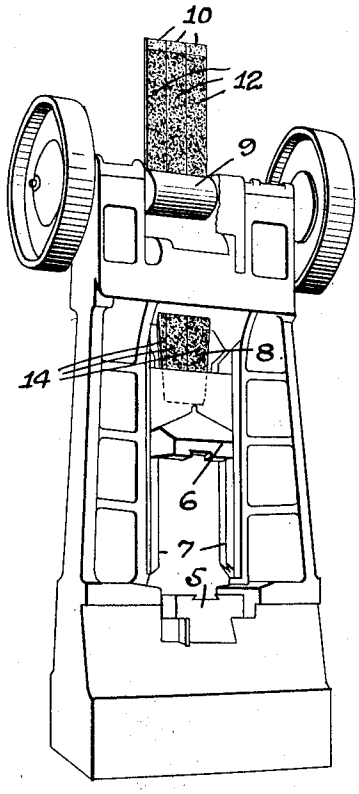
April 16, 1929. G. E. SMITH 1,709,599

DROP HAMMER

Filed March 31, 1925 2 Sheets-Sheet 1

Fig. 1



INVENTOR
Grant E. Smith.
BY
Emery, Booth, Janney & Varney
ATTORNEYS

April 16, 1929. G. E. SMITH 1,709,599

DROP HAMMER

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Fig. 2

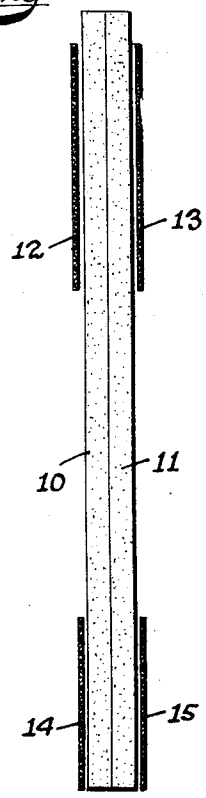


Fig. 3

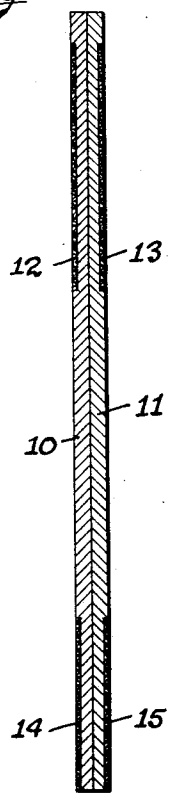


Fig. 4

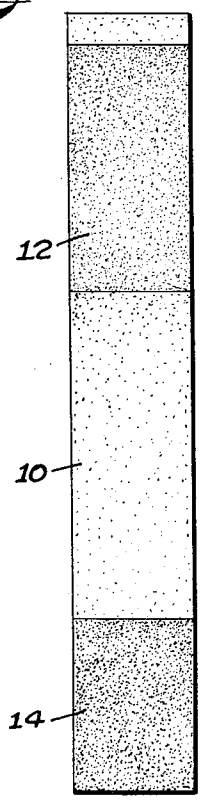


Fig. 5

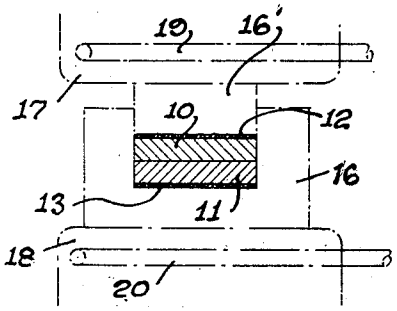
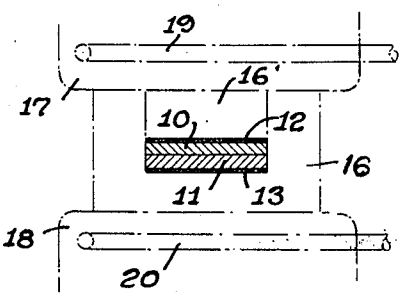


Fig. 6



INVENTOR
Grant E. Smith.
BY
Emery Booth Janney & Porney
ATTORNEYS

Patented Apr. 16, 1929. 1,709,599

UNITED STATES PATENT OFFICE.

GRANT E. SMITH, OF POUGHKEEPSIE, NEW YORK.

DROP HAMMER.

Application filed March 31, 1925. Serial No. 19,648.

The present invention relates to drop hammers of the type commonly known as board drop hammers and has for an object to provide an improved machine of this character.

The mechanism for raising the head or ram of such drop hammers usually comprises a so-called board or, and more often, a set of parallel boards secured to the head and opposed rolls arranged to grip the boards and by rotation thereagainst to raise them and the ram. The rolls conveniently may rotate constantly in a direction to feed the boards in an upward direction therebetween and these constantly rotating rolls may be moved relatively toward each other to grip the boards when the ram is to be raised and separated to permit the ram to drop.

Whatever the particular mode of operation of the rolls, the effect upon the boards is very destructive. The repeated blows of the hammer which jar the boards and force the board-securing wedges more tightly into the ram slot also have a very destructive effect upon the secured lower ends of the boards, frequently causing splits at the lower ends which splits, once started, soon extend upwardly and make the boards useless. Because of the destructive effects of the rolls and jarring of the ram in operation, boards as ordinarily made are very soon destroyed especially on hammers of the larger sizes. It has been found, for example, that boards of even the hardest woods will not operate satisfactorily in use for an average of more than two or three days on drop hammers of the larger sizes, such, for example, as those in which the rams weigh two thousand pounds or more. There are several reasons for this: The density and hardness of the wood is not uniform and under the compressive action of the rolls the surface becomes compressed in spots and therefore irregular, causing an irregular lifting action; the boards splinter at the surface under the action of rolls; the rolls tend to slip, especially if the boards are irregular and when they slip they char or burn the wood, sometimes to such an extent as to start a fire; the separate boards, when a plurality are used, because of unavoidable variations in hardness across the width thereof wear unevenly so that the rolls are effectively engaging the set of boards throughout only a portion of the width thereof; and the boards split or crush and work loose where they are wedged into the ram due to the effects of the securing wedges and the jar in use.

It requires usually the services of two skilled men for an hour to remove a set of boards that have failed and to introduce new boards and secure them rigidly in place, and in the meantime use of the machine is lost. The frequent failure of the boards is therefore a serious matter.

The present invention provides a more effectively operating drop hammer by providing an improved board which is hard and dense and durable in use and which is provided with a surface with which the lifting rolls cooperate effectively. The nature and objects of the invention will be better understood from a description of a particular illustrative embodiment thereof, for the purposes of which description reference should be had to the accompanying drawings forming a part hereof and in which,—

Figure 1 is a perspective view of a drop hammer embodying the invention;

Figure 2 is a view in side elevation of the blank from which a board for the drop hammer is to be formed, showing the parts separated but arranged to indicate the manner of assembling the same;

Figure 3 is a sectional view of the finished board, taken on the line 3—3 of Figure 4;

Figure 4 is a view in front elevation of the finished board;

Figure 5 is a sectional view of the blank before the same is compressed showing also the molds in which the board is compressed and molded;

Figure 6 is a sectional view similar to Figure 5 but showing the parts after compression;

The drop hammer shown for the purposes of illustrating the invention has an anvil 5 and a head or ram 6 movable to and from the anvil on vertical ways 7. The head is raised by means of a set of similar boards 8 secured at their lower ends to the ram 6 and rolls cooperating with the boards. Any desired number of rolls may be used, only two being employed in the illustrated structure. Only the front roll 9 is shown in Figure 1,

the other being directly behind it on the opposite side of the boards so that the boards may be gripped between the rolls when they are moved relatively together, it being sufficient and usually more practicable to move only one of the rolls, the other being rotatable in a fixed bearing.

In the embodiment of the invention illustrated, the boards are made of wood, preferably hard wood, such as maple, ash or oak, which is compressed sufficiently to compact the fibers, at least throughout the portion of the length of the boards which is engaged by the rolls, to make it strong, tough and wear-resisting.

Each board may be made in one single piece of any suitable wood or it may be built up in various ways of several sections. If it is built up of sections, the several pieces are preferably fitted together and assembled before compression. The board shown is made of two sections 10, 11.

In order to reinforce the board and to provide a more durable wear-resisting surface for engagement by the rolls strips 12, 13 of reinforcing material such as asbestos, heavy canvas or the like are applied to the surfaces of the board where engaged by the rolls. The lower end of the board is also similarly reinforced as by strips 14, 15 of heavy canvas or other suitable material to provide a strong section for securing to the ram. While any suitable material may be used as reinforcement, I prefer to use, especially at the part engaged by the rolls, a very heavy canvas or cotton duck which has been treated to render it fireproof.

I prefer to treat the surface of the board and the reinforcement with a coating which will improve its condition, especially with respect to the wear-resisting qualities. The board is preferably made of thoroughly seasoned wood. The wood is preferably kiln dried for several days and then coated with adhesive. If the board is built up of separate sections, the several separate pieces should be coated with adhesive and dried before they are assembled. The reinforcing material is also coated and preferably saturated throughout its body with the adhesive.

Any suitable adhesive may be used as for example, glue or shellac or any of the various condensation products of phenol or cresol or cresylic acid or homologues thereof. They may be used with formaldehyde or any suitable equivalent. In the embodiment of the invention herein particularly described, a phenolic condensation product with formaldehyde dissolved in a suitable solvent such as alcohol is used, it being convenient to use the material in liquid form. This material will serve as an adhesive to bind the sections together and the reinforcing material to the wood, and will also condition the fabric or other reinforcing material and provide an effective surface. The coating of phenolic condensation product or synthetic resin is indicated by like stippling in Figures 2 and 4. The coating may be applied as a solution to the thoroughly dried wood and fabric, and allowed to dry, and, if desired, an additional quantity of the same material in powdered form may be applied to the surface while the solution is still in tacky condition. I may also apply to the portions of the board which in use are to be engaged by the lifting rolls a material such as fire clay which will improve the frictional engagement between the rolls and board and make the surface more durable. To this end, I apply the fire clay to the outer surfaces of the canvas strips 12 and 13 while the adhesive is in tacky condition. This coating is indicated in Figure 4 by heavy stippling.

After the coated blank sections have thoroughly dried the same are assembled and compressed in a mold under heat and pressure sufficient to reduce the board to, for example, three-quarters or two-thirds of its original volume. A much greater compression may be effected if desired. Ordinarly, unless the canvas or other fibrous reinforcement to be applied is particularly thick, it is not necessary to recess the blank to receive it. As shown only a single thickness of very heavy canvas is applied, in each position. When the blank is compressed, the canvas is compressed and pressed into the wood as indicated in Figure 3.

In the method of molding, selected for particular description, the assembled blank is placed in a two part mold 16, 16′ and the mold placed in a press between heated pressure heads 17, 18. Preferably, but not necessarily, the mold is formed to confine the board at the edges to limit the flow of the wood during compression. A mold of this character is illustrated. The mold may be so formed as to close to a predetermined point to insure uniform thickness of the boards. After the mold is placed in the press the pressure heads 17, 18 are then applied against the mold parts to press the same against the blank with a light pressure. Heat is applied to the pressure heads and the board is allowed to absorb heat from the mold for a predetermined time, for example, for five or ten minutes until the blank becomes heated sufficiently to make it moldable and then the extreme pressure is applied to close the mold and press the blank to form the finished board as shown in Figure 6. The mold is then cooled to cool the finished board while it is still held in closed relation. During the compressing and molding operation, the wood will flow to conform to the shape of the mold and the several sections of the blank, if a sectional blank

is used, will be molded together. That is to say, the fibers of the wood will move relatively and adjust themselves to the configuration of other parts of the blank and of the mold.

The heat of the mold softens and makes plastic the coating and then during the compressing operation the coating is forced into the pores of the wood along the surface thereof and simultaneously cured to form a hard, wear-resisting surface. The coating also acts as a lubricant between the mold and the blank.

The pressure employed may range, for example, from five hundred to five thousand pounds per square inch of the blank depending upon the amount of compression desired, the material compressed and other particular features characteristic of the material, finish or mold. The temperature at which the operation is performed may vary considerably. Successful results have been obtained in compressing wood block blanks at temperatures which approximate 300° F. I find it convenient to heat the pressure heads by steam under a pressure of about eighty-five pounds per square inch circulated in suitable passages 19, 20 therein. The molds may be cooled when the compressing operation is finished by circulating water in these passages.

The foregoing description is illustrative merely and not intended as defining the limits of the invention. It will be understood that the invention may be variously embodied and some of the features of the invention may be embodied separately or all may be embodied in one structure within the scope of the appended claims.

What I claim is:

1. A board drop hammer comprising in combination a ram, a board secured to said ram and projecting therefrom, and rolls engageable with said board to raise the ram, said board comprising wood compressed and compacted in the direction of the pressure of the rolls acting thereon and a frictional and yielding fibrous material other than wood reinforcing the wood and providing a roll engaging surface, said material being more resilient and yielding than wood.

2. A board drop hammer comprising in combination a ram, a board secured to said ram and projecting therefrom, and rolls engageable with said board to raise the ram, said board comprising wood with a facing of a frictional and yielding fibrous material other than wood treated with a phenolic condensation product, said material being more resilient and yielding than wood.

3. A board drop hammer comprising in combination a ram, a board secured to said ram and projecting therefrom, and rolls engageable with said board to raise the ram, said board comprising wood and a facing consisting of a fabric sheet treated with a phenolic condensation product and compressed.

4. A board drop hammer comprising in combination a ram, a board secured to said ram and projecting therefrom, and rolls engageable with said board to raise the ram, said board comprising wood and a facing of canvas impregnated with an adhesive.

5. A board drop hammer comprising in combination a ram, a board secured to said ram and projecting therefrom, and rolls engageable with said board to raise the ram, said board comprising a facing of heavy canvas impregnated with synthetic resin cured under heat and pressure extending throughout its roll engaging area.

6. A board drop hammer comprising in combination a ram, a board secured to said ram and projecting therefrom, and rolls engageable with said board to raise the ram, said board having a facing consisting of heavy canvas impregnated with a phenolic condensation product serving to cause the fabric to adhere to the board and serving to toughen the fabric.

7. A board drop hammer comprising in combination a ram, a board secured to said ram and projecting therefrom, and rolls engageable with said board to raise the ram, said board being reinforced at its lower ram engaging end by a fabric impregnated with an adhesive cured by heat and pressure.

8. A board drop hammer comprising in combination a ram, a board secured to said ram and projecting therefrom, and rolls engageable with said board to raise the ram, said board comprising wood compressed under heat and pressure and a reinforcing fabric molded against the face thereof.

9. A board drop hammer comprising in combination a ram, a board secured to said ram and projecting therefrom, and rolls engageable with said board to raise the ram, said board comprising wood and a fabric facing, the wood and fabric being treated with a phenolic condensation product and being molded together under heat and pressure to secure together the parts and to cure the phenolic condensation product.

10. A board drop hammer comprising in combination a ram, a board secured to said ram and projecting therefrom, and rolls engageable with said board to raise the ram, said board being built up of sections separately coated with a synthetic resin and a facing of fabric impregnated with a synthetic resin the whole being assembled and molded together under pressure.

11. A board drop hammer comprising in combination a ram, a board secured to said ram and projecting therefrom, and rolls engageable with said board to raise the ram, said board being formed of wood with a facing fabric reinforcement on the surface

thereof, the whole being treated with a phenolic condensation product and compressed under heat and pressure to substantially reduce the volume of the board.

12. A board drop hammer comprising in combination a ram, a board secured to said ram and projecting therefrom and rolls engageable with said board to raise the ram, said board being formed of wood which has been molded under heat and pressure to substantially reduce the volume thereof and having a fabric reinforcement along its roll engaging surfaces.

13. A board for drop hammers made up of sections of wood separately treated with a phenolic condensation product and fireproof fibrous facing reinforcement treated with a phenolic condensation product all treated by heat and pressure to unite the parts and cure the phenolic condensation product.

14. A board for drop hammers comprising compressed wood and compressed fabric forming a facing therefor treated with a phenolic compound.

15. A board for drop hammers comprising a wooden board and facing of serving fabric secured to the outer face thereof, said board and fabric being compressed in a direction perpendicular to the plane of the fabric.

16. A board for drop hammers formed of wood molded under heat and pressure to a substantially less thickness than its original thickness and having a fabric reenforcement secured to one surface.

17. A board for drop hammers comprising a board of fibrous material and a facing of fabric secured to the outer face thereof, the fibrous material and the fabric being molded integrally together.

18. A board for drop hammers comprising a board of fibrous material, a fabric facing therefor, the fibrous material and fabric facing being compressed to approximately two-thirds of its original volume and molded into interengagement with each other.

In testimony whereof, I have signed my name to this specification this 28th day of March, 1925.

GRANT E. SMITH.