(No Model.) 3 Sheets—Sheet 1.

F. SHENTON.

MACHINE FOR DRESSING SLATE.

No. 355,279. Patented Dec. 28, 1886.

Fig. 2.

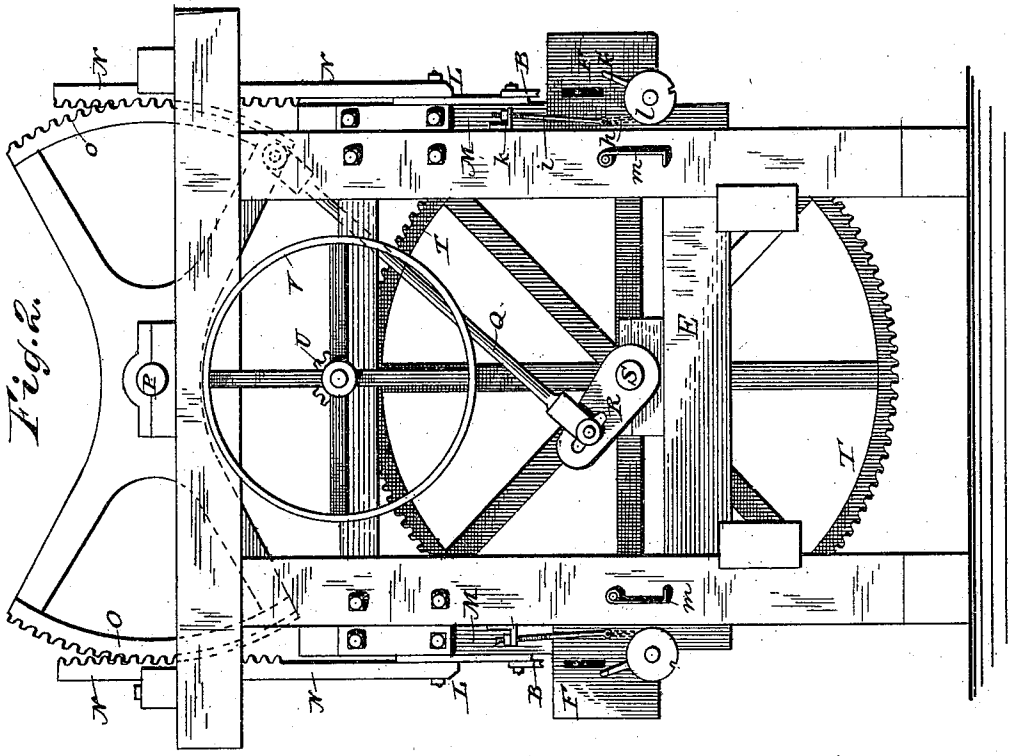
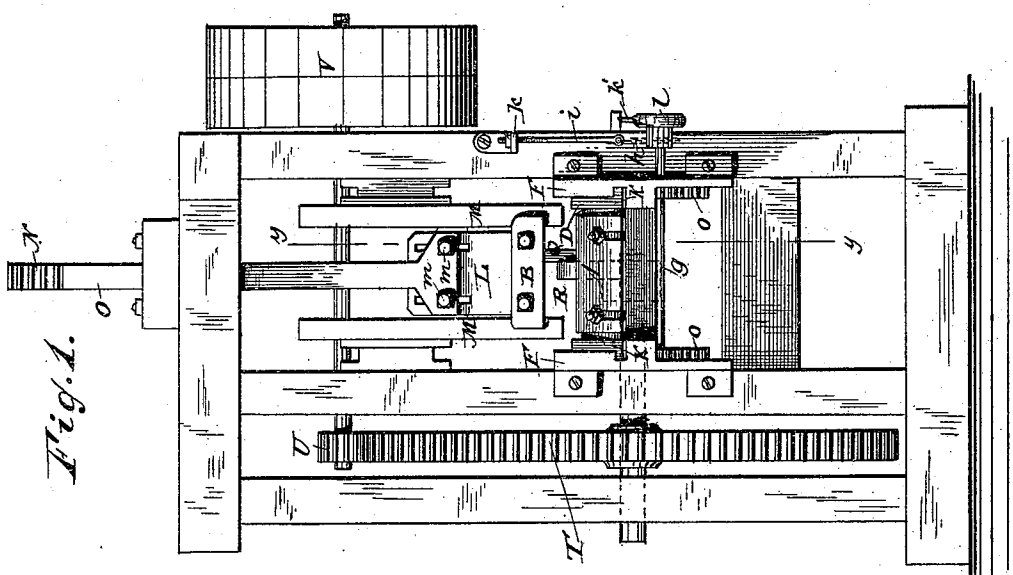


Fig. 1.



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(No Model.) 3 Sheets—Sheet 2.

F. SHENTON.

MACHINE FOR DRESSING SLATE.

No. 355,279. Patented Dec. 28, 1886.

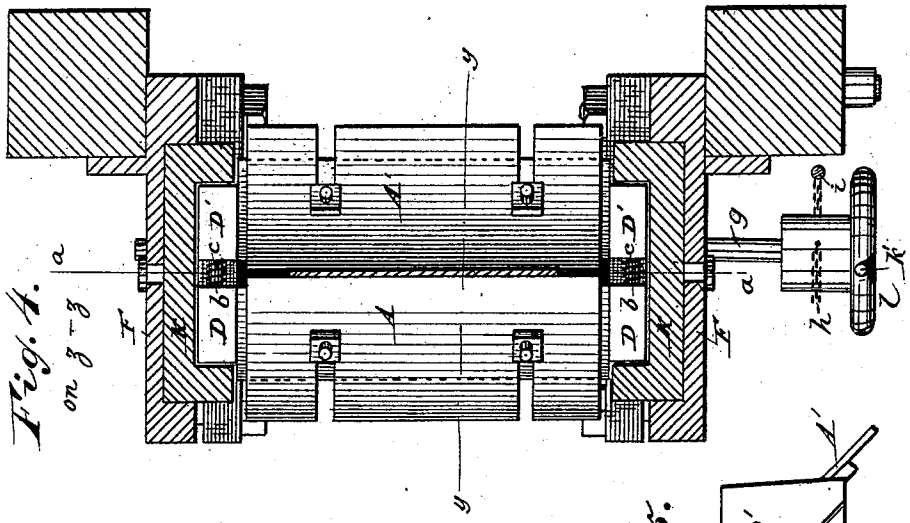

Fig. 4.
on g-g

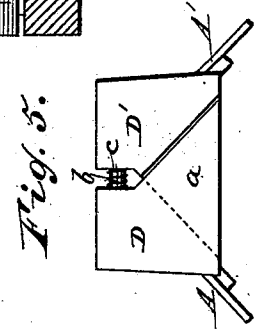

Fig. 5.

Fig. 3.
on y. y

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(No Model.) 3 Sheets—Sheet 3.

F. SHENTON.

MACHINE FOR DRESSING SLATE.

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Fig. 6.

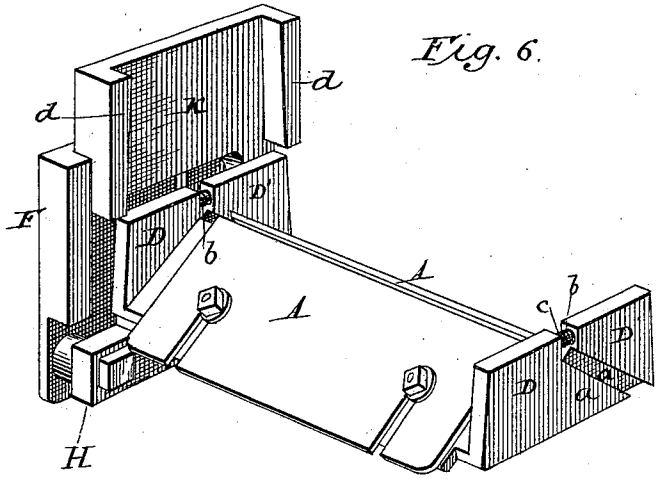
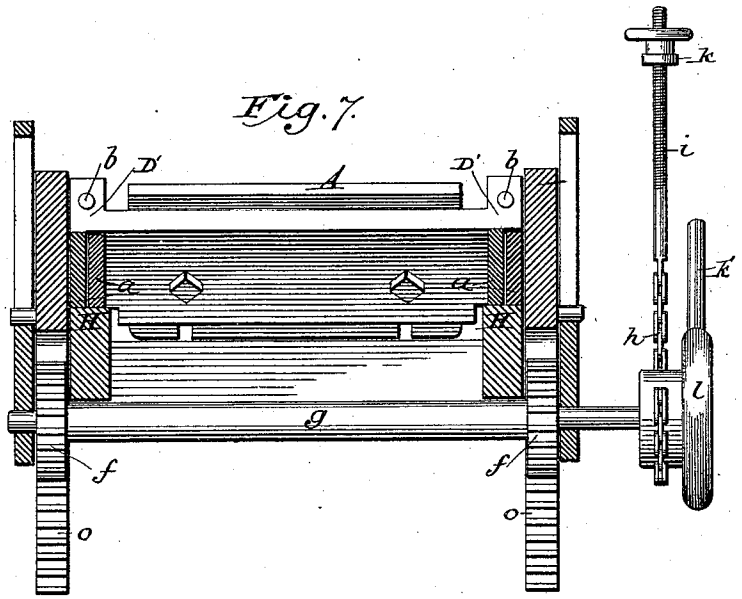


Fig. 7.



Attest.
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Inventor.
Francis Shenton
By his attorney
Philip T. Dodge.

UNITED STATES PATENT OFFICE.

FRANCIS SHENTON, OF SLATEDALE, PENNSYLVANIA, ASSIGNOR TO MARY HOWARD SHENTON, OF SAME PLACE.

MACHINE FOR DRESSING SLATE.

SPECIFICATION forming part of Letters Patent No. 355,279, dated December 28, 1886.

Application filed February 13, 1884. Serial No. 120,575. (No model.)

To all whom it may concern:

Be it known that I, FRANCIS SHENTON, of Slatedale, in the county of Lehigh and State of Pennsylvania, have invented certain Improvements in Machines for Dressing Slate, of which the following is a specification.

This invention relates to a method and means for shaving or planing the surfaces of slates used for schools, counting-houses, roofing, and for other like purposes.

In finishing slates for the purposes above mentioned it is necessary that they shall be dressed to a uniform or substantially uniform thickness and rendered as smooth as possible on both surfaces.

In practice it is found that the sheets or laminæ of slate as they come from the quarry are not only rough or irregular upon the surface, but are frequently to some extent curved or twisted, this twist or curvature from a plane being commonly of an extent as great or greater than the thickness which is to be given the finished slate. Owing to this fact it is manifestly impossible to dress a thin slate twisted to this extent in such manner as to produce plane surfaces on both sides, for the reason that in so doing the slate would be cut through its entire thickness, or, in other words, would have its entire substance removed at those points which depart to the greatest extent from the plane of commencement. Hitherto many machines have been devised for dressing slate; but so far as I am aware they have each and all been designed to dress the surfaces to a plane or dead level, on account of which, and of the reasons before mentioned, it was impossible to employ them in connection with winding or twisted slates unless the latter were of very great thickness, so that a very large portion of the body would be removed as waste in order to bring the remainder to a true flat form—an operation which for economic reasons is inadmissible.

Experience has shown that any attempt to reduce twisted or irregular slate to a flat form by the action of cutting-blades results in a disintegration and loosening of the constituent laminæ in such manner that the slates present rough surfaces and soon become fractured. Now, it is a fact that for the purposes in view it is not necessary that the finished slate shall have surfaces which are true planes. The essential requirement is that the body of the slate shall be of uniform thickness and the two surfaces smooth, and it is immaterial whether or not the surfaces are curved or twisted within moderate limits.

In practicing my invention I propose, when necessary, to take advantage of the fact that the slates may be finished in a twisted or curved form, and I construct the machine for carrying my invention into practice in such manner that the parts may adjust themselves to the winding or twisting form of the slate. Consequently I am enabled to take a thin twisted sheet of slate from which it would be impossible to produce a merchantable sheet by the methods hitherto practiced, and dress the same on its two surfaces so as to produce a merchantable article. In this manner I am enabled not only to utilize what would otherwise be waste material, but to avoid the labor and expense of removing a large amount of surplus material.

The production of a finished surface which follows approximately the original surface of the slate, whether straight or curved, is advantageous, not only for the reasons above mentioned, but also because it is found in practice that smoother and more satisfactory surfaces are produced.

With the ends above mentioned in view my invention relates to a mechanism for passing a slate between the parallel edges of two knives, permitting it meanwhile to serve as its own guide, or, in other words, to follow the natural course due to its shape or cleavage, instead of compelling it to move in a fixed path, as heretofore.

It further relates to the combination, with two parallel knives, of a pressure device adapted to cause the passage of the slate between them without definitely limiting the course of movement of said slate.

It further relates to an improved manner of sustaining the knives, so that they may be quickly removed and replaced by others without stopping the action of the remaining parts of the machine.

It also relates to means for adjusting the

distance between the knives to compensate for wear, and to produce slates of different thickness.

It also relates to various details of minor importance, which will be hereinafter described and claimed.

Referring to the accompanying drawings, Figure 1 represents a front elevation of a machine constructed in accordance with my plan; Fig. 2, a side elevation of the same. Fig. 3 represents a vertical transverse section through one side of the machine on the line *y y* of Figs. 1 and 4. Fig. 4 represents a horizontal section on the line *z z* of Fig. 3, looking in a downward direction. Fig. 5 is an end elevation of the knives and the heads by which they are supported detached from the machine. Fig. 6 is a perspective view of the knives, their supports, and, in part, of the devices by which the knives are adjusted and confined while in action. Fig. 7 is a transverse vertical section on a plane between the edges of the two cooperating knives, as indicated by the lines *a a*, Figs. 3 and 4.

The drawings represent a double machine, or a machine containing two complete dressing mechanisms, located on opposite sides, and operating independently of each other. As these mechanisms are constructed in duplicate and are alike in their mode of action, the detailed description of one will apply equally well to the other.

In order that the essential characteristics of the machine may be the more readily understood, I will first describe one of the dressing mechanisms, and subsequently the devices by which motion is imparted thereto.

Each mechanism consists, essentially, of two fixed knives, A and A, having straight or flat edges arranged parallel with each other and at a distance apart equal to the thickness which is to be given the finished slate, and of a reciprocating pressure device, B, designed to act against one end or edge of the slate and force the same longitudinally between the two knives. As represented in Figs. 3 to 7, the knives are inclined upward and inward in cross-section toward each other, their inner cutting-faces being vertical or approxmiately so, while their upper and outer surfaces incline downward and backward, so that the material removed from the body of the slate will be discharged over them.

The pressure device B consists, preferably, of a bar or plate slightly grooved or recessed in its under edge to fit over and retain the edge of the slate while forcing the same between the knives. It is to be noted as an important feature of my machine that this pressure device is the only guide, other than the knives themselves, for the slate. It is further to be noted that while the pressure device is acting on one end of the slate to force the same between the knives the slate is free to move sidewise, except as it is guided by the latter. In consequence of this arrangement a curved or twisted slate is permitted while passing through the knives to follow a curved or irregular path corresponding to its curvature, whereby the knives are prevented from removing an excess of material or from cutting through the slate, as would be the case were the slate guided at both ends and compelled to move in a right line. A curved slate forced between the knives by the device acting at one end, the opposite end being left free to move, will emerge from the knives of a uniform thickness and with smooth surfaces, retaining, however, the general form of curvature which it originally possessed.

It will of course be understood that it is not designed to employ slates which have an excessive curvature, and, further, that straight or flat slates are preferred in all cases.

Referring now to the details of the mechanism by which the knives are supported and adjusted, it will be seen, on reference to Figs. 3 to 7, that the knives consist of thin blades or sheets secured respectively to head-blocks or supports D and D′, each block consisting of two upright end plates united by a transverse plate having an inclination corresponding with the angle at which the knife is to be placed. The two knives are arranged with their edges directly opposite to and parallel with each other, in the manner represented. In order to prevent the knives from being tipped forward or inward by the strain applied to their cutting-edges, each of the supporting-blocks is provided with projections or feet *a*, extending forward in advance of the knife, in the manner plainly represented in Figs. 5 and 6. In this manner the blocks are given a broad base or support extending both in front and in rear of the cutting-edge, so that there is no danger whatever of the knife tipping either forward or backward when in use. The head-blocks are drawn together to bring the knives in a proper proximity to each other by means which will be presently described. In order to effect their automatic separation when released from the action of said devices I propose to apply springs in any suitable manner, a convenient mode of application being that represented in Figs. 4, 5, and 6, in which it will be perceived that one of the blocks is provided with projecting fingers or tenons *b*, designed to enter corresponding holes in the opposite block, and bearing spiral springs *c*, which act between the two blocks and tend to urge them apart. These tenons also serve the additional purpose of guides, to assist in maintaining the blocks and knives in the proper relations to each other.

Referring now to the frame of the machine and the means which co-operate with the knives, attention is directed to Figs. 1 to 4. An upright rigid frame, E, is constructed in any form and of any material which will admit of its sustaining the other parts. At the front this frame is bolted firmly on opposite sides to upright plates F, which are connected by cross bars or slats G, and which have upon their inner faces horizontal shoulders or ledges

H. On these ledges the head-blocks supporting the two knives are seated, the knives receiving in this manner a perfectly solid support. The knife-bearing heads being thus supported it is necessary that they shall be confined in position against lateral displacement and held at the proper proximity to each other, so that they may not be forced apart by the passage of the slate between them. For this purpose I make use of two vertically-sliding plates, K. These plates are arranged to slide in vertical guides or rests formed in the stationary plates F, and are each provided at the front and rear edges, respectively, with shoulders or flanges *d*, designed to engage over the outer edges of the knife-bearing heads in the manner represented in Figs. 3 and 4, to prevent said heads from moving apart. The two shoulders *d* of each plate have a slight divergence toward the lower ends, and the outer edges of the respective heads D and D′ are inclined to correspond, so that as the plate K is depressed its flanges act with a wedging or contracting effect to draw the two heads D and D′ together, and thus bring the edges of the two knives nearer each other. On the contrary, the elevation of the plate K will have the effect of releasing the heads and permitting the knives to be separated by the action of the springs before described. The vertical movement of the two plates K is secured by providing them with downwardly-extending arms or rack-bars with spur teeth thereon, as shown at *o*, Figs. 1, 3, and 7, and arranging in connection with said rack-bars operating pinions *f*, mounted on opposite ends of a horizontal shaft, *g*, supported in fixed bearings. By turning this shaft the two plates K may be raised and lowered, and the distance between the knives thus adjusted with great precision. The weight of the plates K will cause them to move downward and draw the knives together whenever they are released. To effect the proper adjustment it is only necessary, therefore, to provide means for raising and sustaining the plates. A simple means to this end consists in winding about a drum or pulley on one end of the shaft *g* a cord or chain, *h*, the free end of which is connected to a screw, *i*, passed through a fixed guide, *k*, on the upper end. The nut and chain serve to limit the rotation of the shaft and pinions in one direction, and thus to sustain the plates K. By turning the nut in one direction or the other the shaft will be caused to raise or lower the plates, and thus to vary the distance between the two knives, as before explained. The parts are so proportioned that by turning the shaft *g* backward a sufficient distance the flanges of the plates K may be raised above and wholly out of engagement with the knife-supporting heads, as represented in Fig. 6. The effect of this action is to release the two heads, so that they may be instantly withdrawn from the machine in the event of the knives becoming dulled or broken. Other heads bearing knives in proper condition may be instantly substituted in place of those removed, and locked in position by permitting the plates K to descend, and this without stopping the action of the other parts of the machine.

In operating with the machine it is proposed to construct a series of knife-bearing heads, so that one set may be employed while the other is being sharpened or prepared for use. In order that the substitution of one head for another shall not cause a variation in the thickness of the slate produced, and shall not require a special adjustment of the parts, care is taken to adjust the cutting-edges of the knives at equal distances from the outer or rear edges of the supporting-heads, these being the edges against which the adjusting-flanges *d* engage.

In order that the plates K may be quickly elevated to release the cutting-heads and retained in their elevated position until the heads are removed and replaced by others, the shaft *g* is provided at one end with an operating lever or handle, *k′*, and also with a disk or wheel, *l*, notched in its periphery to receive a pawl, *m*, which is attached to the main frame, and which engages therein automatically when the shaft is turned to lift the plates.

Having thus described the knives and their adjuncts, attention is now directed to the pressure devices.

The bar or pressure device B, to which reference was before made, is secured to a vertically-reciprocating head or slide, L, which slides in fixed guides M, bolted to the main frame. It is recommended that these guides be made of metal and of a grooved form, as shown, and that the edges of the reciprocating slide be provided with wooden facings to work in said guides, it being found that the parts thus constructed work in the presence of the dust arising from the operations in a better manner than metal surfaces acting one on the other. It is to be distinctly understood, however, that the details of the reciprocating head and of the guides therefor may be modified to any extent desired, as they do not constitute an essential part of the invention. The slide may be permitted a slight horizontal play in or between the guides.

In order to facilitate the introduction of the slate in a proper position—that is to say, with its upper edge directly beneath the pressure device, which is kept constantly in motion—I provide the pivoted guide-arm M, represented in Fig. 3. This arm is made of angular form and pivoted in the main frame behind or in rear of the pressure device. Its rear end is weighted to hang in a pendent position when released, and its opposite end made of such form and length that when the rear end is depressed the forward end will stand in line vertical with the pressure device, as plainly represented in Fig. 3. In this position the forward end serves as a stop against which to rest the upper end of the slate in placing the same in position. As the press-

ure-head descends it acts upon the guide, which swings upon its pivot and turns backward out of the way, as indicated by the dotted lines.

I have now described the construction of the dressing mechanism on one side of the machine, it being remembered that the mechanism on the opposite side is of similar construction. Attention is next directed to the mechanism for imparting motion to the pressure devices of the two mechanisms. Each of the reciprocating heads or slides is provided with an upright rack-bar, N, and these two rack-bars are arranged to engage with spur-teeth formed on opposite ends of a vibrating sector-plate or walking-beam, O, which is mounted at its center on a horizontal rock-shaft, P, sustained in bearings on the top of the main frame. It will be perceived that under this construction the vibration of the sector-plate will cause the two pressure devices to rise and fall alternately. Motion is imparted to the vibrating plate by means of a pitman, Q, at one end thereof, connected at the opposite end to a crank, R, on one end of a horizontal shaft, S, to which motion may be imparted in any suitable manner.

In the drawings I have represented the crank-shaft as provided with a large gear-wheel, T, which receives motion from a pinion, U, mounted on a second horizontal shaft, which is provided with a driving-pulley, V, which will be connected by a belt with a motor of any suitable character.

In order to adapt the machine for dressing slates of different lengths without loss of motion the pitman is connected to the crank by means of an adjustable bolt or wrist-pin extending through a slot in the crank, as represented. By means of these devices the throw of the crank-pin, and consequently the movement of the pressure device, may be increased or diminished at will. Inasmuch, however, as any variation in the throw of the crank is accompanied by a corresponding variation in the point to which the pressure device is depressed, it is necessary to provide a means of adjusting the pressure device vertically with respect to its rack-bar. This is accomplished by connecting the lower end of the rack-bar to the reciprocating frame or slide by means of bolts *m*, extended through vertical slots in the slide, as plainly represented in Fig. 1.

I am aware that in wood-working machinery wood has been guided and forced between parallel straight knives, and also that wood has been forced in a free condition or without guides between two knives having parallel curved edges adapted to produce, respectively, the convex and concave surfaces of barrel-staves. To such combinations, neither of which can be practically operated with slate or applied for the purposes of my machine, I lay no claim. I believe myself to be, however, the first to provide for the passage of slate without definite guidance between knives having parallel straight edges, which must be employed with slate, because of its laminated structure and brittle character, to avoid splitting and fracturing the same.

Having thus described my invention, what I claim is—

1. In a machine for dressing slate, two opposing knives with straight parallel edges, in combination with a pressure device arranged to reciprocate to and from the knives, said parts operating, as described, independently of guides or other means for determining the course of the slate, whereby the slate is given flat parallel surfaces and the knives permitted to follow the course of its lamination.

2. In combination with the pressure device to advance the slate, the two movable head-blocks provided with parallel knives, the stationary support for said head-blocks, and the movable locking-plates, as described, engaging and confining the head-blocks to prevent their separation.

3. The combination of movable head-blocks provided with knives, the supports whereon the heads slide, and the movable plates *k*, provided with the projecting flanges engaging the heads, whereby the heads may be confined and adjusted to change the distance between the knives.

4. The knife supporting heads movable to and from each other and the gravitating plates K, provided with inclined flanges to approximate the heads and knives, and also with the rack-bars extending therefrom, in combination with the shaft and its pinions engaging said bars, whereby the two plates K may be raised and lowered simultaneously and equally.

5. In combination with the movable knife-supporting heads and the springs to separate the same, the movable plates K, provided with the projecting flanges to confine and adjust the heads, and means, substantially as described, for raising and lowering said plates, whereby the distance between the knives may be varied at will.

6. In combination with the two inclined opposing knives, the supporting-heads therefor having their bases extended forward in advance of the knives, substantially as described and shown, whereby the knives are prevented from tipping forward or inward when in action.

7. In combination with the opposing inclined knives, the movable supporting-heads having the forwardly-extended overlapping bases or feet *a*.

8. In combination with the solid head-blocks provided with knives, the adjusting-plates K, engaging the head-blocks, as described, the racks, and the shaft and pinions to elevate said plates, the chain *h*, having one end connected with the shaft and the opposite end adjustably secured to the frame, whereby the adjustment of the chain is caused to limit the descent of the plates K and the consequent approximation of the knives.

9. In a slate-dressing machine, the combination of the two pairs of dressing-knives, the two vertically-reciprocating pressure devices,

their bars, and the vibratory plate connecting them, whereby the pressure devices are reciprocated alternately and the dressing of the slates in vertical positions permitted.

10. The dressing-knives and the reciprocating pressure device, the rack-bar adjustably secured to the pressure device, the vibrating plate applied to operate said rack-bar, the pitman, and the operating-crank for the pitman adjustably connected thereto, whereby the stroke of the pressure device may be increased or diminished to adapt the machine for dressing slates of different length.

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Witnesses:
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