Aug. 10, 1948. M. R. CHIDAKEL 2,446,741

LUMBER RECLAMATION MACHINE

Filed July 6, 1945 2 Sheets-Sheet 1

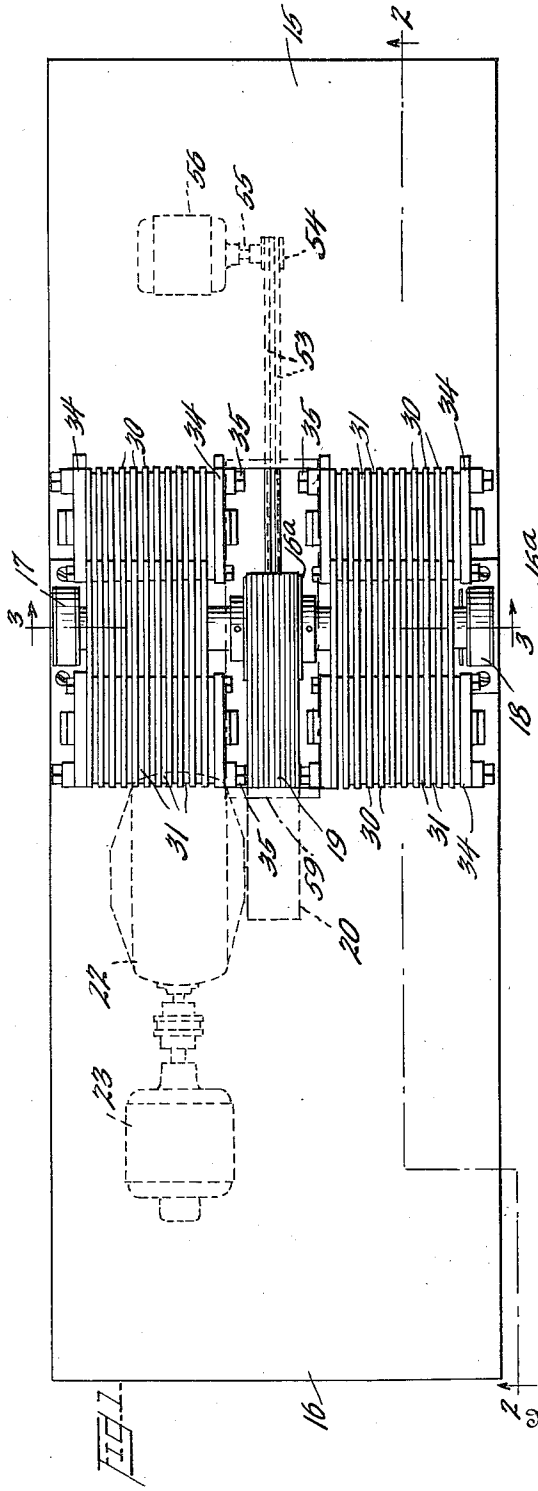


FIG. 1.

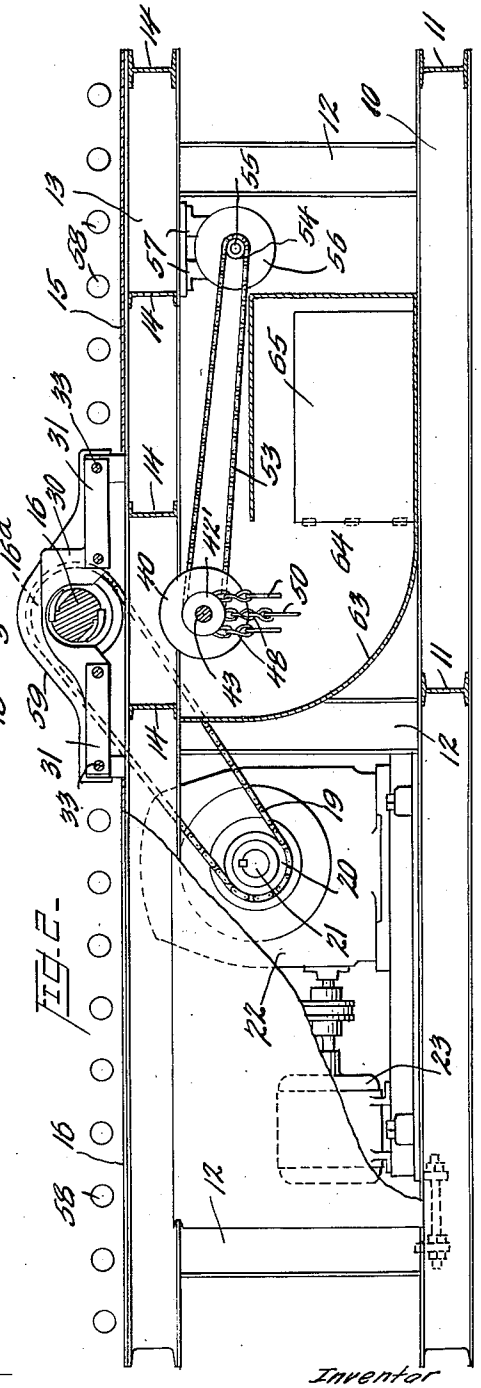


FIG. 2.

Inventor
By Myer R. Chidakel,
Smith, Michael & Gardiner, Attorneys

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FIG. 3.

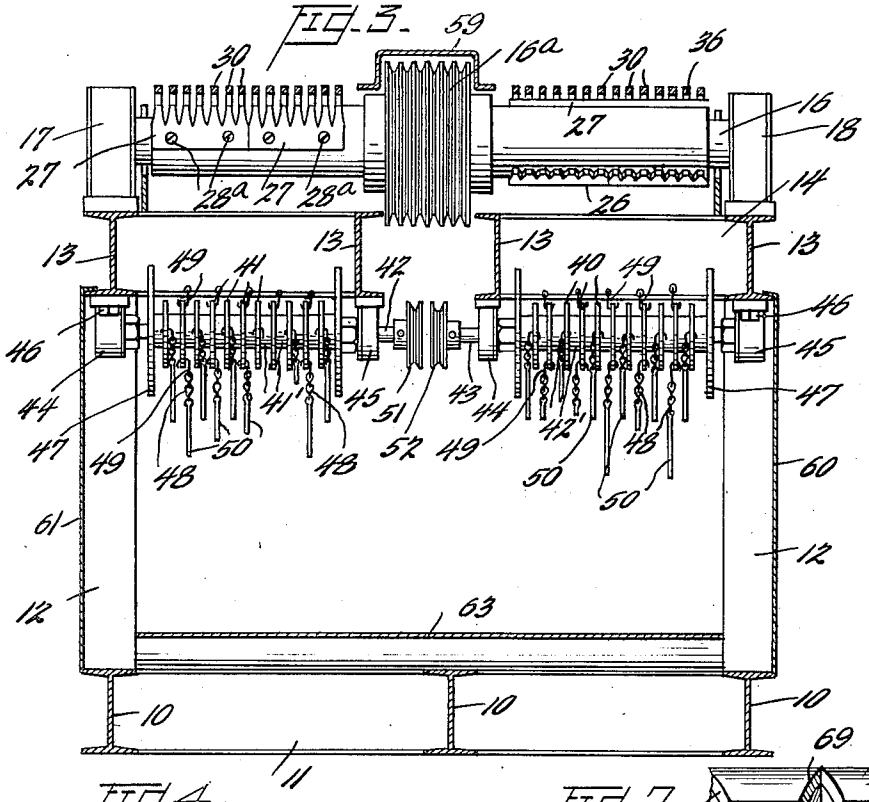


FIG. 4.

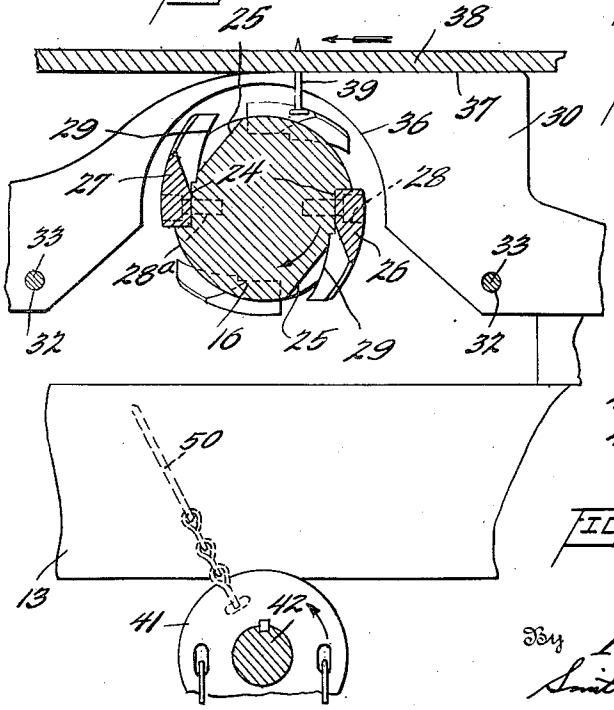


FIG. 7.

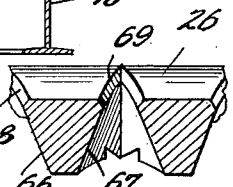


FIG. 6.

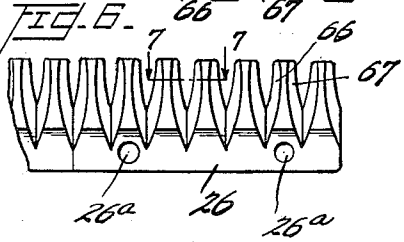
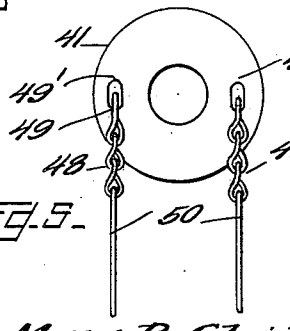


FIG. 5.



Inventor

By Myer R. Chidakel

Smith, Michael & Gardiner, Attorneys

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UNITED STATES PATENT OFFICE

2,446,741

LUMBER RECLAMATION MACHINE

Myer R. Chidakel, Washington, D. C.

Application July 6, 1945, Serial No. 603,439

17 Claims. (Cl. 254—18)

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This invention relates to a lumber reclamation machine and in its more specific aspect is directed to the extraction of nails or the like which have been driven into the lumber.

The enormous demand for lumber at the present time has increased the rate of deforestation to such an extent that it presages critical shortages in the future. Constructions of a more or less temporary character have been erected throughout the country and tremendous quantities of lumber are being used daily in packing, crating and the like. Under normal conditions these temporary constructions will not be permitted to stand and will be dismantled although the need for lumber in connection with the packing industries will continue.

In the post war period greater activity is expected in the building fields and in many different construction undertakings so that there will still remain a pressing demand for lumber.

Lumber that has been used in construction or in the packing fields is almost universally nailed or screwed together and in the past the problem of removing the nails, screws or the like has been a tedious, slow and costly operation. Therefore, it is not unusual that no attempt is made to reclaim the used lumber so that it is either discarded or destroyed, entailing unnecessary waste and encouraging further deforestation.

Heretofore when there were any attempts made at extraction of nails from the lumber so that it could be reused the operation has always been performed entirely by hand so that the cost of the operation is often so great as to discourage any attempts to reclaim the same.

The present invention is designed to alleviate these conditions by providing an economical method of extracting nails from used lumber so that the relative cost thereof is small and the operation can be put on a profitable basis.

This invention is directed to a power driven machine in which a plurality of claws engage the heads of the nails or screws and during their movement pull the same from the lumber.

It is common knowledge that in pulling nails by means of claw members the nails frequently wedge between the tines of the claw member and have to be forcibly released before the claw member is in condition for pulling other nails. In the present invention, however, extractor members are provided which engage any nails that may be carried between the tines of the claw and drive the nails from between the tines. This operation, therefore, clears the claw members so that in the next cycle of movement they will be free from obstructions and in condition to engage additional nails in the lumber. The machine of the present invention likewise employs suitable guide plates located adjacent the moving claw members which insure proper positioning of the nails with reference to the claws and support the lumber during the movement of the claw member so that the nails are readily pulled from the lumber.

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While in its simplest form the invention comprises a rotating shaft carrying spaced claws thereon for pulling nails from a single piece of lumber, the preferred embodiment consists of a machine designed for dual operation, that is, for extracting nails from a plurality of pieces of lumber substantially simultaneously so that the work accomplished by the single machine may be multiplied with a consequent reduction in the cost of the operation.

A further element entering into the successful operation of the present invention resides in the specific claw structure which is used for pulling the nails. Heretofore claw structures of this character have universally been tapered to a feather edge and in the manual operation of extracting nails from lumber this construction was satisfactory. However, it has been found that in power operated nail pulling machines such as in the present case, the feather edge which is rotating at relatively high speed chips or fractures upon engaging the nail and in order to eliminate this defect the specific design of the claw has been modified.

The objects and advantages of the present invention will more readily appear as the description proceeds and while there is shown the preferred embodiment of the invention, it is to be understood that changes and modifications may be resorted to so long as they fall within the scope and spirit of the appended claims.

Reference is hereby made to the accompanying drawings forming part hereof and in which corresponding parts are similarly numbered throughout the views.

In the drawings:

Fig. 1 is a plan view with a portion removed to more clearly disclose the interior construction,

Fig. 2 is a longitudinal sectional view taken along the line 2—2 of Fig. 1,

Fig. 3 is a sectional view taken along the line 3—3 of Fig. 1,

Fig. 4 is a fragmentary sectional view showing the relationship of the claw and extractor members,

Fig. 5 is a detail view of one of the extractor members.

Fig. 6 is a plan view of one of the claws, and

Fig. 7 is a sectional view of a plurality of the claws taken along the line 7—7 of Fig. 6.

Referring more specifically to the drawings, there is shown a base comprising spaced longitudinal members 10 connected by transverse braces 11, with the base 10 connected to a table structure by means of verticals 12. The table structure consists of other spaced longitudinals 13 and transverse members 14. The table structure is completed by cover plates 15 and 16 which lie on opposite sides of the operating portions of the machine.

Substantially midway between the ends of the table structure there is located a rotary shaft 16 journaled in its opposite ends in bearings 17 and 18 which are suitably attached to the table structure, and intermediate the ends of the shaft 16 a multiple pulley 16a is provided, the pulley 16a being secured to the shaft 16 for the purpose of imparting rotation thereto. The pulley 16a is rotated by means of a plurality of endless belts or chains 19 trained over the multiple pulley 20 driven from the shaft 21 of a suitable gear reducing mechanism 22, the gear reducing mechanism being driven from an electrical motor 23 adjustably carried on the base longitudinals 10.

Rotary shaft 16 is provided with land portions 24 and 25 as shown more clearly in Fig. 4. In this figure it will be noted that the land 24 extends along the chord of the rotary shaft 16 and that the land 25 likewise extends along the chord of the shaft but at an angle to the land 24.

Sectional claws 26 and 27 are secured to the shaft 16 by means of suitable bolts 28 and 28a which pass through spaced openings 26a in the claws and project into the shaft 16 so that the claws are supported against the face of the lands 24. The claws 26 are arcuate in form and project from the peripheries of shaft 16 in such a manner that a space is provided between the leading face of the claw as at 29 and the lands 25. This construction is necessary in order that the head of the nails which are being pulled from the lumber can pass into the claws to be fully and firmly engaged thereby.

Cooperating with the claw supporting shaft 16 there is provided a plurality of guides 30 consisting of flat plates which are spaced apart a distance substantially equal to the distance between the tines of the claw members by means of spacers 31. The guides and spacers are provided with openings 32 through which tie rods 33 extend so that the guides and the spacers are rigidly secured in position.

The guides and spacers are supported from the table structure by end plates 34 through which the tie rods 33 likewise extend, it being understood that the tie rods are threaded at their ends to receive fastening means such as the nuts 35 in order that the entire assembly may be disconnected from the table surface when it is necessary to gain access to the portions lying below the same.

As seen in Fig. 4 the guides 30 are provided with an arcuate recess 36 cut from the lower edge of the guide and extending upwardly toward the top of the guide. The claw supporting shaft 16 and its attached claw members rotate substantially within the circular recess 36 so that the claws follow a path closely adjacent to the surface 36. The guide 30 is likewise designed so that the distance between the arcuate surface 36 and the top of the guide 37 is relatively small so that the nails which are to be extracted must be driven from the board only a slight distance in order to expose the heads of the nails so that the claws may engage the nails for pulling the same.

In Fig. 4 it will be seen that the board which is illustrated at 38 carries a nail 39 which is to be extracted. The nail has been driven from the board by manual operation a sufficient distance so that as the board 38 passes over the surface of the guide 37 the nail head 39 will project beyond the arcuate surface 36 and into the path of the claw members 29. As the claws revolve the nail is extracted, the board 38 in the meantime being supported against downward movement by the top surface 37 of the guide. Consequently, the operator of the machine must only pass the board slowly across the surface 37 in order to extract the nails therefrom, the nails being guided by the spaced guides 30 into proper relation with the spaces between the tines of the claws 29.

It will be obvious from an inspection of Fig. 6 that due to the fact that the space between the tines converges toward the root of the tine that any nails that are not directly in alignment with the space between the tines will be forced into the space due to the converging relationship of the tine edges.

As illustrated in Fig. 1 the present embodiment involves duplicate sets of claws and guide members on opposite sides of the centrally located pulley 17 although, of course, it is to be understood that only one set of guides and claws may be used. However, in order to increase the capacity of the machine it is possible to employ the two sets of extracting members so that workmen at opposite sides of the machine can extract nails substantially simultaneously and although only a single motor is used to drive the double sets of claws, the relationship of the claws on opposite sides of the central pulley is such that the claws on one side only are operating at a given time, the claws on the opposite side being at that time in a process of recycling to engage additional nails. In order to more fully appreciate this it will be seen in Fig. 4 that the claws 26 and 27 are disposed 180° apart with the tines facing in the same direction. Assuming the claws 26 and 27 as being secured to the left hand end of the shaft 16 as viewed in Fig. 3, it will be apparent that the corresponding claws on the other end of the shaft can be seen to occupy a different position in this same figure. This is because of the fact that the claws which are supported by the right hand end of the shaft 16 will be rotated 90° with reference to the claws 26 and 27 previously mentioned so that when one of the claws 26 or 27 at the left hand side of the machine is in engagement with nails in the lumber, the claws at the right hand end will be free from such engagement. Consequently, the load on the motor at any given time is only that required to extract the nails by one of the sectional claw members, thereby producing an economical utilization of power.

As stated before, one of the difficulties of extracting nails with claw members is the fact that the nails become wedged between the claw members, thereby preventing satisfactory extraction of the nails until the claws have been cleared. Therefore, in order to expel the nails from between the tines of the claws, I provide a plurality of discs 40 and 41 spaced apart by means of spacers 41' and 42', said discs and spacers being rigidly secured to rotating shafts 42 and 43. These shafts are journaled in bearings at their opposite ends such as at 44 and 45, the bearings

being secured to longitudinal frame members 13 by means of bolts 46.

The shafts 42 and 43 are located below and in the plane with the shaft 16 and carry at their ends chain confining discs 47 which are of larger diameter than the discs 40 and 41 confining the chains to the proper path of travel so as to prevent them from becoming jammed in the operating parts during their rotation.

Secured to the extracting discs 40 and 41 are a plurality of flexible whip-like members 48 herein illustrated as comprising chains having at one end hooks 49 passing through apertures 49' in the extracting discs 40 and 41 and fixed securely therein. The opposite ends of the chains 48 carry straight elongated hammers 50 which, during rotation of the shafts 42 and 43 and the extracting discs 40 and 41, fly outwardly owing to centrifugal force and forcefully strike the nails depending from the adjacent claw members in order to expel the nails from the claws.

It is to be understood that the claw shaft 16 and the extracting shafts 42 and 43 rotate in the direction of the arrows indicated in Fig. 4 so that the path of travel of the nail as well as the rotating hammers will be from right to left with the result that the nails are driven from engagement with the claws so that the claw is free at its next revolution to engage additional nails.

It has been found that it is advantageous to employ flexible extracting members as represented by the chains 48 and hammers 50 since in operation these chains will flex in case the nail is not extracted from between the claws and permit the extracting shaft to continue its rotation, whereas if rigid elements were used and engaged a nail which would not be expelled from between the claw tines serious breakage would occur. In operation it is found that due to the flexible character of the extracting elements their tendency is to ricochet from one nail to the other and since the extracting shafts are driven at a much higher rate of speed than the claw shaft, the hammers can bound back and forth against the nails between adjacent tines thereby striking several blows if such is necessary to expel the nail from the claw.

In the embodiment shown the extracting shafts 42 and 43 are shown as separate shafts which are driven by means of pulleys 51 and 52 carried at the inner ends thereof directly below the pulley 17 on the claw shaft 16. These pulleys are driven by means of belts or chains 53 trained over a multiple pulley 54 fixed to the shaft 55 of a motor 56, the motor being mounted to the table structure by brackets 57. It will be obvious, of course, that a single shaft can be employed.

The operation of the machine is as follows: Lumber from which nails are to be extracted is first prepared by driving the heads from the boards a slight distance so as to expose the heads. Thereafter the lumber is fed to the machine constituting the present invention by means of suitable conveyors such as shown at 58 where the workman places the board on the guide surface 37 with the nail heads projecting downwardly as shown in Fig. 4. The claw shaft 16 and the extracting shafts 42 and 43 are then set in motion after which the operator slowly moves the board across the surface 37 so that during its movement one or the other of the sets of claws will engage the nails and extract them while the board 38 is rigidly held by the guide surface 37. When the nail has been extracted the claw shaft 16 continues its rotation until the nail is brought into the path of travel of the hammers 50 which, rotating at higher speeds than the claw shaft 16, strike the nail depending from the claw with a sharp blow, thereby expelling the same from between the tines of the claw.

In order to protect the operators of the machine from injury, the entire working parts are completely inclosed so that danger from flying nails is eliminated.

The guide members 30 completely inclose the claw carrying portions of the shaft 16 and the multiple pulley 17 is inclosed in a removable cover 59.

The frame structure below the table surfaces 15 and 16 is inclosed by means of side and end panels such as 60 and 61 and a bottom panel 62.

A deflector 63 is located within the frame member to arrest the flight of the nails expelled from the claws by means of the hammers 50, and it is noted that the deflector 63 is curved downwardly and rearwardly so that nails which have been extracted accumulate in a chamber 64 to which access may be had through the side of the machine through the door 65. Therefore, there is no possibility of injury to the operator of the machine and the extracted nails are recovered for salvage purposes.

The claw members 26 and 27 have been illustrated as comprising short sections placed in side by side relationship along the shaft 16 but, of course, it is to be understood that a single claw member may be utilized or a multiplicity of such sections may be attached to the shaft depending upon the size of machine desired.

As stated hereinbefore, it has been found that in power driven machines as here contemplated, considerable difficulty has been experienced in providing claw members that will withstand the impact upon engagement with the nails, with the result that the edges have become chipped and broken to such an extent as to require frequent replacement of the claw members.

This difficulty has been eliminated by providing the claw members 26 and 27 with tines having the structure shown in Figs. 6 and 7, wherein it will be seen that each tine tapers outwardly from its tip to its root and that the side faces 66 and 67 diverge from the leading to the trailing faces of each tine. In the usual claw construction the faces 66 and 67 are continuously tapered from the leading to the trailing faces of the tines so that a feather edge is provided at the juncture of these two faces. This edge consequently is so fine as to fail under impact between the tine and nails.

As seen in Fig. 7, the faces 66 and 67 of the present tines diverge from the leading faces to a point closely adjacent the trailing faces of the tines where they taper in a reverse direction or converge, as seen at 68 and 69. By this construction the angles between the faces 66, 67 and 68, 69 are obtuse rather than acute, so that the fine feather edge previously employed is eliminated and chipping, cracking and the like are reduced to a minimum.

From the foregoing description it will be seen that the present invention constitutes a simple and highly efficient means for the reclamation of lumber by the operation of extracting the nails from the same rapidly and completely. Due to its simplicity of operation and construction, it can be readily assembled and disassembled for transporting to various localities where it may be operated without the necessity of calling upon skilled labor, and that by incorporating the dual

sets of extracting elements the speed with which the extraction can proceed is greatly increased, resulting in an economical operation. In actual practice the machine herein employed has been found to operate in a highly efficient manner and has resulted in the saving of many thousands of dollars during the process of reclaiming more than a million feet of lumber per month.

I claim:

1. A lumber reclaiming machine comprising a frame carrying a rotary shaft thereon, a nail extracting claw on said shaft and rotating therewith, and means adjacent said claw engaging nails that remain in the claw after extraction from the lumber to positively expel the nails from the claw.

2. A lumber reclaiming machine comprising a frame carrying a rotary shaft thereon, a nail extracting claw on said shaft and rotating therewith, and rotary means adjacent said claw engaging nails that remain in the claw after extraction from the lumber to expel the nails from the claw.

3. A lumber reclaiming machine comprising a frame carrying a rotary shaft thereon, a nail extracting claw on said shaft and rotating therewith, and flexible means adjacent said claw, engaging nails that remain in the claw after extraction from the lumber to positively expel the nails from the claw.

4. A lumber reclaiming machine comprising a frame carrying a rotary shaft thereon, a nail extracting claw on said shaft, a rotary shaft adjacent said claw carrying shaft, means thereon engaging nails that remain in the claw after extraction from the lumber, and means for rotating the shafts in opposite direction to cause said nail engaging means to expel said nails from the claw.

5. A lumber reclaiming machine comprising a frame carrying a rotary shaft thereon, a nail extracting claw on said shaft, a rotary shaft adjacent said claw carrying shaft, spaced discs secured to said second shaft, and flexible means carried by said discs and movable during rotation of said last mentioned shaft into engagement with nails remaining in the claw after extraction thereof from the lumber, said flexible means moving in the same direction as the claw at the time of engagement with said nails but at higher speed to forcibly contact said nails and expel the same from the claw.

6. A lumber reclaiming machine comprising a frame carrying a rotary shaft thereon, a nail extracting claw on said shaft, a rotary shaft adjacent said claw carrying shaft, spaced discs secured to said second shaft, and flexible means carried by said discs and movable during rotation of said last mentioned shaft into engagement with nails remaining in the claw after extraction thereof from the lumber, said flexible means moving in the same direction as the claw but at higher speed to forcibly contact said nails and expel the same from the claw, the flexible means comprising chains terminating in hammer members which travel in paths in alignment with the space between the tines of the claw.

7. A lumber reclaiming machine comprising a frame, a claw carrying shaft extending across said frame, a driving pulley fixed to said shaft intermediate its ends, and means for driving said pulley, said shaft carrying claw members disposed along said shaft one on each side of the said pulley and the claw member on one side of the pulley being staggered with reference to the claw member on the opposite side of the pulley.

8. A lumber reclaiming machine comprising a frame, a claw carrying shaft extending across said frame, a driving pulley fixed to said shaft intermediate its ends, and means for driving said pulley, and a pair of claw members fixed to each end of the shaft with the claw members of each pair displaced approximately 180° with respect to each other, the pair of claw members at one end of the shaft being displaced approximately 90° with respect to the pair of claw members at the opposite end of the shaft so that only one of the claw members engages the nails at any given time.

9. A lumber reclaiming machine comprising a frame carrying a rotary claw carrying shaft extending thereacross, a claw member comprising a plurality of spaced tines on said shaft, spaced guide members carried by said frame and closely overlying said shaft to enclose the claws, said guide members being so positioned that the spaces therebetween lie in the same planes as the spaces between the tines of the claws, said guides directing the nails into position to be engaged by the claws as the lumber carrying the nails to be extracted is moved across the guides.

10. A lumber reclaiming machine comprising a frame carrying a rotary claw carrying shaft extending thereacross, a claw member comprising a plurality of spaced tines on said shaft, spaced guide members carried by said frame and encircling said shaft to enclose the claws, each guide member being provided with an arcuate recess at one side which receives the shaft and its associated claws and being provided at its opposite edge with a flat lumber supporting surface, said guide members being so positioned that the spaces therebetween lie in the same planes as the space between the tines of the claws, said guides directing the nails into position to be engaged by the claws as the lumber carrying the nails to be extracted is moved across the said supporting surfaces.

11. A lumber reclaiming machine comprising a frame having a rotary claw carrying shaft extending thereacross, a claw member comprising a plurality of spaced tines on said shaft, spaced guide members carried by said frame and encircling said shaft to enclose the claws, said guide means being so positioned that the spaces therebetween lie in the same plane as the spaces between the tines of the claws for directing the nails into position to be engaged by the claws as the lumber carrying the nails to be extracted is moved across the guides, each guide member being provided with an arcuate recess at one side which receives the shaft and its associated claws and being provided at its opposite edge with a flat lumber supporting surface, the guide between the top of the recess and said flat supporting surface being narrow so that the nails will project into said recess and into the path of the claws rotating therein as the lumber moves across said supporting surface.

12. A lumber reclaiming machine comprising a frame having a power driven rotary claw carrying shaft extending thereacross, a claw member fixed to said shaft for rotation therewith, guide members secured to said frame and spaced laterally from each other along the shaft and enclosing the shaft and claw member, the spaces between the guide members lying in the same plane as the space between tines of the claw member.

13. A lumber reclaiming machine comprising a

frame having a power driven rotary claw carrying shaft extending thereacross, a claw member fixed to said shaft for rotation therewith, guide members secured to said frame and spaced laterally from each other along the shaft and enclosing the shaft and claws, the spaces between the guide members lying in the same plane as the space between tines of the claw member, and a rotary striking member located below the claw member and travelling in a path to strike nails that are carried by the claw after extraction from the lumber to expel the same from the claw.

14. A lumber reclaiming machine comprising a frame having a power driven rotary claw carrying shaft extending thereacross, a claw member fixed to said shaft for rotation therewith, guide members secured to said frame and spaced laterally from each other along the shaft and enclosing the shaft and claws, the spaces between the guide members lying in the same plane as the space between tines of the claw member, a rotary shaft located below said claw carrying shaft and having spaced discs fixed thereon, chains carried by said discs and located to travel in paths in the same plane as the plane of the paths travelled by nails depending from the claw carrying member after extraction from the lumber, the chains being of such length that they strike the said depending nails during rotation of shafts to expel nails from the claw member without striking the claw members.

15. A lumber reclaiming machine comprising a table, a power driven rotary shaft extending across said table, a pulley on said shaft intermediate the ends thereof and intermediate the side edges of the table, claws on both ends of the shaft on opposite sides of the pulley, each of the claws comprising a plurality of teeth spaced lengthwise of the shaft and the claws at one end of the shaft being staggered with reference to the claws on the other end of the shaft, and a single source of power for driving said shaft whereby nails may be extracted from a plurality of pieces of lumber

as they are moved in side-by-side relation lengthwise of the table over the claws, with the claws at one end only of the shaft imposing load on the power source at any one time.

16. In a power driven nail pulling machine, a nail pulling claw member, said claw member comprising a plurality of spaced tines tapering from their roots to the free ends thereof, the opposed side faces of adjacent tines converging toward each other from the leading face thereof to a point closely adjacent the trailing face of the tine and then diverging from each other.

17. In a power driven nail pulling machine, a nail pulling claw member, said claw member comprising a plurality of spaced tines tapering from their roots to the free ends thereof, the opposed side faces of adjacent tines converging toward each other from the leading face thereof to a point closely adjacent the trailing face of the tine and then diverging from each other, the angle between the converging and diverging side faces being obtuse.

MYER R. CHIDAKEL.

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