

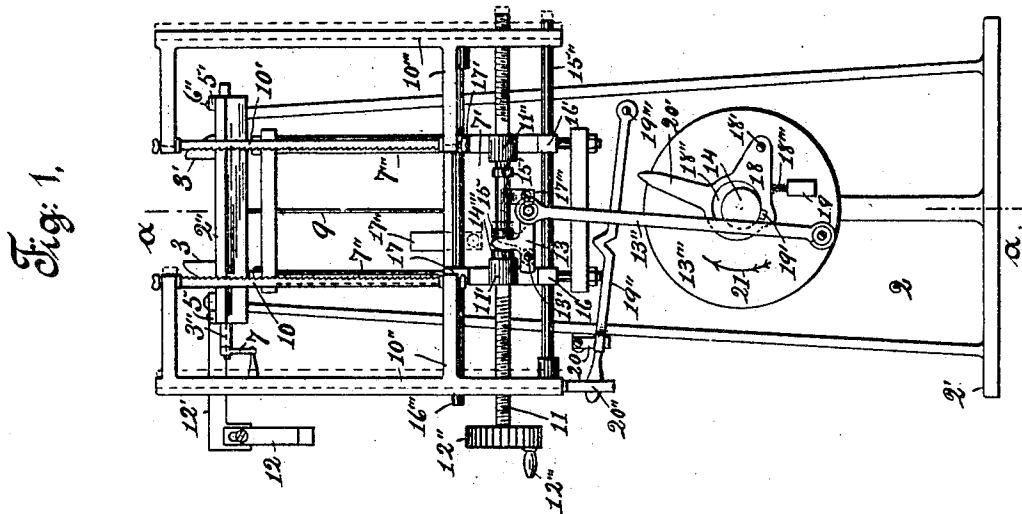
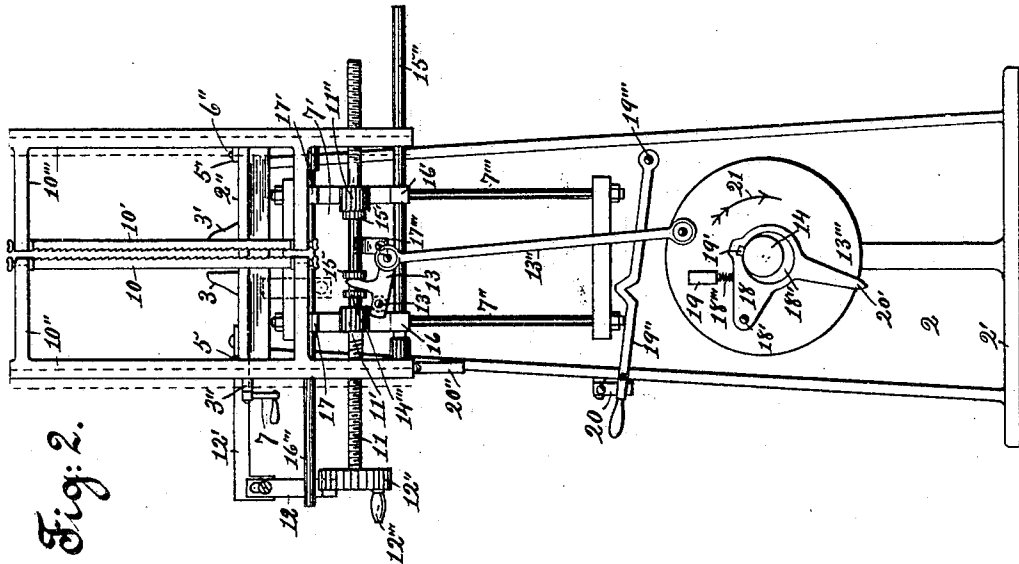
No. 766,495.

PATENTED AUG. 2, 1904.

H. DALGETY.
MULTIPLE SAWING APPARATUS.
APPLICATION FILED MAY 4, 1903.

NO MODEL.

2 SHEETS—SHEET 1.



Witnesses:
Max B. T. Döring
J. F. Kneass

Inventor:
Hubert Dalgety

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2 SHEETS—SHEET 2.

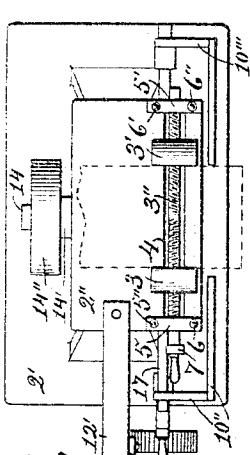


Fig. 5.

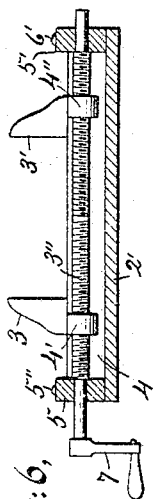


Fig. 6.

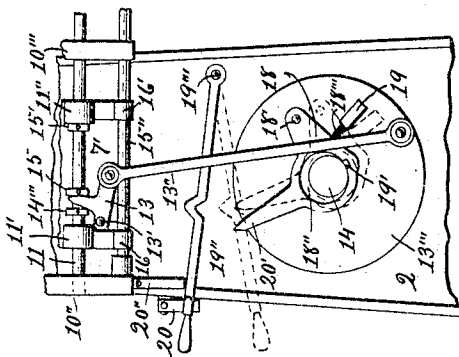


Fig. 7.

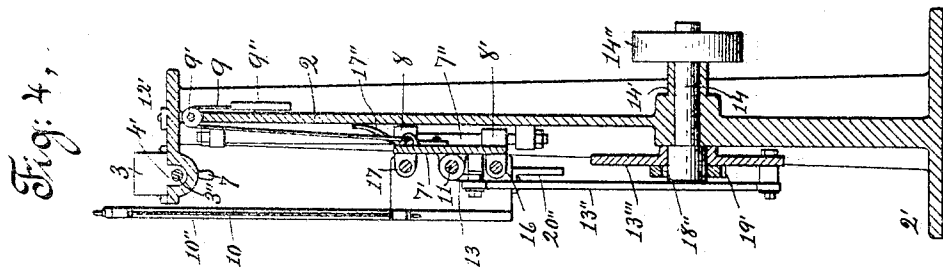


Fig. 4.

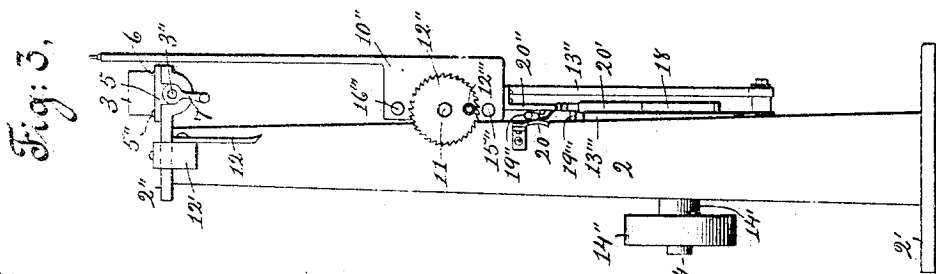


Fig. 3.

Witnesses:
Chas. H. Loring.
J. Buchanan Jr.

Inventor:
Herbert Dalgety

UNITED STATES PATENT OFFICE.

HERBERT DALGETY, OF EAST YONKERS, NEW YORK.

MULTIPLE-SAWING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 766,495, dated August 2, 1904.

Application filed May 4, 1903. Serial No. 155,487. (No model.)

To all whom it may concern:

Be it known that I, HERBERT DALGETY, a subject of the King of Great Britain, and a resident of East Yonkers, in the county of Westchester and State of New York, have invented certain new and useful Improvements in Multiple-Sawing Apparatus, which improvements are fully set forth in the following specification.

This invention relates to improvements in mechanical contrivances of that class employed for the purpose of kerfing or severing material, particularly metallic stock, such contrivances being commonly known as "sawing apparatus."

The object of this invention is to provide a multiple-sawing apparatus which shall be simple and inexpensive as regards construction, durable, expeditious, and reliable in practical service, capable of attacking the material to be acted upon at opposite sides or points thereof, which shall insure a marked degree of convenience to the user in applying the same to practical purposes, which shall be compact, portable, and substantially automatic in operation, and which shall possess certain well-defined advantages over prior analogous constructions.

The invention consists in the novel disposition and relative arrangement of the various parts thereof, whereby the attainment of the above object is rendered practicable in certain combinations and in certain details of construction, all of which will be specifically referred to hereinafter and set forth in the appended claims.

The invention is clearly illustrated in the accompanying drawings, wherein similar reference-numerals denote corresponding parts throughout the several views, and as to said drawings Figure 1 is a front elevation of a multiple-sawing apparatus embodying my said improvements, the saw-carriage being in readiness for a thrust away from the main shaft of the apparatus. Fig. 2 is a view similar to Fig. 1, the reciprocating carriage being in readiness for a return thrust or a thrust in the direction of the main shaft of the apparatus. Fig. 3 is a view in elevation of the left side of the apparatus as seen in Fig. 1,

the movable parts of the apparatus occupying the positions indicated in the figure last named. Fig. 4 is a central vertical section along the line *a a* of Fig. 1. Fig. 5 is a plan view of the apparatus. Fig. 6 is a detail view showing the clamping mechanism which I purpose to make use of, the scale being enlarged. Fig. 7 is a detail view showing the clutch mechanism which I purpose to make use of, certain coöperating parts being illustrated in connection therewith and the scale being enlarged.

In a general sense my invention comprises means for holding material to be kerfed, severed, or similarly acted upon, opposing reciprocating saw-blades adapted to attack such material at opposite sides or points thereof, and means for reciprocating said blades.

It further comprises in a general sense means for holding material to be treated, as stated, opposing saw-blades capable of undergoing both a reciprocating movement and a lateral movement, the latter to relieve the drag on each blade when the same shall have completed each of its severing or kerfing strokes, a construction by which the opposing saws may make a complete severance of the material and overcut each other without interfering, and means whereby said blades may be reciprocated and whereby said lateral movement may be duly imparted thereto.

In carrying out my invention, reference being had to the accompanying drawings, I make use of a standard 2 of any appropriate contour, provided with a base 2' and preferably formed from metal by the process of casting. There is arranged at the top of the standard 2 a bed 2'', the chief function of which is to support the material to be acted upon.

In connection with my improved apparatus it is essential that mechanism be provided whereby the material aforementioned may be firmly clamped or held in position for treatment and preferably so clamped or held centrally along the front edge of the bed 2''. To this end I provide clamping mechanism, which is here illustrated as comprising opposing jaws 3 3' and a jaw-controller 3'', whereby said jaws may be actuated, the path of move-

ment of said jaws being parallel with the front edge of the bed 2". Specifically, the bed 2" has an elongated channel 4 near the front edge thereof and running parallel therewith.

Jaws 3 3' are shouldered, each at the opposite sides thereof, for a sliding engagement with the bed 2", along the top thereof, and are provided, respectively, with depending shanks 4' 4", having each a threaded connection with the controller 3", the latter being oppositely threaded from a point midway the length thereof toward its respective ends for the purpose of permitting said shanks to cooperate therewith, as stated, and said controller is oppositely reduced to form journals which rotatively bear in hangers 5 5', the latter being disposed one at each end of the channel 4.

The hangers aforementioned are here shown as being shaped so as to project into the channel 4 and at the same time overlap the bed 2" at the opposite sides of said channel, thus permitting said hangers to be readily secured in position, as by means of bolts 5" 6 6' 6".

Reduction of the controller 3", as stated, prevents any undue longitudinal movement thereof, as the shoulders thus formed work each against or at one of the hangers aforementioned, at the inner side thereof, as clearly shown in Fig. 6, and said jaws may consequently be opened or closed by duly rotating said controller.

Jaws 3 3' are relatively adjusted along the controller 3" in a manner to insure their meeting at the center of the controller under sufficient direct rotative movement of the latter and centrally along the front edge of the bed 2".

Controller 3" may be provided with a crank 7 or analogous device for hand operation.

While the clamping mechanism just described admirably meets all requirements in connection with the holding of the material to be acted upon, it will be understood that any mechanism capable of conserving the purpose stated may be substituted therefor.

I further employ in connection with my improved apparatus a reciprocating saw-carriage 7', here shown as movable in a vertical plane at the front of the standard 2, and to facilitate such operation of said carriage any appropriate part or parts, as the opposing guides 7" 7"', may be employed, said guides in this instance being arranged vertically along and at the front of the standard and with which, respectively, said carriage has a sliding engagement, as through the medium of the eye-clips 8 8'.

It is desirable that means be employed whereby a balancing effect may be had in connection with the carriage 7', and accordingly I attach to said carriage a flexible leader 9, which operates on a pulley 9' and carries at its free end a weight 9". Other means, however, may employed for balancing said carriage, if preferred. Carriage 7' is adjusted

for operation so that its vertical center line registers with the point along the controller 3", at which the jaws 3 3' meet in their closing action. There are conjoined with the carriage 7' opposing saw-blades 10 10', movable with said carriage and adapted to attack at opposite sides or points thereof the material held by the clamping mechanism aforementioned. The blades 10 10' are here shown as carried, the former by a vertical saw-frame 10" and the latter by a like saw-frame 10"', said frames 10" 10"' being respectively conjoined with said carriage for movement therewith, and accordingly serving as elements whereby such movement as may be imparted to said carriage will be transmitted to said blades.

It is essential that provision be made whereby the relation of each of the blades 10 10' with reference to the material undergoing treatment may be altered at the completion of each direct or cutting stroke thereof, so as to insure further action of said blade on said material during the next following direct or cutting stroke thereof.

To the foregoing end I have illustrated features of construction which render said blades each laterally adjustable with respect to the carriage 7', said blades being arranged to operate at the front of said carriage in a plane parallel therewith and being adapted to undergo each its direct lateral adjustment automatically and intermittently and its reverse lateral adjustment continuously at the will of the operator. Further, I prefer that said blades be arranged to undergo simultaneously the direct and reverse lateral adjustments aforementioned, respectively. Specifically I make use of a saw-feeder 11 in the form of a screw-threaded rod which works freely in the hangers 11' 11"', conjoined with the carriage 7' at the front thereof. The portions of the feed-rod 11 which project outwardly or away from the respective hangers 11' 11"' are oppositely threaded to receive, respectively, the saw-frames 10" 10"'.

For effecting the direct lateral adjustment of the saw-blades 10 10' automatically and intermittently I employ a resilient pawl 12, here shown as depending from the arm 12', secured to and projecting laterally away from the bed 2", the free end of said pawl being adapted to engage somewhat prior to the completion of each direct thrust of the carriage 7' a tooth of the ratchet-wheel 12", fixed on said saw-feeder and into proper alinement with which the arm 12' projects, thus insuring the application of a degree of direct rotative movement to said feeder through the medium of said ratchet-wheel and through the continued direct movement of said carriage from the time of engagement of said pawl with said ratchet-wheel until said carriage reaches the limit of its direct movement. It is obvious, therefore, that varying degrees of rotative

movement may be accordingly imparted to said ratchet-wheel by rendering said pawl vertically adjustable with reference to said ratchet-wheel, and this may be accomplished in any common and approved manner, as by providing said pawl with an elongated opening through which may pass the element employed for fastening said pawl to the arm 12', as clearly illustrated in the drawings. The degrees of direct rotative movement thus intermittently applied to the feeder 11 result in the blades 10 10' being brought correspondingly nearer together for action, respectively, on the material undergoing treatment, such effect being due to the threaded relation existing between the respective frames 10'' 10''' and said saw-feeder.

For reversely rotating the feeder 11 continuously or otherwise, as the operator may elect, any appropriate part or parts may be conjoined with said feeder for hand operation. In this connection I have shown a handle 12''' applied to the ratchet-wheel 12'', these elements accordingly serving, in a sense, as a crank for the feeder 11.

It is further essential that in addition to the direct and reverse adjustments above described of the blades 10 10' along the feeder 11 said blades be arranged to undergo a secondary lateral adjustment whereby each of said blades may be relieved from any dragging effect during its reverse stroke and also whereby at the end of the severing action one blade may be withdrawn as the other advances to completely sever the material. To this end I employ a bell-crank 13, which works on a pin 13', projecting forwardly from the carriage 7', said bell-crank being movable within prescribed limits. There is pivotally conjoined with the horizontal member of said bell-crank one end of a connecting-rod 13'', the opposite end of the latter being pivotally connected with the main crank 13''', mounted on the main shaft 14 at the front end thereof. Said main shaft rotates in the bearing 14', formed integral or otherwise suitably conjoined with the standard 2, and said shaft is provided at its rearwardly-projecting portion with a part, as the pulley 14'', whereby power and motion taken from any appropriate source may be applied to said shaft, as through the medium of a belt or other approved connection.

The vertical member of the bell-crank aforementioned projects freely into the space intervening between the opposing collars 14''' 15', fixed, respectively, on the feeder 11 between the hangers 11' 11''. Accordingly, movement of the bell-crank 13 in opposite directions on the pin 13' will result in corresponding shifting movements laterally being imparted to the feeder 11, and in such movements said feeder is accompanied by the blades 10 10', said blades and feeder undergoing jointly such shifting movements.

Any appropriate part or parts may be employed for limiting the aforementioned shifting action of the feeder 11, the same being effected, however, in this instance, by means of the collar 14''' and an additional collar 15', the latter also fixed on the feeder 11, and the collars 14''' 15' are spaced along said feeder so that the distance between the outer faces thereof will be appropriately less than the distance between the inner faces of the hangers 11' 11'', against which hangers the collars last named respectively abut in practice, and consequently limit not only the shifting action of the feeder 11, but also the action of the bell-crank 13 in opposite directions on the pin 13'.

It will be seen that the feed-rod 11 not only regulates the feed, but also acts as a shifting carrier for the saws. These two functions are distinct and might be performed by separate parts without departing from the spirit of my invention; but preferably they are performed by one mechanism. It is with relation to this function of the feeder 11 that I have employed the term "shifting carrier" in the claims.

Saw-frame 10'' has a rigid arm 15'', which projects inwardly therefrom freely through the opposing eye-clips 16 16' on carriage 7' and freely through the opposing frame 10''', said arm accordingly having a sliding engagement with each of said eye-clips and with said frame 10''', and the latter is provided with a rigid arm 16''', (corresponding to 15'',) which projects inwardly from the frame 10''', through the opposing eye-clips 17 17', also on carriage 7', and freely through the opposite saw-frame 10'', the relation of said arm 16''' to the eye-clips 17 17' and frame 10'' being the same as described as existing between arm 15'', eye-clips 16 16', and frame 10'''.

The foregoing construction provides substantial bearing-surfaces for the arms 15'' 16''', insures the maintenance of the frames 10'' 10''' in proper position for service, and also insures due rigidity for said frames, the blades 10 10' being adjusted to said frames, respectively, in any approved and well-known manner.

To insure proper operation of the parts involved in the shifting action just referred to and independently of the carriage 7', I apply to the latter a friction element 17'', here shown as taking the form of a leaf-spring and whose free end portion is arranged to elastically bear against the standard 2 at all positions of the latter, and for preventing any undue reverse action of the feeder 11 through such friction as may occur between pawl 12 and ratchet-wheel 12'' at the commencement of each return thrust of the carriage 7' a friction element 17''' may be employed, the same being here shown as attached to the carriage 7', as taking the form of a leaf-spring, and as having its free end portion arranged to elastically bear on the feeder 11.

It is desirable that provision be made whereby the movement of the carriage 7', and consequently the parts cooperating therewith, may be automatically discontinued when the material under treatment shall have been severed, and to this end I loosely mount the main crank 13''' on the shaft 14, said crank being here shown in the form of a disk, and conjoin with said crank a clutch 18, movable on a pin 18' through the operation of lever 19''. The main portion of the clutch 18 is provided with an opening 18'', through which extends the main shaft 14, said opening being of greater diameter than said shaft to permit proper radial movement of said clutch with respect to the pin 18'.

18''' denotes an elastic element, in this instance taking the form of a spiral spring interposed between the main portion of the clutch 18 and the stop 19 on the crank 13''' and the tendency of which elastic element is to yieldingly hold the clutch 18 in engagement with the shaft 14 at one segment of the opening 18'' and at which segment said clutch is provided with a suitable indentation or recess adapted to receive the feather or detent 19' with which the shaft 14 is provided, the parts occupying the positions indicated in Figs. 1 and 2, and under which conditions crank 13''' will operate as a unit with the shaft 14, the result being that proper reciprocating movement is imparted to the carriage 7' through the medium of the connecting-rod 13'' in the practical operation of the apparatus.

It will be seen that depression of the clutch 18 as to the position indicated in dotted lines in Fig. 7, thus disengaging the clutch 18 from the detent 19', will result in annulment of the operative relation existing between the crank 13''' and shaft 14, thus permitting the latter to turn independently of the former. For thus depressing clutch 18 I provide the lever 19'', which works on the pin 19''' and whose free end is held against descending movement by the catch 20 frictionally engaging said lever, and I further provide the clutch 18 with an arm 20', adapted at a suitable point in its movement, in conjunction with the crank 13''' and shaft 14, to be engaged at its free end by the lever 19'', when such lever is liberated from the catch 20 and allowed to move downwardly, as by its own gravity, the weight of said lever being sufficient to depress the clutch 18 against the tendency of the element 18''' and so that the parts will occupy substantially the positions indicated in dotted lines in Fig. 7, whereupon shaft 14 is permitted to continue in motion without affecting the remaining movable parts of the apparatus.

Disengagement of the lever 19'' from the catch 20 is automatically effected by the saw-frame 10'', in this instance through the medium of the depending arm 20'', which when said saw-frame shall have reached substan-

tially the limit of its adjustment inwardly along the feeder 11 and carriage 7' is about completing one of its downward thrusts contacts with the lever 19'' and depresses it sufficiently to cause its liberation from the catch 20, whereupon said lever completes its downward movement, as by its own gravity.

Mechanism other than that described may be availed of for automatically discontinuing the operation of the apparatus at the proper time, and though I show this specific form of stop mechanism as applied to my multiple saw I reserve the right to make it the subject of a future application for patent.

In operation and assuming that shaft 14 rotates in the direction of the arrows 21, Figs. 1 and 2, and the material to be acted upon is in place between and held by the jaws of the clamping mechanism employed, as indicated in dotted lines in Fig. 5, a portion thereof accordingly projecting forwardly of the apparatus between the saw-blades 10 10', the user lifts the free end of lever 19'' to engagement with the catch 20, thus permitting the element 18''' to act on the clutch 18 in a manner to cause the detent 19' to enter the recess aforementioned of said clutch, whereupon crank 13''' turns with the shaft 14, and movement is accordingly imparted to the carriage 7' through the medium of connecting-rod 13'', as hereinbefore explained. As the lower end of the said connecting-rod approaches the position indicated in Fig. 1 from its position indicated in Fig. 2 its first action is upwardly on the bell-crank 13, thus shifting the feeder mechanism and the saws as a whole laterally, with the parts conjoined therewith, from the position indicated in full lines in Fig. 2 to the position indicated in full lines in Fig. 1 to free one saw from and bring the other into contact with the work, and immediately thereafter such shifting movement of the feeder 11, being limited by the collar 14'', carriage 7' receives motion through the medium of said connecting-rod and bell-crank and moves upwardly, thus causing saw-blade 10' to take a cut from the material held by the clamping mechanism aforementioned. As the carriage 7' approaches the limit of its upward movement the saw-blades 10 10' are adjusted automatically somewhat nearer together through the medium of the ratchet-wheel 12'' and pawl 12, as hereinbefore explained, and thereafter, as the lower end of connecting-rod 13'' approaches the position indicated in Fig. 2 its first action is downwardly on the bell-crank 13, thus oppositely shifting the feeder 11, with the parts conjoined therewith, and immediately thereafter such oppositely-shifting movement of said feeder being limited by the collar 15, carriage 7', through the medium of the parts aforementioned, receives motion and moves downwardly, thus the blades 10 10' having been brought nearer together, as stated, enabling the saw-blade 10 to act on the material held

by the clamping mechanism referred to. Accordingly, where my construction is employed, a cut is taken from the material under treatment at each direct and return thrust of the carriage 7, thus materially expediting the severing of such material.

The shifting action of the feeder 11, with the parts conjoined therewith, is further indicated by the dotted lines in Figs. 1 and 2, respectively.

It will be seen that my improved apparatus is particularly well adapted for the purpose for which it is intended, and, further, that the same may be modified to some extent, particularly as regards the details of the construction, without materially departing from my invention.

Having fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. An apparatus of the class described, comprising a holder for the material to be treated; saw-blades oppositely disposed and with their teeth facing each other; feed mechanism for moving said saws inward toward a common center; mechanism for automatically shifting said saws laterally in unison and in the same direction at the final cut; and a movement for operating said saws; substantially as herein described.

2. An apparatus of the class described, comprising a holder for the material to be treated; saw-blades disposed in a plane opposite to and with their teeth facing each other; a movement connected to said saws to operate the same; feed mechanism for moving the saws inward toward a common center; and a connection between the saws, whereby at the final cut one of the saws is retracted on the advancement of the other to and past the common center; substantially as herein described.

3. An apparatus of the class described, comprising a holder for the material to be treated; saw-blades oppositely disposed and with their teeth facing each other; a movement connected to said saws to operate the same; feed mechanism for moving said saws inwardly toward each other; a shiftable carrier common to both saws; and mechanism for shifting said carrier laterally at the final cut whereby one of the saws is retracted from and the other advanced to and past a common center, substantially as herein described.

4. An apparatus of the class described, comprising a holder for the material to be treated; saw-blades oppositely disposed and with their teeth facing each other; a shiftable carrier common to both saws; feed mechanism on said carrier for moving said saws inwardly toward a common center; mechanism for shifting said carrier laterally at the final cut whereby one of the saws is retracted as the other advances into its path; and a movement for reciprocating said carrier, substantially as herein described.

5. An apparatus of the class herein described, comprising a holder for the material to be treated; a reciprocating carrier; and opposing saw-blades conjoined with said carrier; mechanism for moving said saw-blades alternately into and out of a severing action on said material at opposite sides thereof and a feeder for intermittently feeding each toward the other, substantially as herein described.

6. An apparatus of the class described, comprising a holder for the material to be treated; saw-blades oppositely disposed and with their teeth facing each other; feed mechanism for feeding said saws inward to a common center; a movement for operating said saws; and mechanism for shifting said saws in unison and in alternate directions laterally at the end of each stroke, substantially as herein described.

7. An apparatus of the class described, comprising a holder for the material to be treated; saw-blades oppositely disposed and with their teeth facing each other; feed mechanism for feeding said saws inward to a common center; a shiftable, reciprocating carrier common to both saws; and mechanism for shifting said carrier laterally in alternate directions at each stroke, substantially as described.

8. An apparatus of the class described, comprising a reciprocating, laterally - shiftable carrier; a saw-feed mechanism conjoined with said carrier; opposing saw-blades borne by said carrier and shiftable therewith, movable toward a common center by the action of said feed mechanism; and means for automatically shifting said carrier laterally, substantially as described.

9. An apparatus of the class described, comprising a holder for the material to be treated; saw-blades oppositely disposed and with their teeth facing each other; a laterally-shiftable feed mechanism carrying both saws, and acting on each to feed it toward a common center; a reciprocating sliding carriage on which said saws and feed are shiftablely mounted; and mechanism for shifting said feed and the attached saws laterally in alternate directions at every stroke, substantially as described.

10. An apparatus of the class herein described, comprising a reciprocating laterally-shiftable carrier; a saw-feed mechanism conjoined with said carrier; opposing saw-blades borne by said carrier, shiftable therewith, and adapted to be intermittently moved each toward the other by said feed mechanism; a bell-crank engaging said carrier and feed mechanism to shift the same; and means for operating said bell-crank, substantially as described.

11. An apparatus of the class described, comprising a holder for the material to be treated; saw-blades oppositely disposed and with their teeth facing each other; laterally-shiftable feed mechanism carrying both saws

and acting on each to feed it toward a common center; a reciprocating sliding carriage on which said saws and feed are shiftably mounted; a bell-crank lever pivoted to said carriage and having one arm engaging with the shiftable feed mechanism and another arm which connects with a pitman; and a pitman-rod connecting the said bell-crank lever with a suitable source of reciprocating motion, substantially as described.

12. An apparatus of the class described, comprising a holder for the material to be treated; saw-blades oppositely disposed and with their teeth facing each other; a laterally-shiftable feed-rod carrying said saws, and having reverse screw-threads engaging the said saws to move them toward a common center; mechanism for turning said rod; a reciprocating, sliding carriage on which said feed-rod and its connected saws are shiftably mounted; collars on said rod; a bell-crank lever pivoted to said reciprocating carriage and having one arm which projects between and engages said collars and another arm which connects with a pitman-rod; and a pitman-rod which joins the bell-crank and through it the carriage with a source of reciprocating motion, all substantially as described.

13. In an apparatus of the class described, a holder for the material; saw-blades oppositely disposed and with their teeth facing each other; a reciprocating, sliding carriage; a laterally-shiftable, revoluble conjoined saw-carrier and feed-rod, the said carrier and feed-rod being borne by said reciprocating carriage; a ratchet-wheel on said feed-rod; a pawl for intermittently engaging to turn said ratchet; and mechanism for shifting said saw-

carrier and feed-rod and its connected saws, alternately from one direction to another at the end of each stroke of the saws, substantially as described.

14. In an apparatus of the class described; a holder for the material; saw-blades oppositely disposed, connected to, and with their teeth facing each other; a vertically-reciprocating, sliding carriage; a feed mechanism for moving the saws toward a common center; and mechanism for shifting both saws laterally at the final cut, substantially as described.

15. In an apparatus of the class described, a holder for the material to be treated; saw-blades oppositely disposed, connected to and with their teeth facing each other; a vertically-reciprocating, sliding carriage; a feed mechanism for moving the saws toward a common center; and means for shifting both said saws in the same direction alternately from side to side at the end of each stroke of the saws, substantially as described.

16. In an apparatus of the class described, a holder for the material; a saw-blade operating against said material; a vertically-reciprocating carriage bearing said saw; a screw-threaded feed-rod capable of turning in either direction and having a ratchet at one end; and a pawl for engaging said ratchet intermittently to turn it to feed the saw, said pawl being adjustable, whereby it may be moved out of the way of said ratchet, substantially as described.

HERBERT DALGETY.

Witnesses:

S. ZUCKERMAN, Jr.,
A. C. TANNER.