

B. A. LINDERMAN.
MACHINE FOR DOVETAILING AND JOINING LUMBER.
APPLICATION FILED MAY 27, 1910.

976,192.

Patented Nov. 22, 1910.

4 SHEETS-SHEET 1

Fig. 1

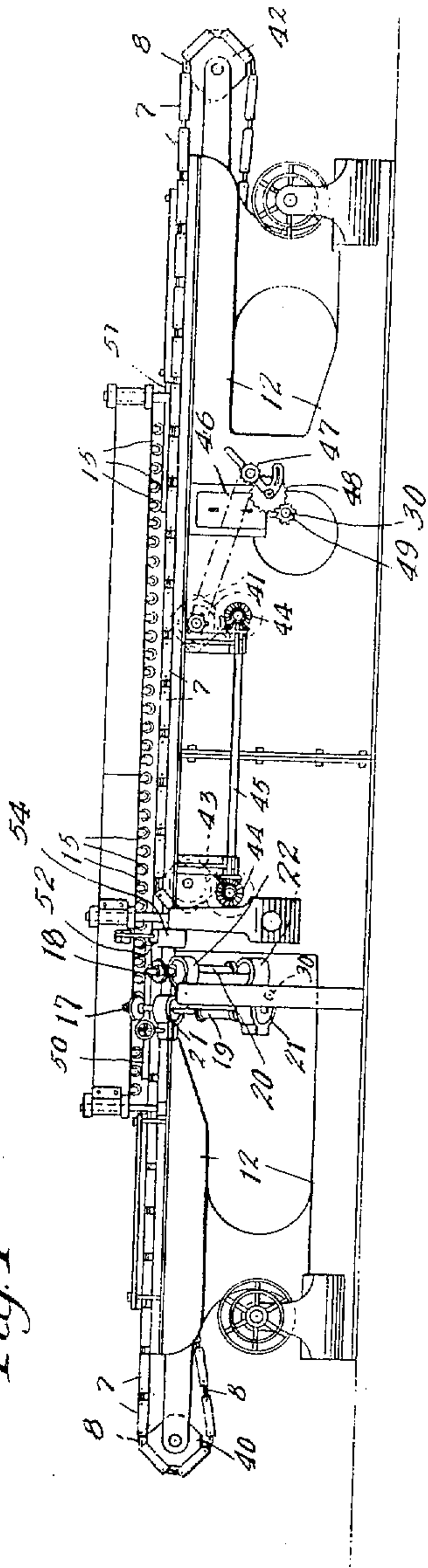
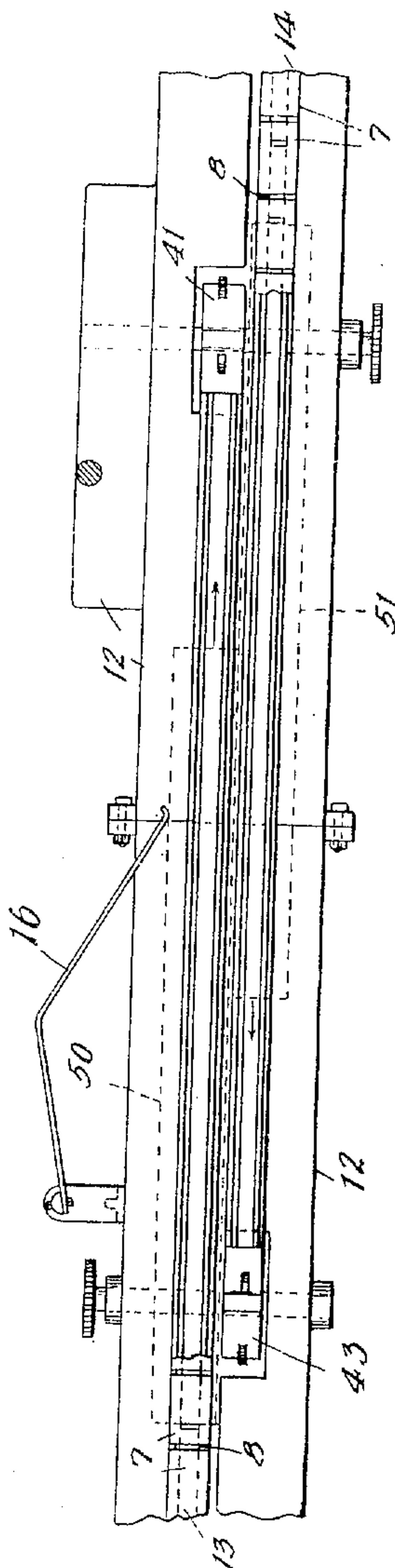


Fig. 2



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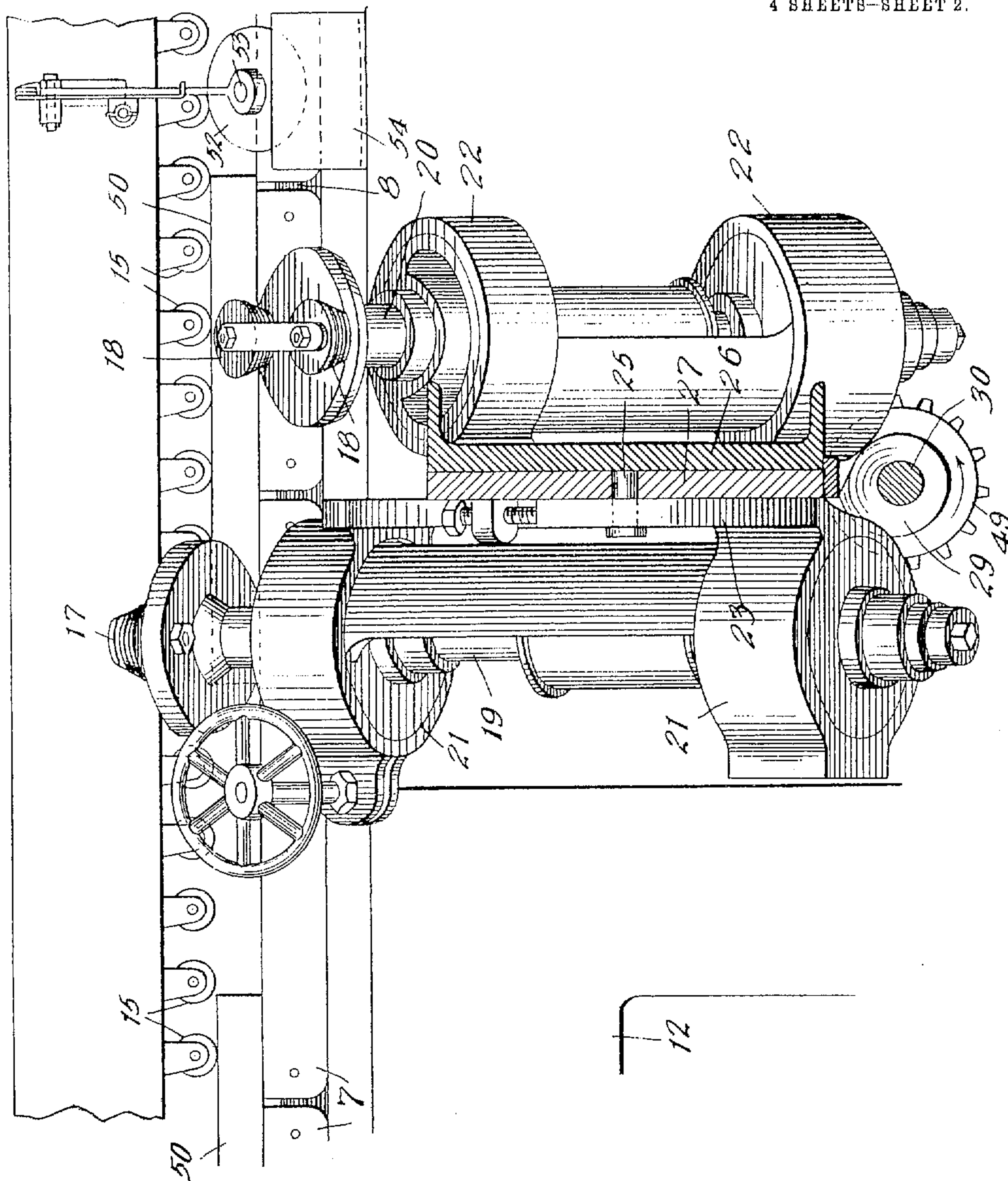


Fig. 3

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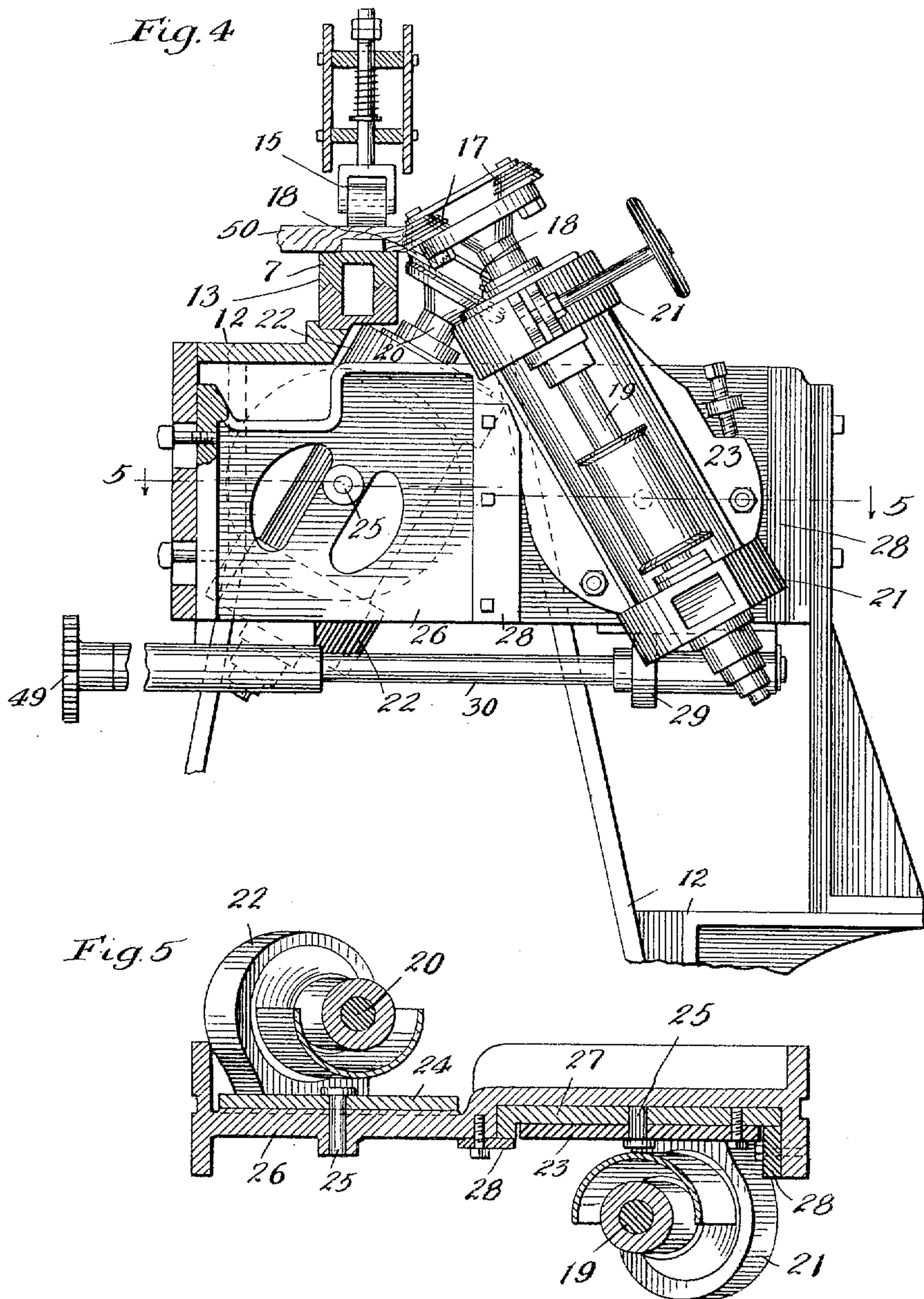
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4 SHEETS--SHEET 4.

Fig. 6

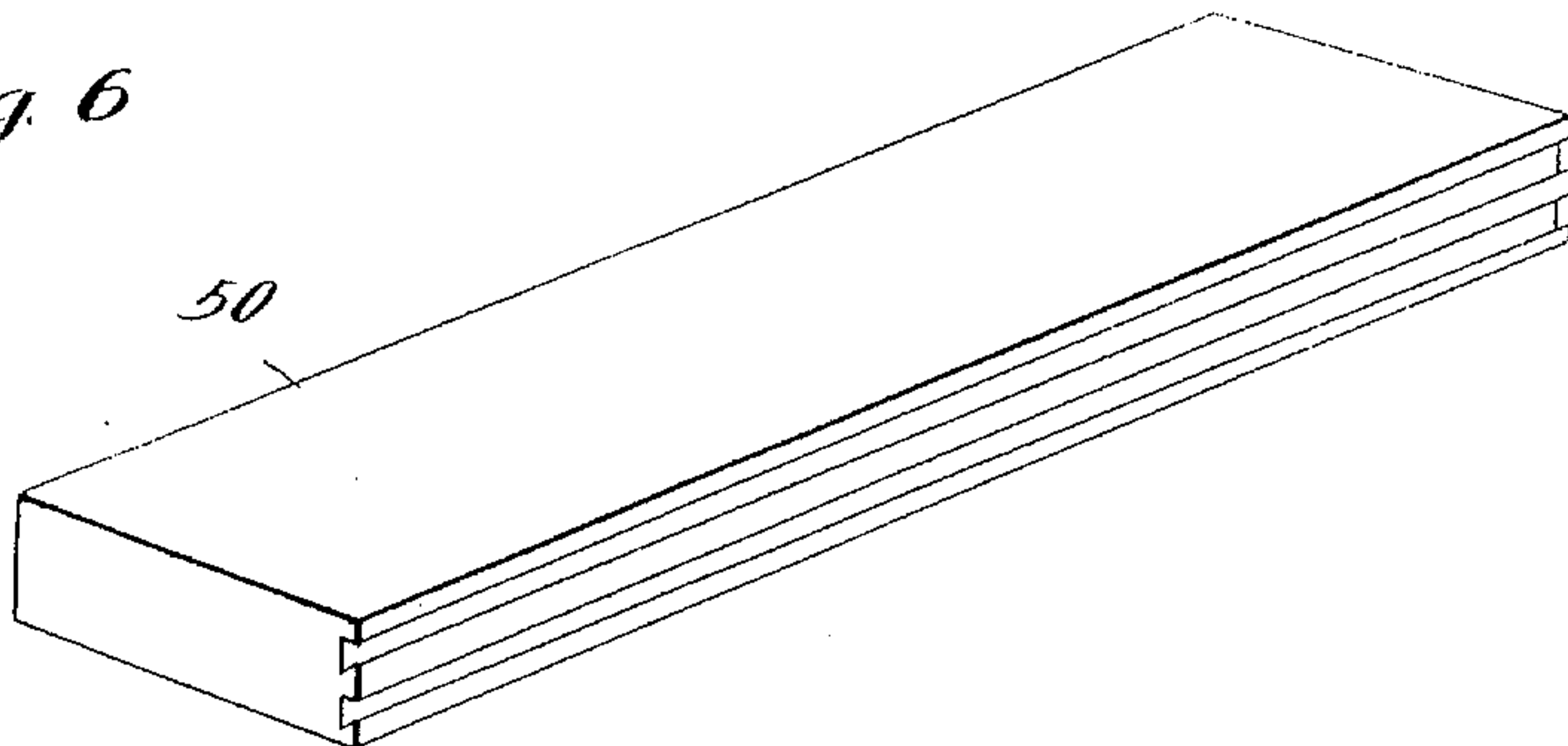


Fig. 7

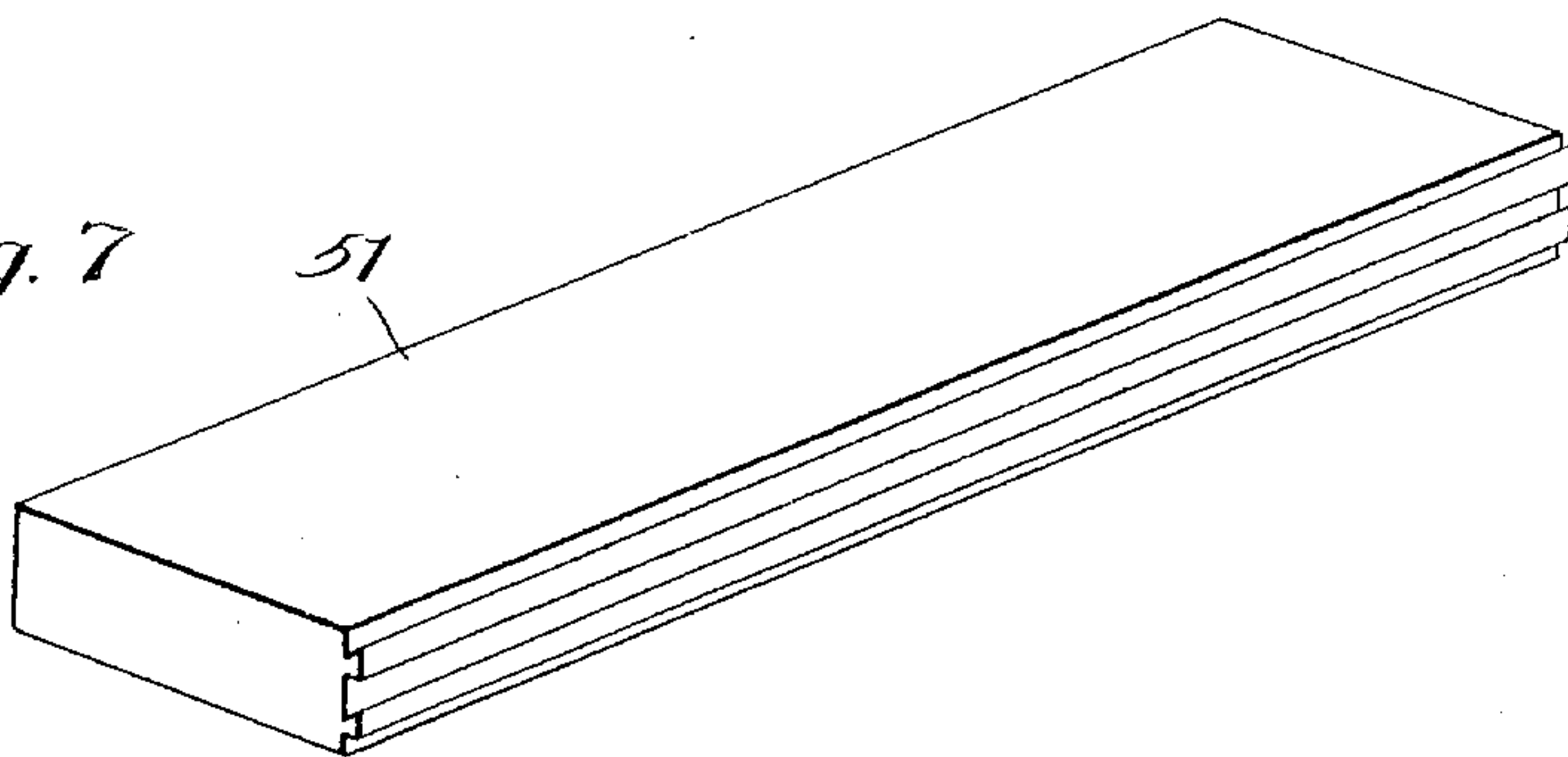


Fig. 8

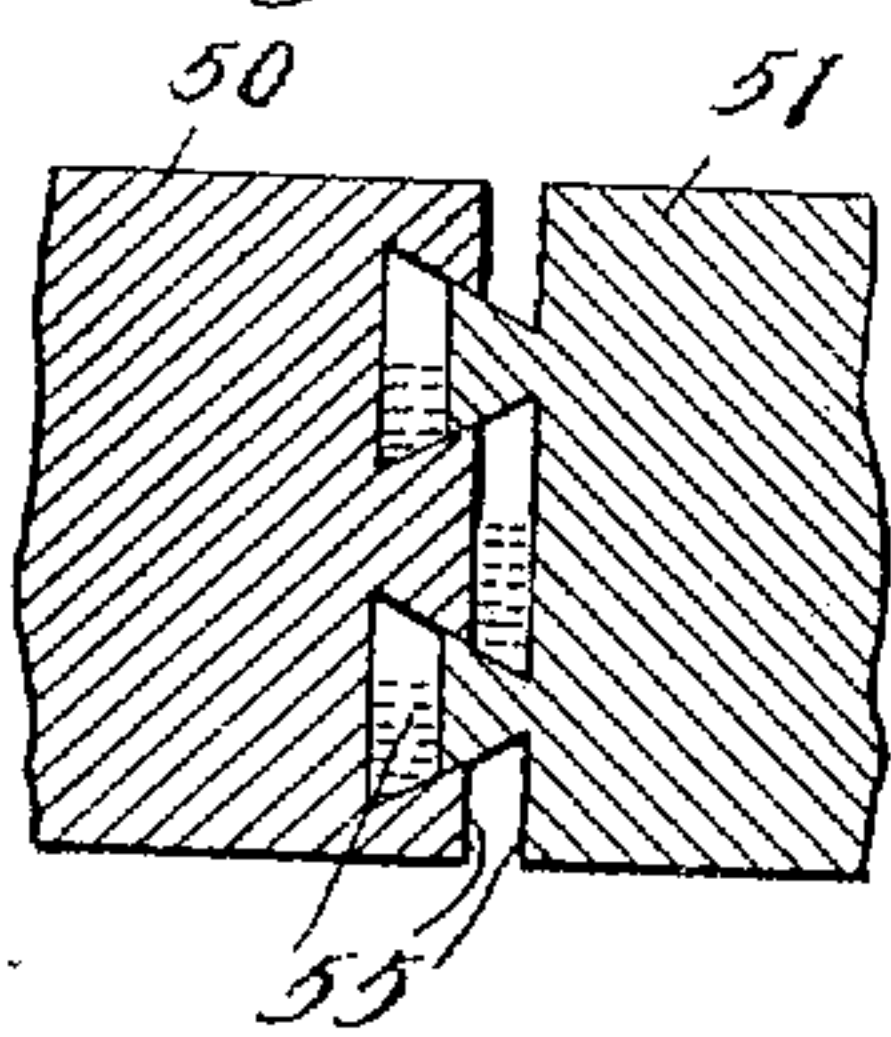


Fig. 9

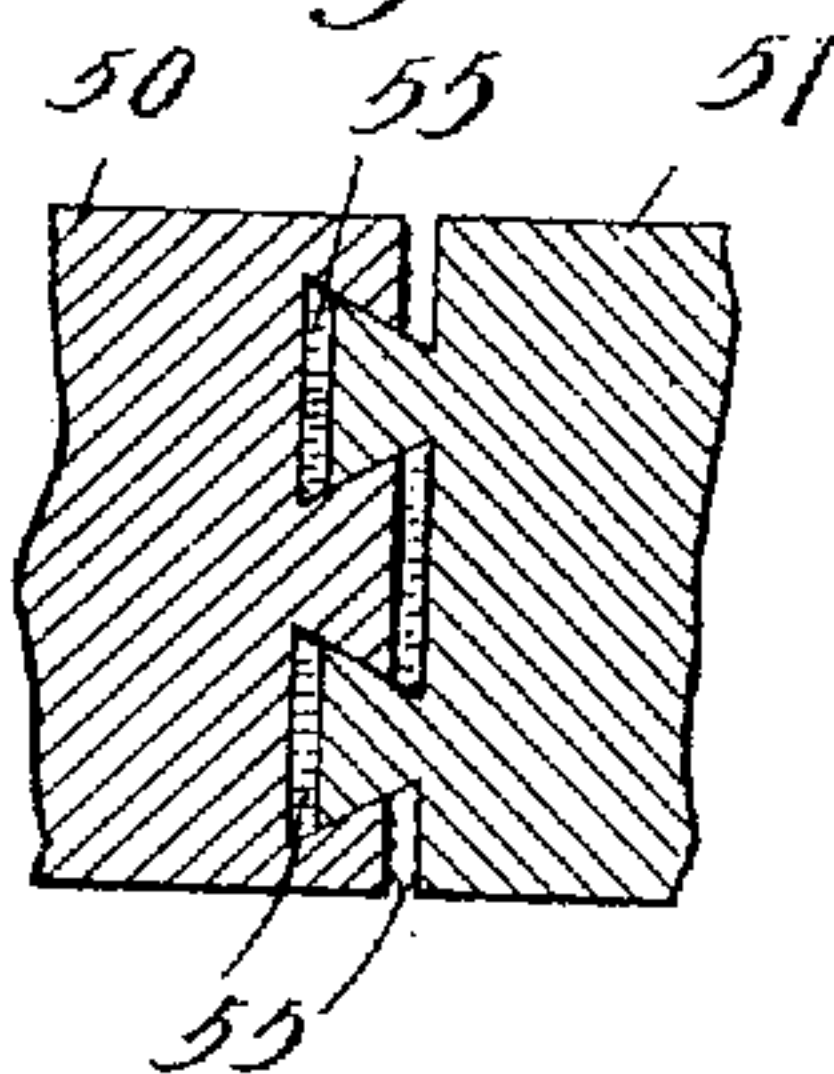


Fig. 10

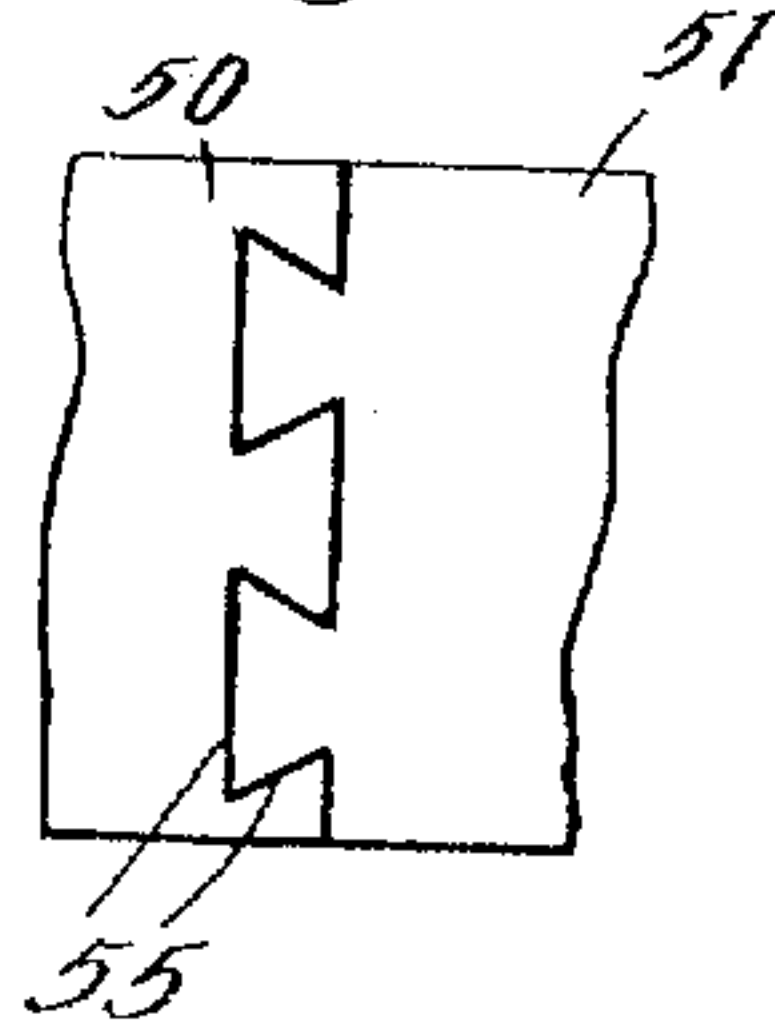
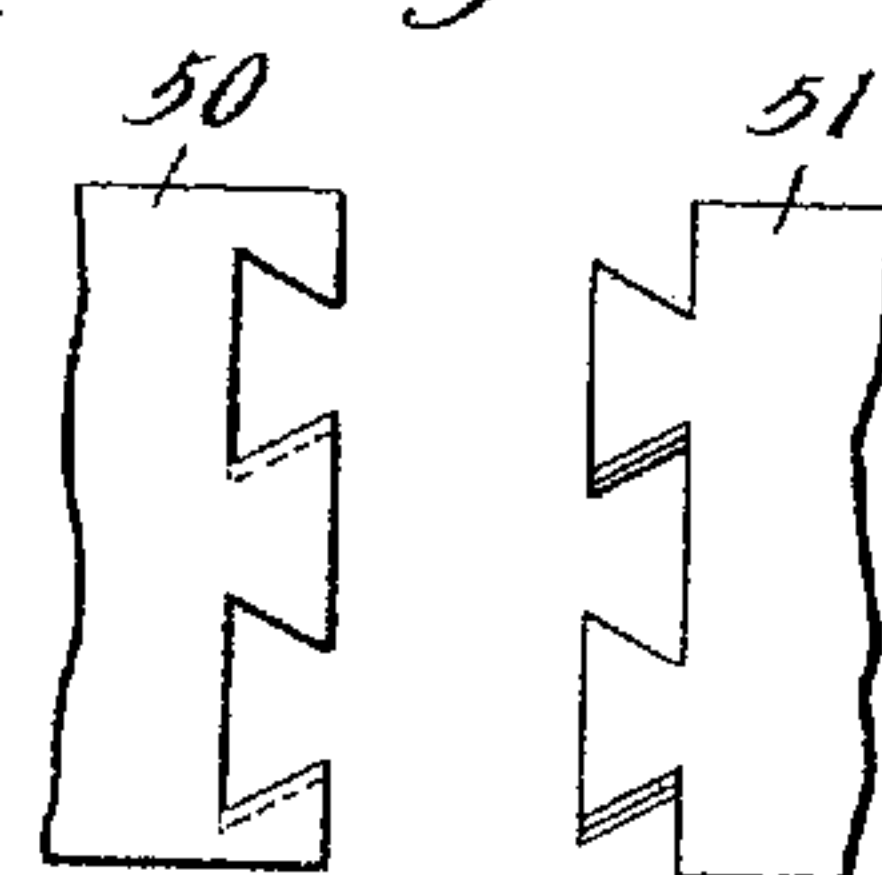


Fig. 11



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UNITED STATES PATENT OFFICE.

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MACHINE FOR DOVETAILING AND JOINING LUMBER.

976,192.

Specification of Letters Patent.

Patented Nov. 22, 1910.

Application filed May 27, 1910. Serial No. 563,688.

To all whom it may concern:

Be it known that I, BERT A. LINDERMAN, a citizen of the United States, residing in Muskegon, in the county of Muskegon and State of Michigan, have invented a new and useful Improvement in Machines for Dovetailing and Joining Lumber, of which the following is a specification.

In the uniting of pieces of lumber by means of dovetails formed on the longitudinal edges of the lumber, difficulty has been experienced in supplying the dovetail surfaces with sufficient glue to render the joint as secure and firm as it should be for use in making furniture and interior house fittings. This inability to retain sufficient glue in the joint is due to the fact that if the dovetail surfaces fit closely together nearly the entire supply of glue which is applied to the surfaces at the time they are moved into engagement is forced off of them when the engagement takes place, because the uniting movement is necessarily a longitudinal one and the dovetail surfaces are in close rubbing contact during the whole of it. To increase the quantity of glue which may be allowed to remain in the joints so that they may be strengthened thereby to the degree necessary or desirable, has led to the making of this invention. I have conceived that if the tongues and grooves were made to taper slightly in a longitudinal direction from end to end of the stock, that the object sought would be attained, because in uniting such tapered dovetails the small end of the tongue and the large end of the grooves enter into engagement first, but their surfaces do not come into close or rubbing contact until the uniting movement is nearly complete and the full size of the tongue has arrived at the large or wide end of the groove. This lack of contact during the initial part of the uniting operation leaves the majority of the glue still adhering to the surfaces and undisturbed, and during the final portion of the uniting operation when the parts are in full contact, there is not sufficient change of position by either of the dovetailed pieces to cause any serious dislodgment of the glue from its original position.

This invention is adapted to be practiced by the machine illustrated in the accompanying drawings and described below, and in said drawings, Figure 1 is a side elevation of the machine embodying the present

invention. Fig. 2 is a horizontal section of the same. Fig. 3 is an enlarged side elevation of a portion of the machine showing the cutters for cutting the dovetails on the edge of one of the pieces of board to be united. Fig. 4 is a partial transverse vertical section of the parts shown in Fig. 3. Fig. 5 is a section on the line 5—5 of Fig. 4. Figs. 6 and 7 are perspective views of two pieces of lumber provided with the tapering and interfitting dovetails. Figs. 8 and 9 are cross sections of the lumber taken in the early stages of the uniting operation; Fig. 10 is an end elevation of the united lumber after the union is completed and Fig. 11 is an end elevation of the two pieces of lumber showing the ends which first engage.

In said drawing 12 represents the framework of a dovetailing machine built in substantial accordance with Letters Patent #827738 granted to A. T. Linderman August 7, 1906, and adapted not only to cut the dovetails in the edge of the stock but also to unite the pieces of stock upon which the dovetails are cut forcing them together with the dovetails in engagement. The machine illustrated is provided with two parallel endless carriers 13 and 14, the carriages 7 of which are linked together by links 8, and these carriers feed the stock at a uniform speed past suitable dovetail cutters. The carriers move in opposite directions so that they are adapted to present the proximate edges of two pieces of lumber to separate cutters at the same time, as will be understood, and they are also provided with pressers 15 adapted to hold the lumber down upon them during the cutting of the dovetails and also during the uniting operation. These pressers, however, release the united lumber as soon as the union is completed allowing it to be ejected sidewise by the ejector 16. Mechanism suitable for raising the pressers at the proper time and for operating the ejector at the proper time are shown in said patent. The cutters employed by me are also much like those shown in said patent but differ from them in the provision of means for moving them vertically and transversely to the line of feed of the carrier while they are cutting the dovetails, this transverse movement being necessary to give the dovetails the tapering feature. The carriers feed the stock at the same speed, and the cutters which are moved transversely are operated

in such movement at the same speed, so that the dovetail tongues and grooves formed by the cutters are adapted to interfit as closely as needed for good work. The cutters at one
 5 end of the machine are also adapted to form the small end of the tongue or tongues at the advance end of one piece of the stock and the cutters at the other end of the machine are adapted to form the large end of the
 10 groove or grooves at the advance end of the other piece of stock, so that as the pieces are fed toward each other after the dovetails are cut, such ends first enter into engagement.

I illustrate in detail the cutters 17 and 18
 15 at one end of the machine and operating upon the stock carried to them by carrier 13. They are adapted to form the dovetail grooves upon one piece of lumber and are mounted upon arbors 19 and 20, which are inclined in opposite directions and are supported in suitable bearings 21 and 22 attached to plates 23 and 24 which are adjustable on center pivots 25 so as to permit changes in the inclination of the arbors.
 20 One of the pivots 25 is supported in the frame 26, and the other pivot 25 is entered in a plate 27 movably secured in the frame of the machine. In the case of the cutter 17 however, I make the supports vertically
 25 movable while the cutters are operating by providing the plate 27 with retaining bars or strips 28 attached to the frame of the machine and forming ways in which that plate may slide vertically, and placing under plate
 30 27 a rotating cam 29 mounted on shaft 30 and adapted to give a slow and gradual movement to the plate 27 by which the cutters 17 will be raised (or lowered) transversely of the line in which the stock is being
 40 fed, and thus adapted to gradually widen (on contract) the width of the grooves or tongues as the cut progresses. By these means the tongues or grooves will be made to taper from one end of the lumber to the
 45 other end. The movable cutter of the drawing cuts the lower side of the grooves, and as it is necessary in machines of the type shown in said Patent #827,738 which both cut and unite the lumber, that the grooves
 50 be wider at the end which is cut first, I rotate the cam in the direction indicated in Fig. 3. This allows the cutter to fall to its lowest position preparatory to operation on a fresh piece of lumber so that the end of
 55 the groove which is first cut will be the widest part of the groove, and during the cutting which follows the cam gradually raises the cutter so that the groove is narrowed as the cutting proceeds.

60 The cam makes a single revolution during the passage of a single piece of stock past the cutters, and its speed must therefore be regulated in accordance with the speed of the carrier. To some extent also
 65 its speed should be regulated in accordance

with the length of stock being operated upon, as the taper should be continuous and uniform from end to end of the dovetails to allow proper engagement by them. These results are easily attained by modifying the
 70 cam or changing its speed. After operating upon a piece of stock the cutter 17 is lowered by the cam into proper position for commencing the cutting upon the next following piece. The cutters at the other end of the
 75 machine are almost precisely the same in construction as the cutters 17 and 18, varying therefrom only in being adapted to form the tongues instead of the grooves but their construction is well understood and they are
 80 not illustrated for this reason. As in the case of cutters 17 and 18, one of these cutters for forming the tongues is adapted to be moved transversely of the line of feed of the stock while the tongues are
 85 being cut, so that the tongues may be tapered correspondingly with the grooves, and for this purpose a suitable cam adapted to cause such transverse movement, and making a single revolution during the passage
 90 of a single piece of stock is employed, and given a speed which is regulated in accordance with the speed of the carrier, and the length of the stock.

All the cutters used are of a kind well
 95 known at this time, and of those shown in Figs. 3 and 4 the cutter 17 cuts the lower side of the grooves and the cutter 18 the upper side. I have found that the object of
 100 my invention is accomplished if one only of each pair of cutters is given the transverse movement described. It may, however, be provided for both of each pair if preferred.

In Fig. 6 I show a board 50 upon the edge of which the tapered grooves have been
 105 formed by the cutters 17 and 18 of Figs. 3 and 4, and in Fig. 7, I give a like view of another board 51 upon which tapered tongues adapted to interfit with the grooves of board 50, have been formed, the board 51
 110 having been cut by the cutters operating on the stock moved by the carrier 14.

Immediately after the dovetails have been cut in the stock, and before it has been carried into engagement, I apply the glue to
 115 the dovetailed surfaces by some suitable means. The device used for applying the glue to the stock moved by carrier 13 consists of a wheel 52, Fig. 3 which is arranged close to the path of the stock so that it bears
 120 upon the dovetail surfaces and will be frictionally driven thereby. The wheel is supported upon an inclined axis 53 and one edge of it is constantly immersed in a vat 54 of liquid glue. A similar glue applying device is preferably though not necessarily used
 125 to operate upon the stock cut by the cutters operating on stock moved by carrier 14, and it is similarly located so that it operates on the stock after it has been cut and prior to its
 130

engagement with the other stock to which it is to be united. The glue thus applied to the dovetail surfaces remains on them during the initial portion of the uniting operation, as has already been explained, and while the opposing surfaces may come into close bearing contact at the completion of the operation, it is also true that much of the glue will then be unable to escape and that the movement of the parts upon one another after they are in full contact will not be sufficient to force out more than a small percentage of the glue. With the tapering dovetails, it will also be remembered that in the uniting operation the movement of the surfaces is not strictly longitudinal, but is also slightly sidewise, and consequently is less likely to force the glue out at the end of the stock than where the dovetails are straight. The section given at Fig. 8 shows the parts at the start of the uniting operation, the glue 55 partially filling the open spaces, and Fig. 9 shows the parts at a later stage with the parts drawn nearly together. In this Fig. 9 it will be seen that the glue is still present though it is now confined closely at all sides in the open spaces which still remain. At Fig. 10, the parts are shown as having been drawn tightly together by the dovetails, thus completing the union, and either compressing the glue or driving it into the wood so that it hardly shows at the end of the united lumber.

The joint made in the manner set forth and with the glue confined therein as described, possesses all the strength needed, and overcomes the objection noted at the beginning of this specification.

The carrier 13 is supported upon wheels 40 and 41, each having four sides adapted to conform to the length of the carriages 7. The carrier 14 laps by carrier 13 sufficiently to permit the two carriers to bring about complete engagement between the lumber carried by them, and is supported by similar wheels 42 and 43. The inner wheels of both the carriers have a gearing connection to bevel gears 44 and a shaft 45 connects the gears 44 together, so that by applying power to either of said wheels, both carriers may be operated in harmony.

The described transverse movements of the cutters are obtained from the carriers by belting 46, driving the pinion 47 and actuating the shaft 30 by the intervening gears

48 and 49. Similar means are employed for actuating both cams 29.

I claim:—

1. The lumber joining machine, embracing means for cutting longitudinal tapering dovetails on the proximate edges of two oppositely moving pieces of lumber, means for applying glue to said dovetails, and means for feeding said lumber longitudinally past the cutting means into engagement with each other.

2. The lumber joining machine wherein are combined oppositely moving and lapping carriers, cutters for forming interfitting longitudinally tapering tongues and grooves on the proximate edges of two pieces of lumber mounted on said carriers, said tongues and grooves being formed with advance ends adapted to engage and means for applying glue to said tongues and grooves.

3. The lumber joining machine wherein are combined oppositely moving and lapping carriers, cutters for forming tapering dovetail grooves on the edges of a piece of lumber mounted on one of said carriers, with the wide end of the grooves at the advance end, and cutters for forming tapering dovetail tongues on the edge of another piece of lumber mounted on the other carrier with the small end of the tongues at the advance end, and means for applying glue to said dovetails.

4. The lumber joining machine having means for feeding two pieces of lumber in opposite directions, cutters for forming dovetails on the proximate edges of said pieces, said cutters being also movable transversely to the line of the feed, and means for applying glue to said dovetails, said feeding means being also adapted to carry said pieces into engagement with each other.

5. The lumber joining machine having two sets of cutters for forming interfitting dovetails on the surfaces of two pieces of lumber, means for giving the cutters movement transverse of the line of the feed while cutting the dovetails, means for applying glue to the dovetails, and means for feeding said pieces past the cutters and into engagement with each other.

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