G. A. SMITH.

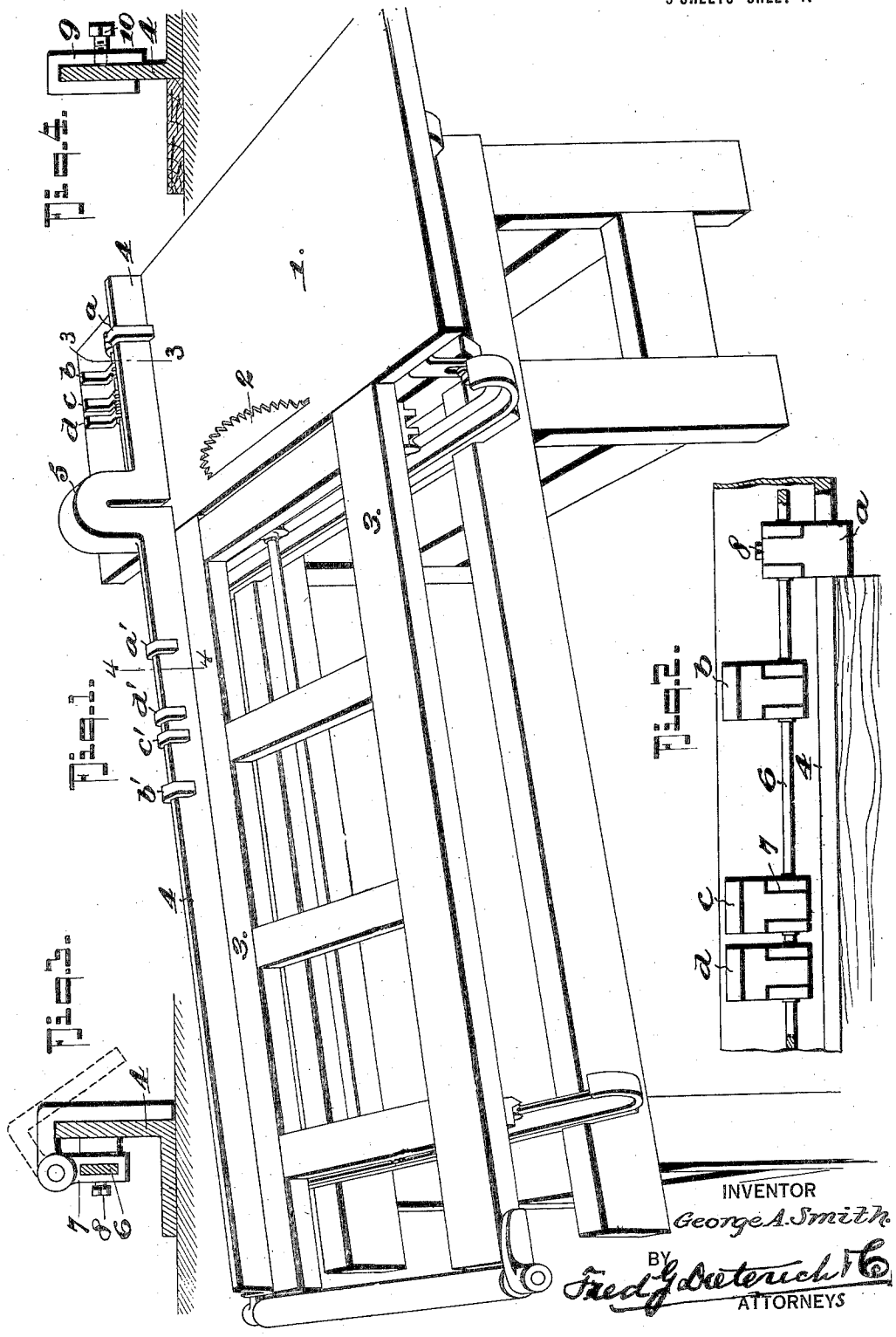
CUT-OFF SAWING APPARATUS AND METHOD OF USING THE SAME.

APPLICATION FILED AUG. 29, 1917. RENEWED DEC. 6, 1919.

1,346,269.

Patented July 13, 1920.

3 SHEETS—SHEET 1.



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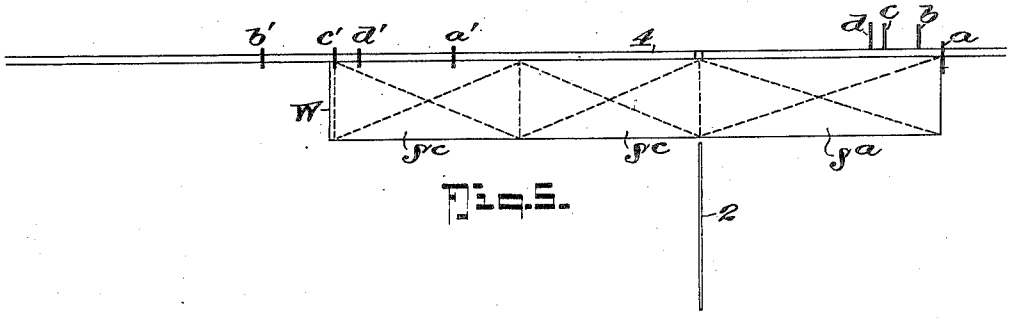


Fig. 5.

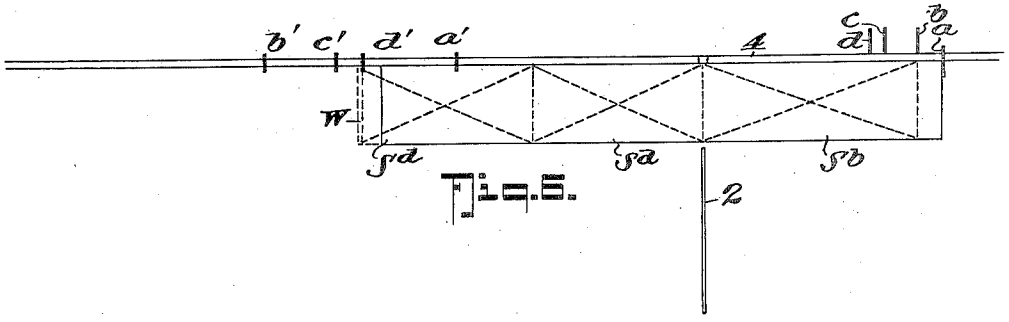


Fig. 6.

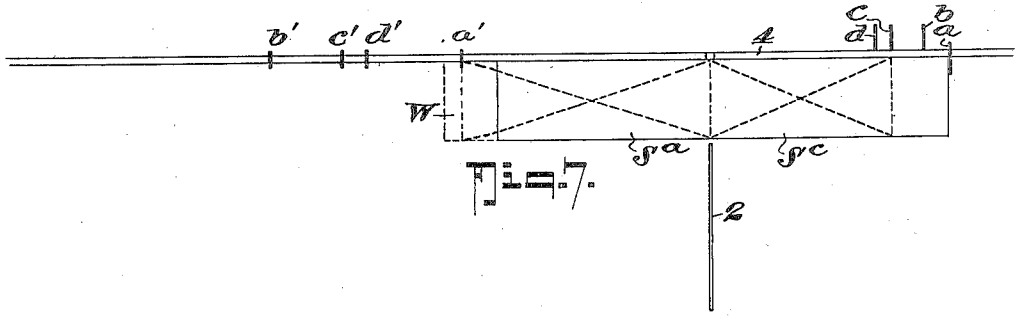


Fig. 7.

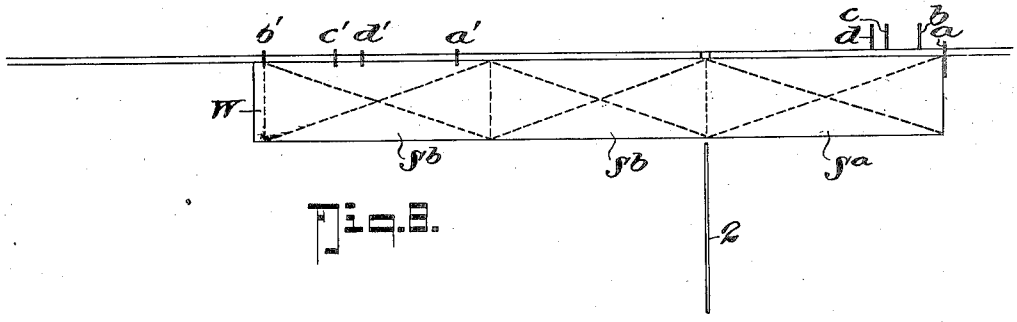


Fig. 8.

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3 SHEETS—SHEET 3.

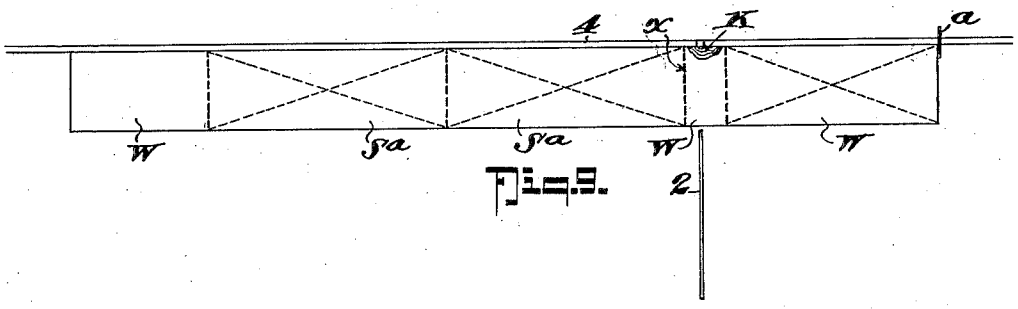


Fig. 9.

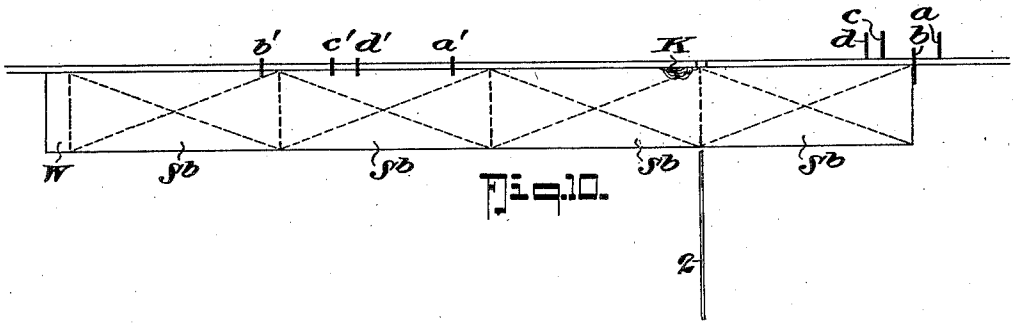


Fig. 10.

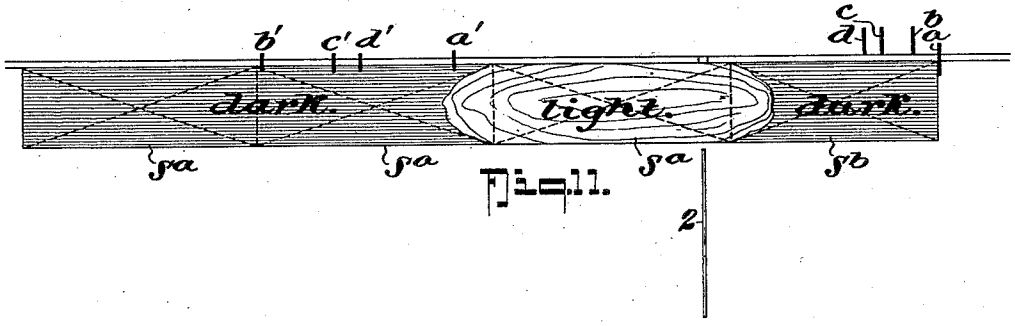


Fig. 11.

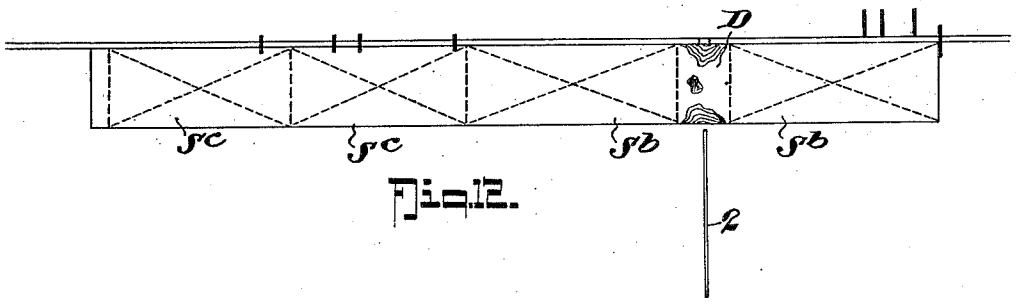


Fig. 12.

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UNITED STATES PATENT OFFICE.

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CUT-OFF SAWING APPARATUS AND METHOD OF USING THE SAME.

1,346,269. Specification of Letters Patent. Patented July 13, 1920.

Application filed August 29, 1917, Serial No. 188,843. Renewed December 6, 1919. Serial No. 343,114.

To all whom it may concern:

Be it known that I, GEORGE A. SMITH, residing at South Hill, in the county of Mecklenburg and State of Virginia, have invented certain new and useful Improvements in Cut-Off Sawing Apparatus and Methods of Using the Same, of which the following is a specification.

My invention relates to the art of box shook manufacture. In making box shooks the boards are cut up into lengths of predetermined sizes, depending on the size box or boxes to be made up. Boards coming from the mill are in lengths of certain standard measurements as, for instance, fourteen feet, sixteen feet, etc., etc. A board known as a fourteen or sixteen foot board, etc., does not exactly measure fourteen or sixteen feet, etc., respectively, because in cutting timbers the rules require an allowance for end or edge trimming waste. Therefore a fourteen foot board may run a few inches over fourteen foot actual measurement and this is true of all standard length boards as they come from the mill.

Furthermore, boards often have defects, such as knots, which under the present practice, frequently result in a great deal of waste of lumber in cutting out the defective place should it be so located as to interfere with nailing. In cutoff sawing as at present practised, the cutoff saw fence is provided with one or more board stops located definite distances from the saw on the farther side of the fence, say located at distances of fourteen, fifteen, eighteen or twenty inches to allow the operator to cut the boards into definite lengths measured from the advance end of the board. For example, if the box requires twenty inch lengths, the twenty inch stop is lowered and the board is brought with its advance end into engagement with such stop before the fence is moved to feed the board to the saw, and as many twenty inch lengths as possible are cut from the board, one after the other, until the end of the board is reached. For example, a fourteen foot board would cut nine twenty inch lengths and leave eight inches of tailings or waste; a sixteen foot board would cut nine twenty inch boards, leaving seventeen inches of tailings or waste (unless stops of lesser degree than a twenty inch stop is used). If a number of stops are used, the seventeen inch piece may be cut into a standard length say, fifteen inches, by the use of the fifteen inch stop, leaving two inches of waste. This assumes the board to be exactly the inches stated, but, as before intimated, they frequently run several inches over the stated lengths and a sixteen foot board might have sixteen feet, five inches, or sixteen feet, eight inches, etc., and a fourteen foot board might run over several inches also, in which event the amount of waste in cutting the board by the present method will be frequently much greater than in the above examples. This waste runs frequently from ten to fifteen per cent. of the total lumber that comes from the mill, under the present practice in cross cut sawing and in view of the present scarcity of lumber, it is quite an item of expense to the purchaser of box shooks, since the lost lumber must be figured in or allowed for in estimating the price to the consumer. It is therefore the principal object of my invention to eliminate this waste or at least reduce it to the minimum by so cutting the board that regardless of its absolute length, it may practically all be cut into lengths for box shooks. This is accomplished by providing the cutoff saw fence with a set of, what I term, observation stops, (the observation stops do not function as board stops, as do the regular board stops, which are also employed) which coöperate with the uncut or following part of the board, *i. e.*, that part which has not yet reached the saw (the board stops coöperating with the advance part of the board, *i. e.*, that part which has passed the saw location) and enable the operator, as the board end reaches the observation stops, to determine thereby which board stop (or combination of board stops) to throw down in order to cut the remainder of the board into such predetermined lengths as to cut shooks out of such remainder without leaving more than a nominal amount of waste.

Another object of the invention is to provide the cutoff saw apparatus with means whereby the operator, before the third from the last cut is made, may determine almost automatically, *i. e.*, with instinctive speed and precision, which board stops to move in order that the remaining part of the board may be cut up into shook lengths (not neces-

sarily the particular length which he is especially cutting, *i. e.*, the maximum length) so as to leave the minimum amount of waste when the board has been fully cut.

In carrying out my invention, the board stops (of which there are usually two or more, preferably four) are set at definite predetermined distances from the saw location or plane of the saw, whereby a piece may be cut off from the end of the board, the desired shook length; for example, the board stop may be located fourteen inches, fifteen inches, eighteen inches and twenty inches, respectively from the plane of the saw to permit shooks of fourteen, fifteen, eighteen or twenty inch lengths to be cut. These stops are, as shown, located on the farther or discharge side of the saw location, the stops being carried by the fence. In carrying out my invention, I place on the inner or entrance side of the saw fence, the observation stops which are the same in number as the board stops but which are located in such way that the observation stop nearest to the plane of the saw is preferably set the same distance from the plane of the saw as is the farthest board stop, while the other obervation stops are respectively located at distances from the plane of the saw double that of the corresponding board stops.

The invention further resides in the novel method of operating the cutoff saw for the purposes stated and the invention also includes those novel structural features and combination of parts which will be hereinafter fully described, specifically pointed out in the appended claims and illustrated in the accompanying drawings, in which:—

Figure 1 is a perspective view of a well-known type of cutoff saw apparatus adapted for use in carrying out my method and showing the arrangement of the board and observation stops.

Fig. 2 is a detail top plan view of a portion of the same.

Figs. 3 and 4 are detail cross sections respectively on the lines 3—3 and 4—4 of Fig. 1.

Figs. 5 to 8, inclusive, are diagrammatic plan views illustrating the use of the machine in carrying out my method of operation.

Fig. 9 is a diagrammatic view illustrating the old method now in common use for cross cut sawing shook lumber, the machines using but a single board stop.

Fig. 10 is a diagrammatic view which illustrates the method of sawing the board in accordance with the present method.

Fig. 11 illustrates how a board having a clear "special" lumber portion may be cut to separate the "special" portion from the remainder and hence obtain a greater aggregate shook value out of the board.

Fig. 12 is a diagrammatic view illustrating how a bad or defective section may be cut out of the board without excess waste.

In the drawings, in which like letters and numerals of reference indicate like parts in all of the figures, the cutoff saw machine is shown in Fig. 1, and may be of the conventional type. It includes a table 1 in which the saw is mounted and a board carriage 3, which is movable back and forth transversely to feed the board to the saw and which carries the fence 4. The fence has an arch 5 to pass over the saw 2. All of the foregoing structure may be of the conventional type and, *per se*, is not my invention.

In carrying out my invention, I provide the fence 4 with a series of board stops *a*, *b*, *c*, and *d*, (one for each shook length which the machine is to be used for cutting, say twenty, eighteen, fifteen, or fourteen inch shooks). The board stop *a* is set to cut the principal shook the machine is employed for cutting (each machine being usually used to cut a single shook length when several machines are employed in a mill). The other stops *b*, *c*, *d* are set to cut other lengths for which there is or may be a demand or an order in the mill, as, for instance, eighteen inch, fifteen inch or fourteen inch shooks. The stop *d* is set for the shortest shook desired, say fourteen inch (any board end less than fourteen inches usually becomes waste but is nearly all saved by my method, as will be hereinafter understood).

I also place on the fence. a corresponding set of what I have termed "observation stops". These consist of a principal stop *a'* and auxiliary stops *b'*, *c'* and *d'*. The stop *a'* is set the same distance from the plane of the saw 2 as is the stop *a*, (twenty inches) but on the entrant side of the fence. The stops *b'*, *c'*, *d'* are set respectively twice the distance from the plane of the saw, as are the related board stops *b*, *c*, *d*. Thus, if the board stop *b* is eighteen inches from the plane of the saw, the observation stop *b'* will be set thirty-six inches away; if the board stop *c* is fifteen inches away, the observation stop *c'* will be set thirty inches from the plane of the saw; if the board stop *d* is fourteen inches from the plane of the saw, the observation stop *d'* will be set twenty-eight inches therefrom.

The mechanical construction of the several stops may be any such as found convenient. In practice, I find it convenient to provide a bar 6 on the back of the fence on which the board stop supports 7 are adjustably held by set screws 8, the supports 7 having ears to which the stops *a*, *b*, *c* and *d* are respectively hinged to permit one or the other of the stops to be swung down into position, or back out of the way, as desired, (see Figs. 1 and 3).

The observation stops may be simply U

members 9 (held in place by clamp screws 10,) since they function only as indicators and not as mechanical stops, while the board stops perform both functions.

In sawing shooks by the use of my invention, the board stop which gives the maximum shook length to be cut by the machine is thrown down (see stop *a*, the twenty inch stop) and the operator feeds the board through the machine endwise against the stop and crosswise against the saw to saw twenty inch lengths, regardless of the observation stops, until the tail end of the board arrives at or near the farthest observation stop. This will be just before the third from the last cut is made. The operator now notices the remainder of the board with regard to the position of the tail end in relation to the observation stops. For example, suppose the operator has been cutting a twenty inch shook and when the advance end of the board is next pushed up against the twenty inch board stop (*a*) he finds that the tail end of the board is close up to but not past the observation stop *c'* (see Fig. 5). He knows at once that after making the next cut to remove the twenty inch length S^a, he has slightly over thirty inches of board left (the observation stop *c'* is thirty inches from the saw plane) so he throws the related board stop *c*, into position and proceeds with the sawing operation, getting two fifteen inch shooks out of the remainder with only a fraction of waste. Were the board sawed under the old practice, he would simply continue cutting twenty inch shooks until the tail end of the board passed the plane of the saw and the last piece, being less than twenty inches would be wasted (the waste being as great sometimes as nearly twenty inches unless the machine has several board stops then he may cut the last piece of board to give a shorter shook length, but if his last stop is for fourteen inch shooks then all of the tail of the board less than fourteen inches would be wasted).

As another example, suppose the operator has been cutting twenty inch shooks and finds that the tail of his board (when he is ready for the next cut) falls just beyond an observation stop (say, stop *d*, Fig. 6). He sees at a glance if he cuts off the twenty inches he cannot cut two fourteen inch lengths and if he cuts off another twenty inch length (observation stop *a'*) he will have too much waste (the piece from observation stop *a'* to the tail end of the saw). He therefore moves the board back and throws down another board stop, say stop *b*. Whereupon he finds the tail of the board just clear of his observation stop *d'*. He therefore knows at a glance that he can make the cut to get the eighteen inch length, and then by throwing stop *d* he can make two cuts and get two fourteen inch shooks and have only a nominal waste (less than two inches).

Should the operator by some oversight cut too many of the full length shooks (twenty inch shooks) and not observe the tail of his board until it has passed the main observation stop *a'*, (see Fig. 7) he can still save a large part of the board, which would otherwise be wasted, by moving it back before making the cut (see dotted lines, Fig. 7,) until the tail of the board is again in advance of the stop *a'*, and by throwing down one of the auxiliary board stops, say *c*, he can cut the board to get a fifteen inch shook and then by throwing stop *a*, (corresponding to observation stop *a'*,) he can get a twenty inch shook with only a small waste at the end.

If the tail end of the board is near the observation stop *b'*, when the front end is against the board stop *a*, (see Fig. 8) the operator knows he can cut a twenty inch shook and two eighteen inch shooks.

In Fig. 9, is illustrated an example of the old method of sawing shook lumber which has a knot or defect K, which, after the advance lengths have been cut, happens to fall in line with the saw. This either can be cut through or, if too much of a defect, must be cut out, thus wasting all of the board from stop *a* to line *x* and then only two twenty inch shooks S^a can be gotten out of the remainder, with the tail waste enormous. With my method employed, however, (see Fig. 10) the operator saves practically all of the board which would have been wasted by the old method (see Fig. 9). With the one stop machine only two shooks twenty inches, can be gotten out of the board with a waste of more than twenty inches in the aggregate, or if a multiple board stop machine be employed, an additional short shook may be obtained while with my method four shooks (eighteen inches) are obtained and the waste is reduced to the minimum.

Another advantage of my invention is due to the fact that it is effective regardless of the length of the board, which is a great advantage because it frequently happens that spotted or poor lumber has clear sections and as clear lumber is more valuable for some classes of boxes than the general run of the mill, I can, regardless of the length of the lumber, cut out the clear section or sections wherever they occur and thus separate the more valuable parts of the board from the remainder. This is illustrated in Fig. 11 by reference to which it will be noted that when a light section appears in position to be sawed the operator will throw down a stop so as to cut through the dark section ahead, say the stop *b*, (eighteen inches) and will then throw the stop which will give him the longest cut or cuts out of the light clear part of the board

(say stop *a*) and then cut the remainder as before. Thus, the board is not cut with part of the clear in one shook and another part in another shook with no clear shooks at all, as would usually occur were the old practice followed. On the other hand, the more valuable part of the board is cut into a separate shook or shooks without, however, wasting the remainder of the board. Again, if a board develops a section D having a defect which is so bad as to require cutting out (see Fig. 11) it does not mean any more waste at the end of the board than the maximum waste which my method allows. As has, no doubt, been observed, such maximum waste allowed by my method is under two inches, whereas by the old method it may be as high as slightly less than the minimum board stop, viz: twenty inches or fourteen inches, etc., according to the location of the lowest value stop.

In the diagrammatic figures of the drawings, the reference letter *w* indicates the waste part of the board and the reference letters S^a, S^b, S^c and S^d indicate the section of board cut by using the board stop of the corresponding index letter.

I believe that from the foregoing description and with the foregoing examples as guides, my invention will be readily understood by those skilled in the art and that it will be seen that in accordance with my improved method of operating the cutoff saws or sawing lumber, a very great saving of lumber is effected. Instead of having a waste of high degree, which has to be figured into the cost of the shooks, the waste factor is rendered negligible and may be disregarded in estimating the amount of shook-feet in a board of any length whatever.

What I claim is:

1. The method of operating cut off saw apparatus which apparatus includes a table, a cutoff saw and a fence, said method consisting in providing a definite series of board stops and locating the same at the farther side of the saw, providing a series of related observation stops and locating them at the near side of the saw, using one or another of the series of board stops to cut off shook lengths from the board irrespective of the observation stops, and as the end of the board approaches the location of the observation stops, determining by comparison of the end of the board with the observation stops, which of the board stops to use in order to obtain the greatest available number of shook lengths out of the remainder of the board with the least possible waste.

2. The method of operating cutoff saw apparatus, which apparatus includes a relatively fixed-as-to-location saw, a table and a relatively movable fence for feeding the board to the saw; said method consisting in providing the fence with a series of board stops, any one of which may be selectively thrown down to be engaged by the end of the board, said board stops being located definite distances from the saw, said method further consisting in providing a series of observation stops on the fence located definite distances from the saw on the side opposite to the board stops, the location of the observation stops having definite relation to corresponding board stops, said method consisting further in moving the board to engage one or another of the board stops during the initial sawing operations on the board and determining from the observation stops, as the end of the board being sawn comes into relation to the observation stops, which of the board stops must be thrown down to cut the remainder of the board into shook lengths with the least possible waste and throwing down such board stops and continuing the cutting operations to cut the lengths so determined.

3. In combination with a cutoff saw apparatus which comprises a table, a relatively fixed-as-to-location saw and a relatively movable fence for moving the board up to the saw; of a series of board stops located beyond the saw toward the discharge end of the table, and a series of observation stops located adjacent to the saw location on the side opposite that where the board stops are located, said observation stops being located from the saw fixed distances with regard to predetermined board stops.

4. A cutoff saw apparatus which comprises a table, a saw mounted thereon, a fence for moving the board up to the saw, a set of board end engaging stops for arresting the longitudinal movement of the board whereby predetermined lengths may be cut from the board and a set of observation stops cooperative with the uncut part of the board for determining which of the board stops shall be sawed in order to cut the greatest number of lengths from the remainder of the board with minimum waste.

5. A cutoff sawing apparatus comprising in combination with the saw and the fence that moves the board toward the saw, of board stops carried by the fence for arresting the longitudinal movement of the board whereby predetermined lengths may be cut from the board, the board stops coöperating with the advance end of the board, and observation stops on the fence coöperative with the uncut part of the board for determining the three last cuts to be made in order to obtain the least possible waste in the remainder of the board.

6. A cutoff sawing apparatus comprising in combination with the saw and the fence that moves the board toward the saw, of board stops carried by the fence for arresting the longitudinal movement of the board

whereby predetermined lengths may be cut from the board, the board stops coöperating with the advance end of the board, observation stops on the fence coöperative with the uncut part of the board for simultaneously determining the three last cuts to be made in order to obtain the least possible waste in the remainder of the board, said observation stops being spaced from the plane of the saw to definite distances which are multiples of corresponding board stops.

7. A cutoff sawing apparatus comprising in combination with the saw and the fence that moves the board toward the saw, of board stops carried by the fence for arresting the longitudinal movement of the board whereby predetermined lengths may be cut from the board, the board stops coöperating with the advance end of the board, observation stops on the fence coöperative with the uncut part of the board for determining the three last cuts to be made in order to obtain the least possible waste in the remainder of the board, said observation stops being spaced from the plane of the saw to definite distances which are multiples of corresponding board stops, the distance of the farthest board stop and the distance of the nearest observation stop reckoned from the plane of the saw being equal.

8. In a cutoff saw apparatus, the combination with the fence by which the board is moved toward the saw; of a primary board stop on the fence located the maximum distance from the plane of the saw, a series of secondary board stops located on the fence between the primary board stop and the plane of the saw, said board stops being located on the fence at the discharge or farther side of the saw, a primary observation stop located on the fence at a distance from the plane of the saw equal to that of the primary board stop and a series of secondary observation stops on the fence located at distances from the plane of the saw in multiples of the distances of corresponding board stops, the observation stops being located on the fence at the entrance side of the plane of the saw and coöperative with the unsawed portion of the board while the board stops are coöperative with the end of the board to be sawed off.

9. The method of operating cutoff saws in sawing lumber into shooks which method consists in operating the saw to cut successive shooks of predetermined length and before the third from the last cut is made, determining the remaining cuts by which the board can be divided into the greatest number of predetermined-length-shooks with the least waste, and sawing such remainder into the shook-lengths so determined.

10. A cutoff sawing apparatus comprising in combination with the saw and the fence that moves the board toward the saw, of board stops carried by the fence for arresting the longitudinal movement of the board whereby predetermined lengths may be cut from the board, the board stops coöperating with the advance end of the board, and observation stops on the fence coöperative with the uncut part of the board for determining the third from the last cut and thereby also determining the two final cuts to be made in order to obtain the least possible waste in the remainder of the board.

11. A cutoff sawing apparatus comprising in combination with the saw and the fence that moves the board toward the saw, of board stops carried by the fence for arresting the longitudinal movement of the board whereby predetermined lengths may be cut from the board, the board stops coöperating with the advance end of the board, observation stops on the fence coöperative with the uncut part of the board for determining the third from the last cut and thereby also determining the two final cuts to be made in order to obtain the least possible waste in the remainder of the board, said observation stops being spaced from the plane of the saw to definite distances which are multiples of corresponding board stops.

GEORGE ANDREWS SMITH.