United States Patent

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[73] Assignee The United States of America as represented by the Secretary of the Army

[54] **NAIL PULLING MACHINE**
4 Claims, 6 Drawing Figs.

[52] **U.S. Cl.** **254/18**
[51] **Int. Cl.** **B25c 11/00**
[50] **Field of Search** 254/18; 227/63

[56] **References Cited**

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ABSTRACT: A nail pulling machine for automatically pulling nails from used lumber consisting of a driven shaft mounted on a bench. The shaft carries two longitudinal rows of notched claw plates which, when rotated, engage over the nailheads and pulls them from the lumber. An idler shaft rotated by the driven shaft and carrying sweeper blades brushes the nails from the claw plates where they fall into a chute for storage and later disposal.

Removal of nails from used lumber in a time consuming and laborous process. This was usually done by hand, using a claw hammer. Each nail was removed one at a time.

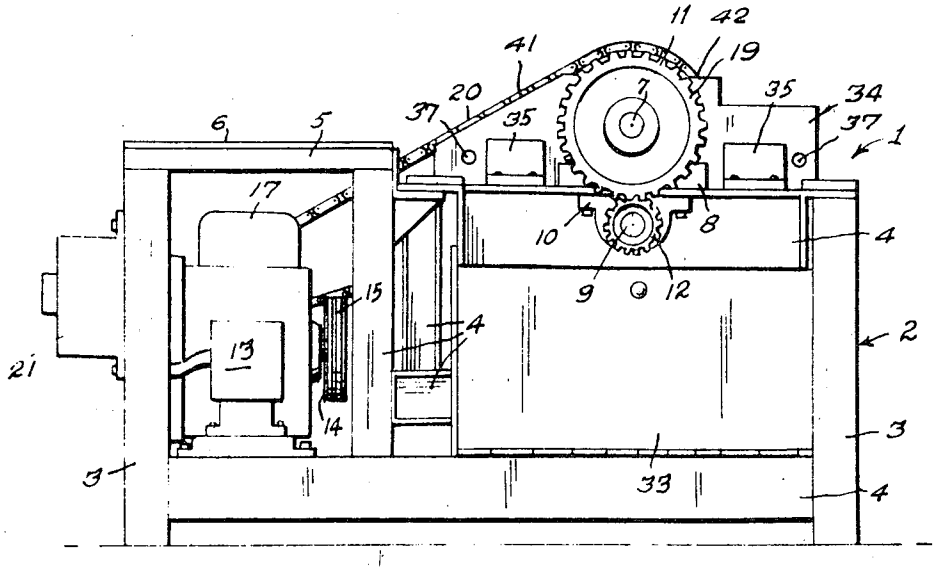

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Fig. 1.

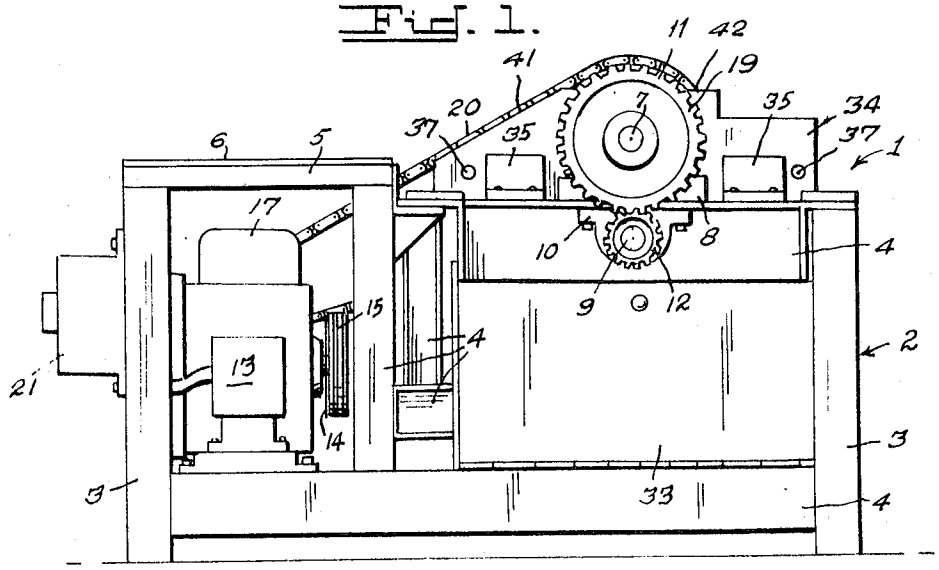
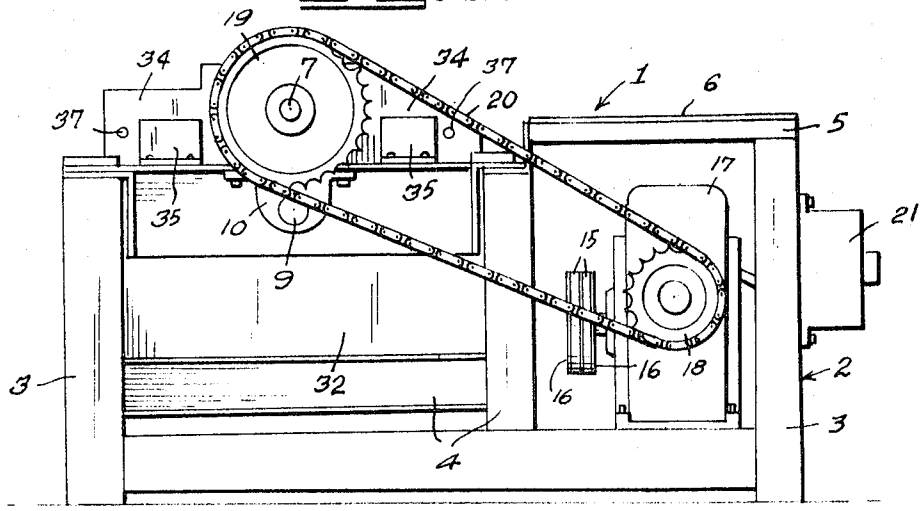


Fig. 2.



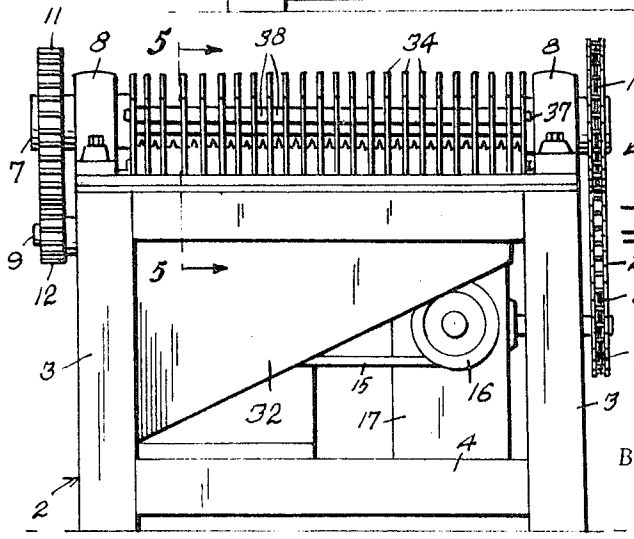


Fig. 3.

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Fig. 4.

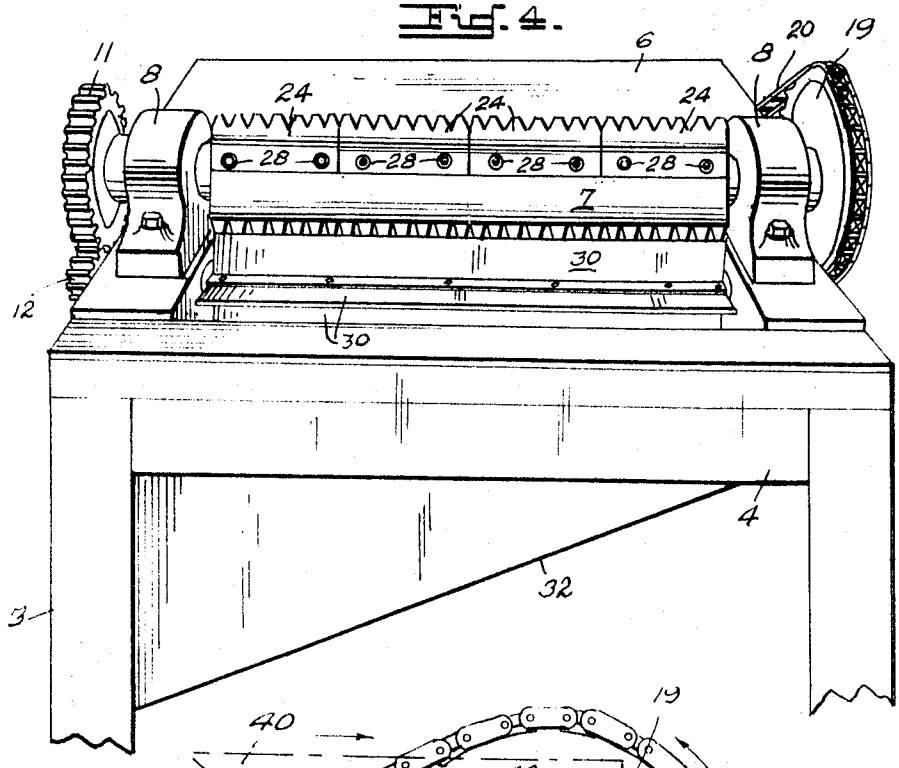


Fig. 5.

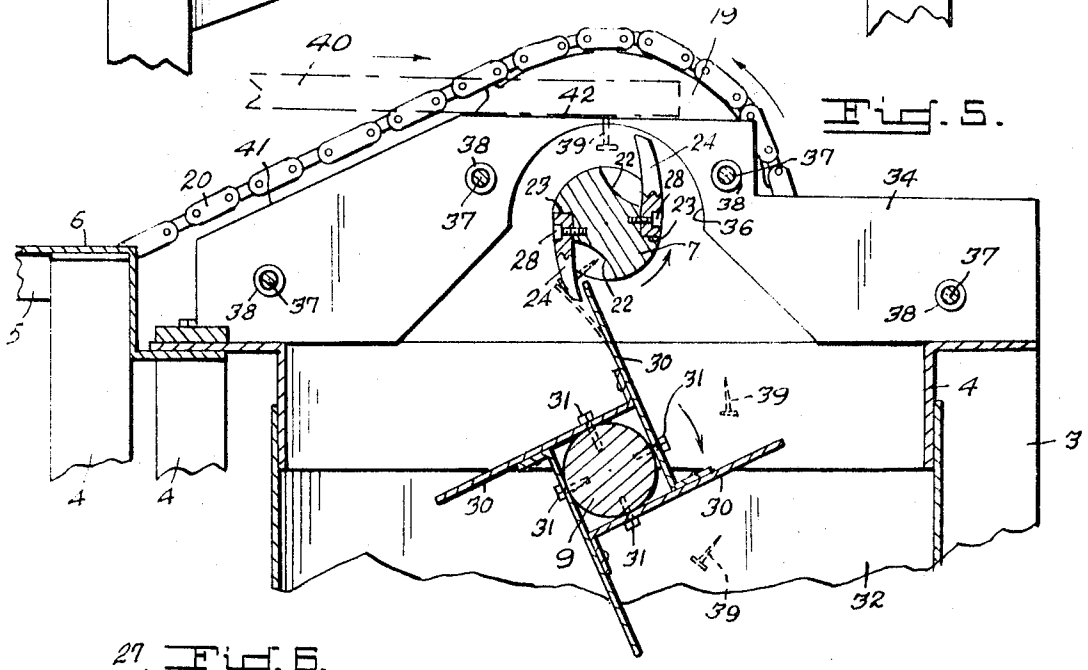
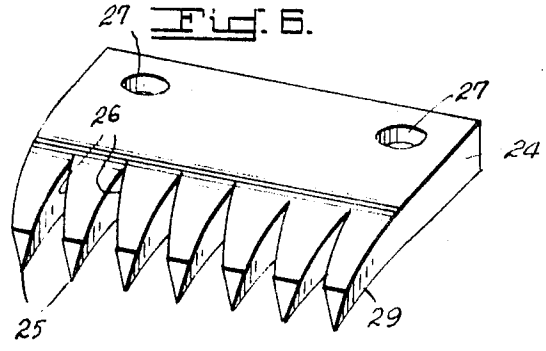


Fig. 6.



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NAIL PULLING MACHINE

The invention described herein may be manufactured, used, and licensed by or for the Government for governmental purposes without the payment to me of any royalty thereon.

The present invention is designed to perform the aforesaid operation automatically, cheaply and quickly: and consists of a workbench on which a shaft is driven by a motor. The driven shaft is provided with two rows of longitudinally mounted, notched, claw plates. The lumber is manually pushed over a grating formed of plates and the rotating claw plates engage over the protruding nailheads to remove them from the lumber. A nail sweeper, rotated by the driven shaft brushes the nails from the claw plates into a discharge chute.

It is therefore a primary object of this invention to provide a machine for automatically removing nails from lumber.

It is another object to provide a machine to remove nails from lumber quickly and inexpensively.

Still another object is to provide a nail pulling machine having a driven claw plate assembly for pulling nails from lumber and a brush sweeping assembly driven by the claw plate assembly for freeing nails which have been pulled by the claw plate assembly therefrom into a chute.

In the drawings:

FIG. 1 is a side elevational view of the nail pulling machine of this invention;

FIG. 2 is a similar view of the other side thereof;

FIG. 3 is an end view of the machine;

FIG. 4 is an enlarged perspective view of the end shown in FIG. 3 with the guard plates removed;

FIG. 5 is a somewhat enlarged sectional detail view taken along line 5–5 of FIG. 3, and

FIG. 6 is a perspective view of one of the claw plates.

Referring to the drawings wherein like reference characters designate like parts throughout the several views, reference character 1 designates generally the nail pulling machine of this invention in its entirety and includes a workbench generally indicated by 2 and consists of a welded framework having legs 3, supporting members 4 which are placed at expedient location, and a raised work platform 5 having a flat top 6. Members 4 and legs 3 may be made from channel iron or like scrap material. The design of the framework will be tailored to accommodate the operating mechanism of the machine and is not to be confined to the embodiment shown in the drawings since the structure may be varied as needed.

The operating mechanism comprises a claw driving shaft 7 journaled in a pair of pillow block bearings 8 fixed to the top of bench 2.

A nail brush shaft 9 is journaled in a pair of pillow block bearings 10, one of which is shown in FIGS. 1 and 2, and is disposed in vertically aligned, spaced relation below chart 7 and is parallel thereto. Shaft 7 is provided with a spur gear 11 mounted on one end thereof which meshes with a spur gear 12 mounted on shaft 9 as shown.

Means are provided for driving shaft 7 and are shown as located under top 6 of bench 2 and consists of an electric motor 13 having a pulley 14. A belt 15 connects pulley 14 with a pulley 16 on a gear reduction box 17. A power takeoff sprocket 18 driven by gear reduction box 17 is connected to a sprocket 19 mounted on the other end of shaft 7 by a chain 20. A switch 21 is mounted on bench 2 for operating the motor 13.

Shaft 7 carries the nail pulling assembly while shaft 9 carries the nail brushing assembly.

The nail pulling assembly includes shaft 7 which is provided with a pair of longitudinal, diammetrically opposed concave cutouts 22 (see FIG. 5). Shaft 7 is further provided with a pair of longitudinal, diammetrically opposed recesses 23, one located at the edge of each concave cutout, as shown. Mounted in each recess 23 is a row of claw plates 24, four being shown (see FIG. 4). Each claw plate 24 (see FIG. 6) consists of a plate having seven teeth 25 along one of its edges are provided with V-shaped notches 26 which are adapted to grasp nailheads. A pair of holes 27, adjacent its other end receive cap screws 28 for mounting the plates 24 to shaft 7 as shown in FIG. 5. Teeth 25 are curved outwardly as at 29, each claw plate 24 resembling a claw-type hammer having multiple nail pulling slots.

The nail brush assembly includes shaft 9 and is best seen in FIG. 5. A nail sweeper is made up of four strips 30 of a flexible material such as heavy belting or the like. Strips 30 are mounted on shaft 9 in a manner wherein they are spaced 90° apart, as shown. The strips 30 are secured on shaft 9 by threaded bolts 31.

A nail discharge chute 32 is mounted in the framework of bench 2 and is disposed below the nail pulling and nail brush assemblies to catch nails which are pulled from lumber for disposal. Chute 32 inclines downwardly and is provided with an access door 33.

Means are provided for guiding lumber over the nail pulling assembly and for guarding the operator against contact with teeth 25 of the nail pulling assembly, and consists of a row of identically contoured plates 34 fixed on bench 2 by brackets 35, or by welding. Each plate 34 has a concave cut out 36 adapted to permit claw plates 24 to rotate. The plates 34 are bolted in side-by-side relation by bolts 37 passing transversely therethrough. Spacers 38 space the plates 34 to permit nails 39 protruding from a piece of lumber 40 to be grasped by slots 26 in claw plates 24. Plates 34 have an inclined edge at their rearward portions and a level upper edge 41 whereby lumber 40 will be guided upward and across the plates for extraction of nails.

OPERATION

Before the nail pulling operation is begun, all nails 39 in lumber 40 are driven by hand so that the heads protrude approximately three-fourths of an inch. Now switch 21 is operated to start motor 13 which, through chain 20, rotates shaft 7 counterclockwise. Shaft 9 is rotated clockwise through spur gears 11 and 12. The claw plates 24, rotating the shaft 7 grasp the protruding nail heads to extract the nails 39 from lumber 40. Loose nails will fall into chute 32 while any nails sticking in claw plate notches 26 are swept free by strips 30 rotating with shaft 9 and will also fall into chute 32.

While only preferred forms of the invention are shown and described, other forms of the invention are contemplated and numerous changes and modifications may be made therein without departing from the spirit of the invention as set forth in the appended claims.

I claim:

1. A nail pulling machine for automatically pulling nails from lumber comprising a supporting structure, a guard mounted on the topside of said structure, a first shaft rotatably mounted across the topside of said structure, a driving means mounted on said structure for rotating said first shaft, there being a pair of diametrically opposed, longitudinally extending recesses in said first shaft and a longitudinally extending cutout adjacent each said recess, a series of claw plates secured in side-by-side relation in each said recess, each said claw plate having a series of slots along its outer edge whereby, when said first shaft is rotated in a counterclockwise manner, said claw plates extract protruding nails from said lumber when passed over said guard, a second shaft rotatably mounted to the underside of the topside of said structure and spaced below said first shaft in vertical alignment and in parallel relation therewith, said second shaft being rotated by said first shaft, four elongated, flexible strips secured, one each, at points 90° apart, on said second shaft, each strip having a length equal to the combined length of said series of claw plates and a width sufficient to sweep nails remaining in said claw plates when said second shaft is rotated in a clockwise manner by said first shaft and a collector in said structure for disposal of said nails.

2. A nail pulling machine as set forth in claim 1 wherein said driving means for rotating said first shaft comprises a motor mounted in said structure, a gear reduction in driving connection with said motor, a first sprocket rotated by said gear

reduction, a second sprocket mounted on one end of said first shaft and a chain connecting said first and second sprockets.

3. A nail pulling machine as set forth in claim 1 wherein said guard comprises a series of longitudinally arranged, laterally spaced plates mounted on the topside of said structure and disposed over said nail pulling machine, a series of spacers arranged between said plates and a bolt passing through said plates and said spacers whereby said plates from a grating to protect the hands of an operator while operating said machine.

4. A nail pulling machine as set forth in claim 1 wherein said collector for disposal of said nails comprises a chute mounted in said structure and disposed below said second shaft, said chute inclining downwardly in said structure and an access door closing its outer end whereby pulled nails will be collected for disposal.