fixedly mounted on said support means; a second shear blade having a cutting edge and being mounted on said support means movable between an open position in which its cutting edge is spaced from said cutting edge of said first blade to define an opening between said cutting edges so that a blank to be sheared may be fed from one side through said opening with a portion of the blank extending to the other side of said opening, and an operative position in which said cutting edge of said second blade is moved beyond that of said first blade; stop means located at said other side and adapted to engage the leading edge if a blank fed through said opening to limit the feed of the blank through said opening; means mounting said stop means on said support means movable toward and away from said blades, said mounting means including a cross bar extending substantially parallel to said blades and guide means on said support means and engaging opposite ends of said cross bar for guiding the latter during movement thereof toward and away from said blades; and moving means operatively connected to said mounting means for moving the latter toward and away from said blades and for maintaining the position of said mounting means and said stop means carried thereby at a selected distance from said blades, said moving means including a carriage mounted on said support means movable in a direction parallel to the elongation of said cross bar, a pair of pulleys respectively mounted on opposite ends of said cross bar, a third pulley mounted on a substantially central portion of said cross bar, an elongated flexible element for each of said pulleys and guided over the respective pulley, each of said elongated flexible elements having one end fixed to said support means, and another end fixed to said carriage, and additional guide pulleys mounted on said support means and guiding said flexible elements in such a manner so as to move said cross bar and the stop means carried thereby toward said blades during movement of said carriage in one direction and to move said cross bar away from said blades during movement of said carriage in a direction opposite said one direction.

10. In a shearing apparatus as set forth in claim 9 and including a graduated member extending substantially parallel to the elongation of said cross bar for guiding said carriage during movement thereof, a rack connected to said graduated member, a gear turnably mounted on said carriage and meshing with said rack, and means fixed to said gear for turning the same about its axis.




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