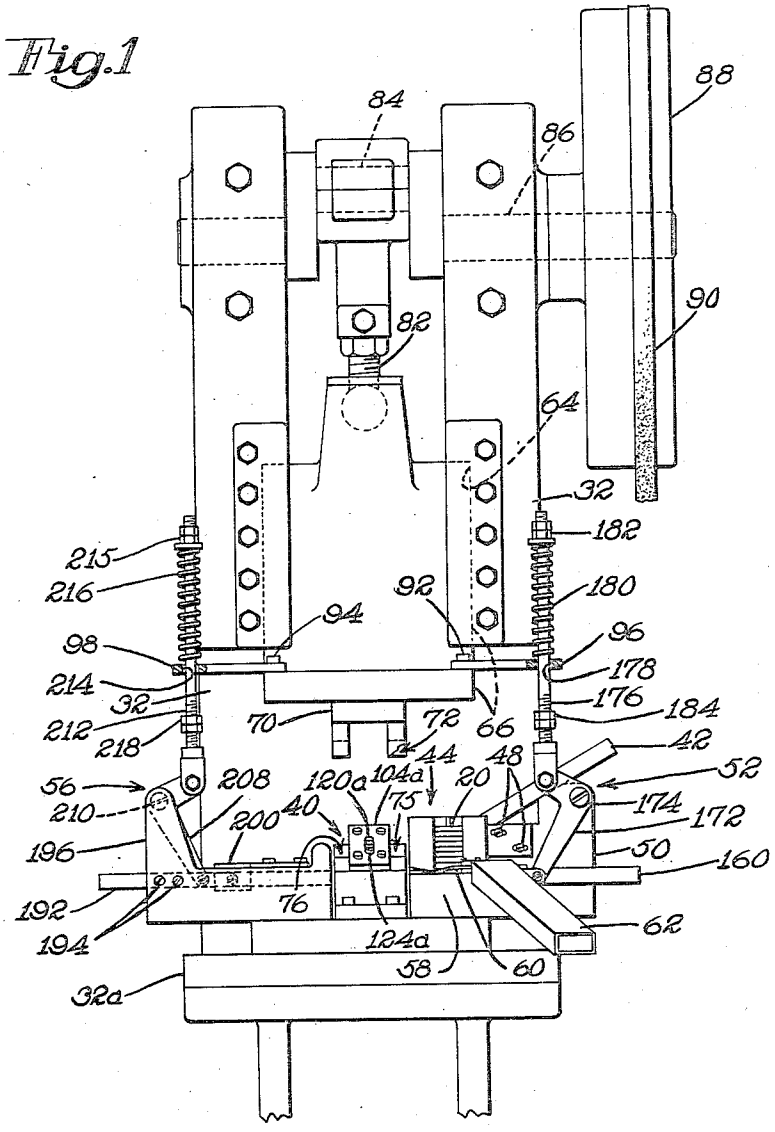
May 27, 1958 F. B. PERRI 2,836,218

MACHINES FOR EMBEDDING METAL JACKETS INTO WOOD CORES OF DOWELS

Filed June 14, 1956 5 Sheets-Sheet 1

Fig. 1



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MACHINES FOR EMBEDDING METAL JACKETS INTO WOOD CORES OF DOWELS

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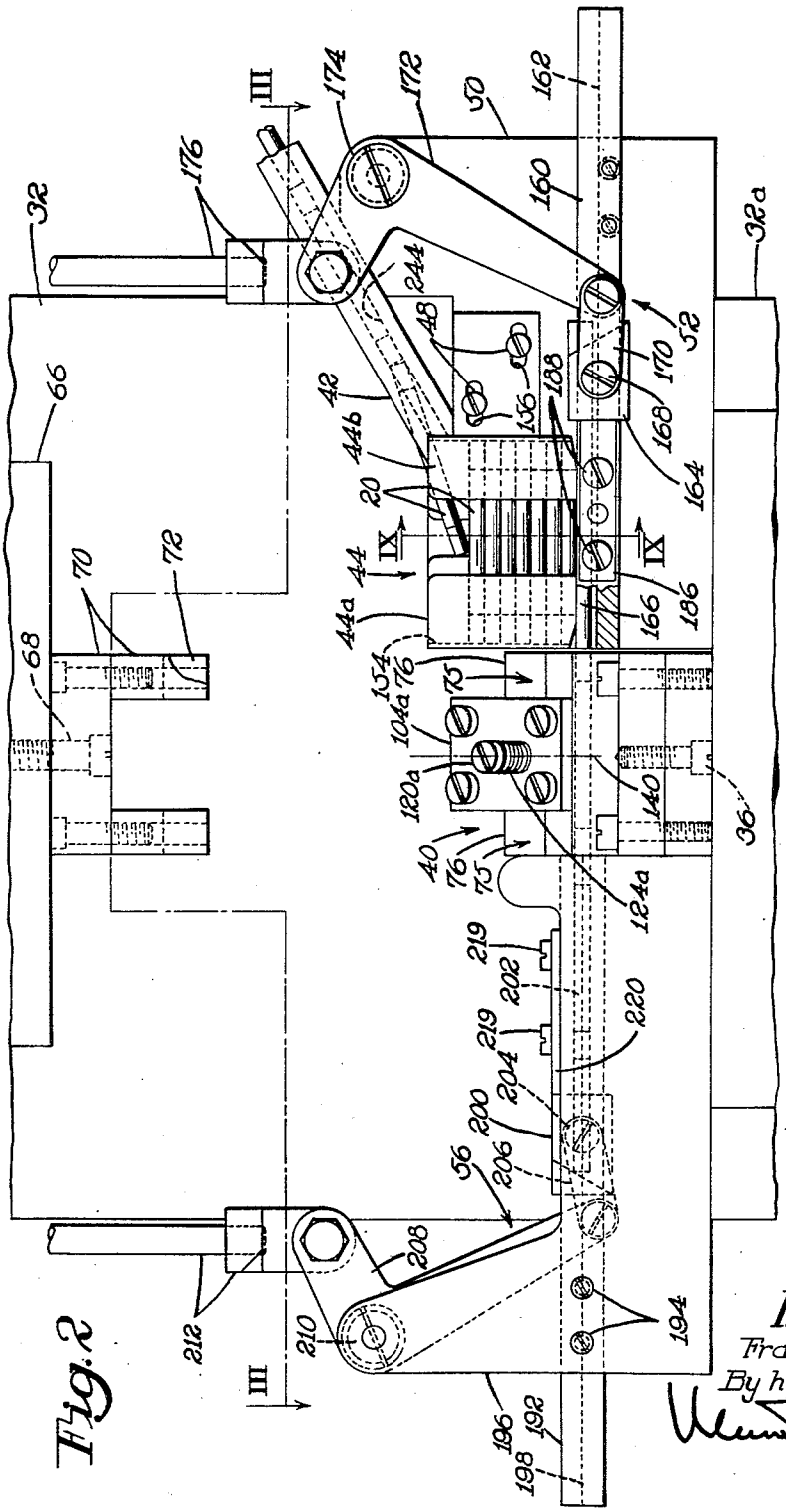


Fig. 2

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MACHINES FOR EMBEDDING METAL JACKETS INTO WOOD CORES OF DOWELS

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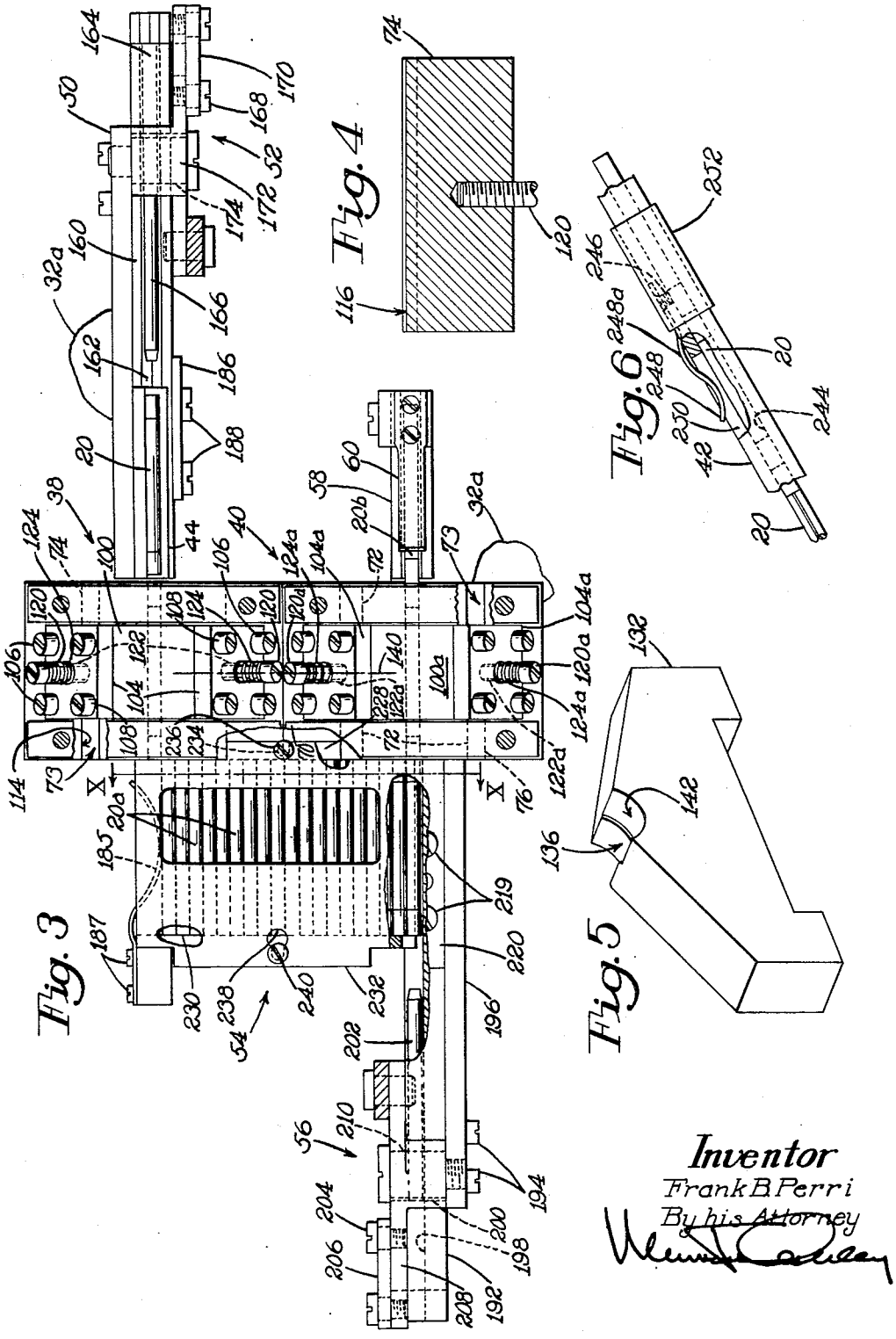


Fig. 3

Fig. 4

Fig. 6

Fig. 5

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MACHINES FOR EMBEDDING METAL JACKETS INTO WOOD CORES OF DOWELS

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Fig. 7

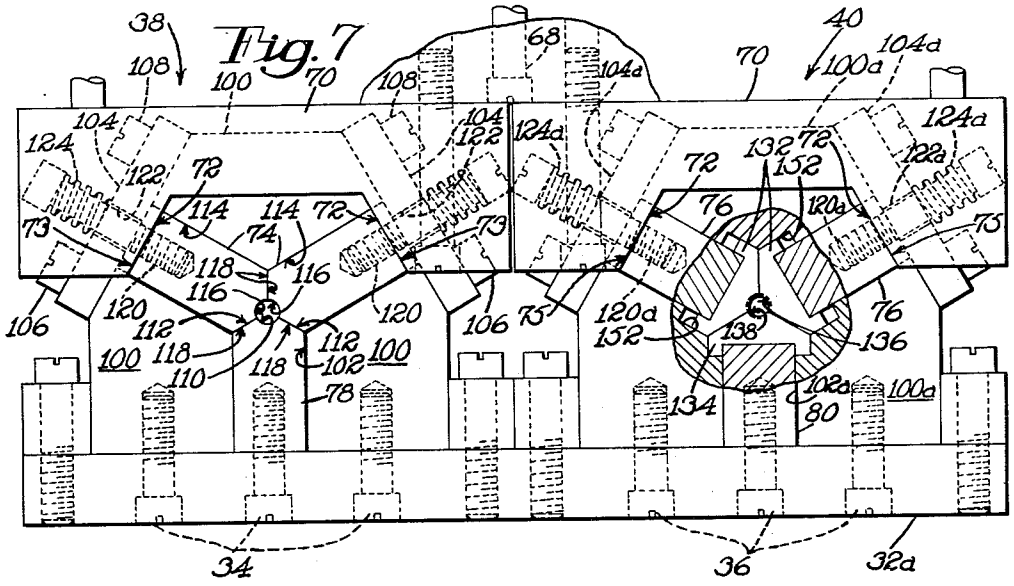
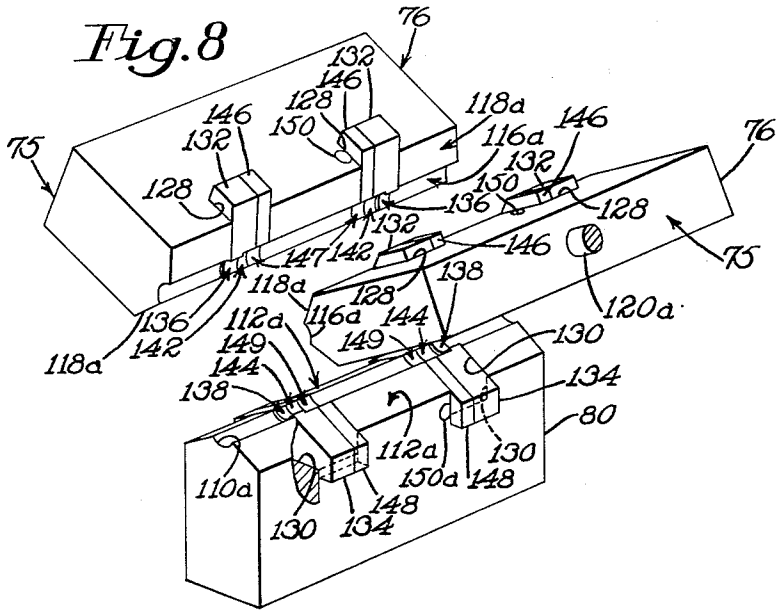


Fig. 8



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MACHINES FOR EMBEDDING METAL JACKETS INTO WOOD CORES OF DOWELS

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Fig. 10

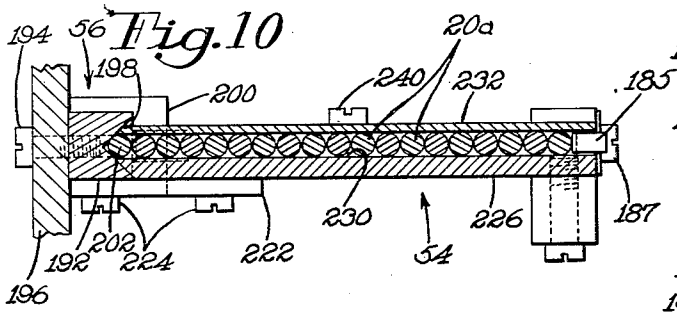


Fig. 9

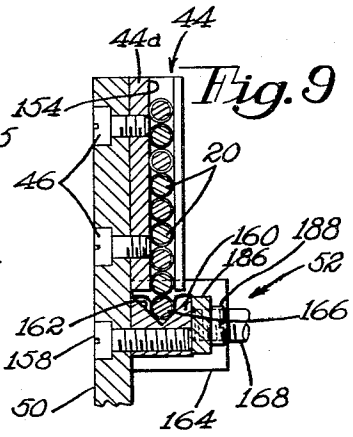


Fig. 11

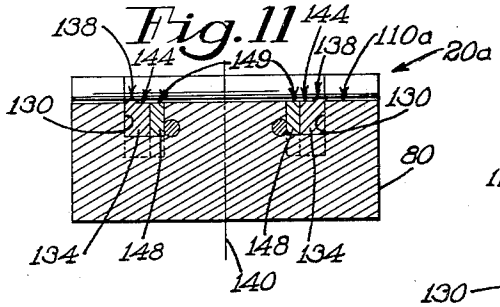


Fig. 12

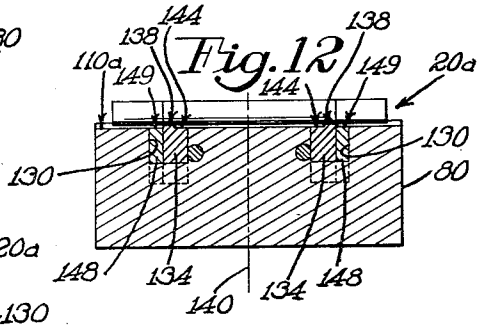


Fig. 13

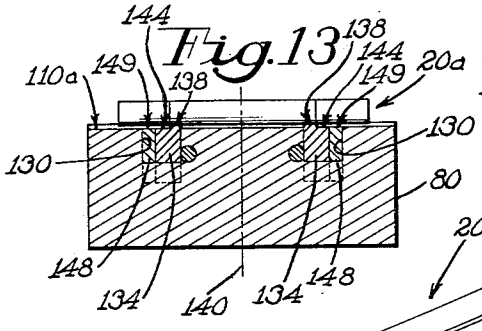


Fig. 14

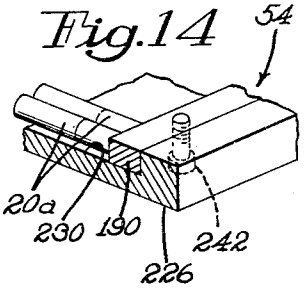


Fig. 15

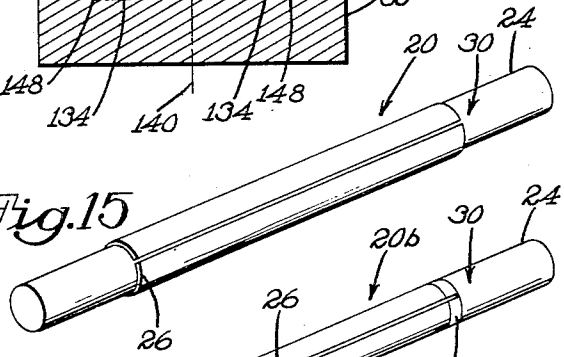
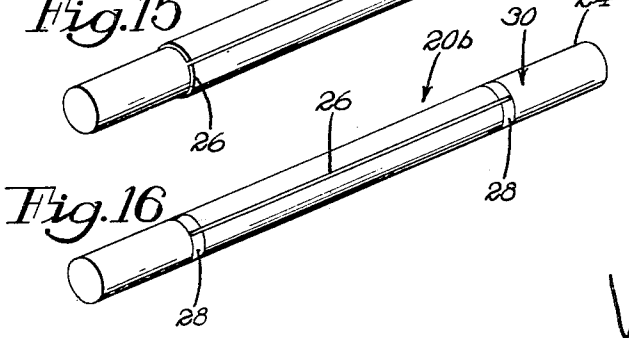


Fig. 16



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United States Patent Office 2,836,218 Patented May 27, 1958

2,836,218

MACHINES FOR EMBEDDING METAL JACKETS INTO WOOD CORES OF DOWELS

Frank B. Perri, Groveland, Mass., assignor to United Shoe Machinery Corporation, Flemington, N. J., and Boston, Mass., a corporation of New Jersey

Application June 14, 1956, Serial No. 591,386

4 Claims. (Cl. 153—1)

This invention relates to machines for use in the manufacture of dowels which are used for reinforcing wood heels and are formed by the use of a machine disclosed in application Serial No. 577,105, filed April 9, 1956 in my name.

It is an object of the present invention to provide a machine for pressing or embedding into flush relation with the peripheral cylindrical surface of a cylindrical wood core of a preformed dowel a thin metal jacket which has been wrapped about a longitudinal median portion of said cylindrical surface and to crimp the end portions of the jacket into the peripheral surface of said core to a depth greater than that of the thickness of the jacket. With the above object in view and in accordance with a feature of the present invention there is provided a machine comprising a swaging unit including a fixed die and reciprocable dies, each of said dies having concave cylindrical operating faces and crimping portions, respectively, means for automatically transferring, in succession to and from the fixed die of said unit, dowels each comprising a cylindrical wood core and a thin metal jacket which is wrapped about a lengthwise median portion of the core and beyond the ends of which the core projects, and means for operating said reciprocable dies to cause the operating faces of the dies to force the jacket of the dowel into the wood core to a depth substantially equal to the thickness of the jacket and to cause the crimping portions of the dies to force the end portions of the jacket into the wood core to a depth greater than the thickness of the jacket.

The present invention consists in the above and hereinafter described novel features, reference being had to the accompanying drawings which illustrate a machine by the use of which dowels having wood cores and metal jackets of different lengths may be quickly and effectively formed, said machine being disclosed in the following description and claims.

In the drawings,

Fig. 1 is a front view, partly broken away, of the illustrative machine;

Fig. 2 shows, on an enlarged scale, a portion of the machine in front elevation;

Fig. 3 is a view of the machine on the line III—III of Fig. 2, parts of said machine having been broken away;

Fig. 4 is a longitudinal median section of one of a pair of movable dies of a rear swaging unit of the illustrative machine;

Fig. 5 shows in perspective a crimping insert or block used in a front swaging unit of the machine;

Fig. 6 is a side view of mechanism used to stop preformed dowels from being supplied from a chute to a magazine of the machine;

Fig. 7 is an end view, partly broken away, of the front and rear swaging units of the machine;

Fig. 8 is an exploded view showing, in perspective, details of fixed and movable dies of the front swaging unit of the machine;

Fig. 9 is a section on the line IX—IX of Fig. 2 showing details of the magazine for receiving preformed dowels from the chute;

Fig. 10 is a section on the line X—X of Fig. 3 showing details of a transfer tray of the illustrative machine;

Figs. 11, 12 and 13 are longitudinal median sections through a fixed die of the front swaging unit, crimping inserts or blocks of this die being shown in three different operating positions in the die;

Fig. 14 is a view showing details of the transfer tray;

Fig. 15 is a perspective view showing the preformed dowel which is operated upon by the machine; and

Fig. 16 shows in perspective a dowel which has been formed by the use of the illustrative machine.

The illustrative machine is described with reference to operating upon a preformed dowel 20 (Fig. 15), which is produced by the use of the machine disclosed in said application Serial No. 577,105, to form a heel reinforcing dowel 20*b* (Fig. 16) which comprises a cylindrical wood core 24 and a thin steel jacket 26 which is of uniform thickness and is pressed into said core an amount substantially equal to the full thickness of the jacket, and end portions 28 of which are crimped into the core so as to lie slightly beneath the adjacent portions of a cylindrical peripheral face 30 of the uncovered end portions of the wood core.

The present machine comprises a main frame 32 (Figs. 1 and 2) having a table portion 32*a* to which are secured by screws 34, 36 (Fig. 7) rear or primary and front or secondary swaging units 38, 40 generally similar to each other, the rear swaging unit being adapted to press the steel jacket 26 into the wood core 24 to a depth approximately equal to the thickness of the jacket whereby to provide the dowel 20*a*, and the front swaging unit also being adapted to press, with a pressure substantially equal to the above-mentioned pressure, the steel jacket against the core, and also to form the crimped end portions 28 of the jacket which are pressed slightly below the uncovered end portions 30 of the wood core, as above explained.

The preformed dowels 20 to be operated upon are supplied by a chute 42 (Figs. 1, 2 and 6) to a magazine 44 (Figs. 2 and 9) which comprises inner and outer parts 44*a*, 44*b* and is secured by screws 46, 48, respectively, to an upstanding bracket 50 secured to the table portion 32*a* of the main frame 32. The preformed dowels 20 in the magazine 44 are automatically fed by ramming mechanism 52, hereinafter described, to the rear swaging unit 38 in which the jacket 26 of a dowel is pressed into the wood core 24, as above explained, the dowel, thus acted upon, thereafter being forced into a transfer tray 54 (Figs. 3, 10 and 14) in which it is moved forward step-by-step and is thereafter forced by ramming mechanism 56 into the front swaging unit 40. By the time the partially completed dowel is forced into the front swaging unit 40 its steel jacket 26 may have sprung or "recovered" to some extent from the position imparted to it in the rear swaging unit and, accordingly, the jacket is pressed by the front swaging unit into the wood core with substantially the same force as exerted against it by the rear swaging unit and simultaneously therewith the end portions of the jacket are crimped into the core 24 to provide the crimped end portions 28 of the jacket. The dowels 22 are then moved from the front swaging unit 40 into a trough 58 (Figs. 1 and 3) secured to the table portion 32*a* of the main frame 32 and beneath a leaf holddown spring 60 and are thereafter moved lengthwise out of said trough and onto a ramp 62 from which they slide into a barrel (not shown).

The main frame 32 has formed in it a vertical guideway 64 in which reciprocates a bearing flange of a carrier 66. Secured to the carrier 66 by screws 68 (Figs. 2 and 7) is

a cam block 70 having pairs of upwardly converging cam faces 72 which, during downward movement of the carrier 66, engage faces 73, 75, respectively, of reciprocable or movable dies 74, 76 of the rear and front swaging units 38, 40 causing them to be moved inward toward fixed dies 78, 80 respectively of the units whereby to operate upon dowels on said fixed dies.

The bearing flange of the carrier 66 is universally connected to a multipart connecting rod 82 (Fig. 1) mounted on a crank 84 of a horizontal shaft 86 journaled in bearings of the upstanding portion of the main frame 32. Secured to the right end of the shaft 86 is a combined flywheel and pulley 88 which is driven by a belt 90 operatively connected to a motor (not shown) controlled by a switch (not shown). Secured to the carrier 66 by screws 92, 94 are actuating plates 96, 98 operatively connected to the rammer actuating mechanisms 52, 56 which, as will be hereinafter explained, are operated simultaneously causing partially completed dowels to be inserted into the rear and front swaging units 38, 40, respectively, in response to upward movement of the carrier.

The rear swaging unit 38 comprises a multipart die holding and guiding assembly which comprises blocks 100 (Figs. 3 and 7) the two lower of which are secured to the table portion 32*a* by a plurality of the screws 34 and form between them a channel 102, the upper block 100 of this assembly being secured to the lower blocks by stop plates 104 which are secured, respectively, to said lower and upper blocks 100 by screws 106, 108. Fitting in the channel 102, formed between the lower blocks 100, is the fixed die 78 which as above explained, forms part of the rear or primary swaging unit 38 and is secured to the table portion 32*a* of the carrier 32 by the screws 34 and which has a concave cylindrical operating face 110 and flat or marginal abutment faces 112 extending outward or laterally from the lateral edges of said face. Slidable in guideways 114, which are formed between the upper block 100 on the one hand, and the lower blocks 100 on the other hand, are the reciprocable dies 74 having formed in them concave cylindrical operating faces 116 from the lateral margins of which extend flat or marginal abutment faces 118. When the dies 74 are in their projected positions, shown in Fig. 7, the combined cylindrical faces 110, 116 have a circular form, lower abutment faces 118 of the reciprocable die 74 being in engagement, respectively, with the abutment faces 112 of the fixed die 78 and upper abutment faces 118 of the reciprocable dies being in engagement with each other. The reciprocable dies 74 have threaded into them rods 120 which extend, respectively, through holes 122 in the plate 104 and interposed between the plates and heads of the rods are springs 124 which constantly urge these dies toward their retracted positions in which their faces 73 are in engagement with associated plates 104.

The front or secondary swaging unit 40 has a multipart die holding and guiding block which is identical with the multipart die holding and guiding block of the rear or primary swaging unit 38 and which comprises blocks 100*a* corresponding to the blocks 100, a channel 102*a* for receiving the fixed die 80 and corresponding to the channel 102, stop plates 104*a* corresponding to the stop plates 104, rods 120*a* which are secured to the dies 76 and pass through holes 122*a* in the stop plates 104*a*, and springs 124*a* which correspond to the springs 124 and serve constantly to urge the dies 76 toward retracted positions in which the faces 75 of the dies are in engagement with the stop plates 104*a*.

The dies 76 are generally similar to the dies 74 and have formed in concave cylindrical operating faces 116*a* (Fig. 8) and flat or marginal abutment faces 118*a* thereof channels 128 which have flat bottoms and extend from one side face to an opposite side face of each of the dies. The die 80 has formed in its upper end a concave cylindrical operating face 110*a* and flat or marginal abutment faces 112*a* which are generally similar to the concave cylindrical face 110 and the abutment faces 112 of the fixed die 78 and have formed in them channels 130 extending from one side face to an opposite side face of the die 80. The channels 128, 130 are positioned equal distances at opposite sides of the median transverse plane 140 (Figs. 2, 3, 11, 12 and 13) of the front swaging unit 40 and the dies 76, 80 of this unit.

Secured in the channels 128, 130 of the dies 76, 80 are crimping inserts or blocks 132, 134 which are substantially identical and have salient concave cylindrical operating faces 136, 138, lateral or side flanges of said inserts or blocks extending along or straddling the above referred to side faces of the reciprocable dies 76 on the one hand, and the side faces of the fixed die 80 on the other hand, as illustrated in Figs. 7 and 8. When the crimping inserts 132, 134 are positioned in the channels 128, 130 their operating faces 136, 138 extend slightly beyond the operating faces 116*a* and 110*a* which are formed in the dies 76, 80, respectively.

Wood cores 24 of different lengths are used in the manufacture of the dowels 20*b* and, accordingly, the jackets 26 covering said cores are commonly supplied in three different lengths, each length of jacket being used to accommodate three different runs of lengths of cores. Accordingly, it is desirable that the salient operating faces 136, 138 of the crimping inserts or blocks 132, 134 shall be arranged different distances from the median transverse plane 140 of the front swaging unit 40, and, accordingly, of the dies 76, 80 of this unit. With the foregoing considerations in view only parts of the inner ends of the crimping inserts or blocks 132, 134 are formed by the salient operating faces 136, 138, respectively, said inserts being provided with set-back concave cylindrical operating faces 142, 144, respectively, which, when the inserts are in their operating positions in the associated dies 76, 80, are in alinement with the operating faces 116*a*, 110*a* of these dies. With the crimping inserts or blocks 132, 134 thus constructed it will be appreciated that by laterally reversing the inserts in the channels 128, 130, respectively, and by arranging said inserts in different positions lengthwise of said channels with relation to filler plates 146, 148 having concave cylindrical operating faces 147, 149, respectively, the salient operating faces 136, 138 may be arranged equal but three different distances from the median transverse plane 140 of the die 80 the three different operating positions of the inserts 134 of the die 80 being shown in Figs. 11, 12 and 13. The crimping inserts 132, 134 and their associated filler plates 146, 148 may be conveniently secured in their active positions in the dies 76, 80 by wedge pins 150, 150*a* driven into said dies. When the filler plates 146, 148 are positioned in the dies 76, 80, respectively, their operating faces 147, 149 are in alinement with the operating faces 116*a*, 110*a* of the dies 76, 80. The blocks 100*a* have formed in them guide slots 152 in which the crimping inserts 132 and the filler plates 146 are guided during reciprocation of the dies 76.

When the movable dies 76, 80 are in their projected positions shown in Fig. 7, there are formed by the combined salient operating faces 136, 138 of the crimping inserts or blocks 132, 134 circular recesses which are concentric with and are slightly smaller than the circular recesses formed by the operating faces 116, 110 of the dies 74, 78 and the operating faces 116*a*, 110*a* of the dies 76, 80, said salient operating faces 136, 138 being adapted to form the crimped end portions 28 of the jacket 26. As above explained, the reciprocating dies 74, 76 of the rear and front swaging units 38, 40, respectively, are moved to their closed or projected positions, shown in Fig. 7, by the cam faces 72 of the wedge block 70, the carrier 66 being so adjusted on the connecting rod 82 that it is in its lowermost position when the reciprocating dies 74, 76 are in their projected or closed positions.

The inner and outer parts 44*a*, 44*b* of the magazine 44 form a passage 154 (Figs. 2 and 9) in which the preformed dowels 20 fit. As above explained, the inner part 44*a* of the magazine 44 is fixed to the upstanding bracket 50 of the table portion 32*a* of the main frame by the screws 46 (Fig. 9) and the outer part 44*b* of the magazine is adjustably secured to the bracket by the screws 48 which pass through slots 156 in said outer part and are threaded into said bracket. It will thus be clear that the width of the dowel passage 154 may be readily varied to accommodate preformed dowels of different lengths.

Arranged beneath the magazine 44 and secured by screws 158 (Fig. 9) to the bracket 50 is a guide bar 160 (Figs. 1, 2, 3 and 9) having a dowel receiving trough 162 on which is reciprocable a slide 164 having welded to it a rammer 166 mounted for movement in the trough.

The slide 164 has threaded into it a bearing screw 168, operatively connected by a link 170 to the lower end of a bell crank lever 172 journaled on a bearing screw 174 secured to the bracket 50. There is pivotally connected to the upper arm of the bell crank lever 172 a multipart rod 176 (Figs. 1 and 2) extending through a bore 178 in the actuating plate 96 which is secured to the carrier 66, a spring 180 being interposed between the acatuating plate 96 and a nut 182 threaded onto the upper end of this rod. The rod 176 has also threaded onto it a nut 184 which, during downward movement of the carrier 66, is engaged by the actuating plate 96 causing the bell crank lever 172 to be moved counterclockwise, as viewed in Fig. 1, and the rammer 166 to be moved to a position in which its left end is positioned to the right of a preformed dowel 20 which has fallen from the magazine 44 into the trough 162, as shown in Fig. 3. As the carrier 66 is raised, the actuating plate 96 engages the spring 180 causing the bell crank lever 172 to move the preformed dowel 20 in the trough 162 onto the operating face 110 of the rear swaging unit 38, a dowel which has just been operated upon in this unit being forced into the initially filled transfer tray 54 against the action of a leaf spring 185 (Figs. 3 and 10) which is secured by screws 187 to the transfer tray. Movement of the rammer 166 to the left, as viewed from the front of the machine, to its projected position is limited by the engagement of the slide 164 with a stop plate 186 (Figs. 2, 3 and 9) which is secured by screws 188 to the guide bar 160. The size of the stop plate 186 is such that a dowel 20*a*, being forced into the transfer tray 54 ahead of the preformed dowel 20 engaged by the rammer 166, is in approximate engagement with a replaceable side piece or plate 190 (Fig. 14) of the tray 54 when the slide 164 has been moved into engagement with the stop plate 186.

The dowel ramming mechanism 156 is generally similar to that above described and comprises a guide bar 192 (Figs. 1, 2, 3 and 10) which is secured by screws 194 to a bracket 196 secured to the table portion 32*a* of the main frame 32, and has at its rear face a guideway 198 which is V-shaped in cross section. Slidingly mounted upon the guide bar 192 is a slide 200 and welded to the slide and mounted for movement in the guideway 198 is a rammer 202, said rammer being in a retracted position to the left, as viewed from the front of the machine, of the forwardmost dowel 20*a* in the tray 54 when the carrier 66 is in its lowered position.

The slide 200 has threaded into it a bearing screw 204 having mounted on it a link 206 pivotally connected to the lower end of a bell crank lever 208 (Figs. 1, 2 and 3) journaled on a bearing screw 210 secured to the bracket 196, an upper arm of the bell crank lever being pivotally connected to the lower end of a multipart rod 212 extending through a bore 214 (Fig. 1) of the actuating plate 98 secured to the carrier 66. Interposed between the actuating plate 98 and a nut 215 threaded onto the rod 212 is a spring 216 and secured to the rod and spaced from the actuating plate 98 when the machine is idle is a nut 218. When the carrier 66 is elevated from its lowered position the actuating plate 98 engages the lower end of the spring 216 causing the forwardmost dowel 20*a* in the tray 54, that is the dowel in the guideway 198, to be moved to the right, as viewed from the front of the machine, onto the operating face 110*a* of the fixed die 80 of the front swaging unit 40 to a rest position in which it is supported by the salient operating faces 138 of the crimping inserts or blocks 134, as shown in Figs. 11, 12 and 13, the dowel 20*b* which has been operated upon in this unit having been moved into the trough 58.

As the dowel 20*b* enters the trough 58 its movement is resisted by the leaf spring 60 mounted on said trough and, during the next cycle of the machine, the dowel in this trough is moved to the right (Fig. 1) into the ramp 62. It is desirable that the dowel 20*a* shall be so positioned on the die 80 that its median transverse plane lies in the median transverse plane 140 of the front swaging unit 40 and, accordingly, of the dies 76, 80 of this unit. Accordingly, the bracket 196 has secured to it by screws 219 (Figs. 2 and 3) a stop plate 220 which is engaged by the slide 200 when the dowel is properly positioned in the front swaging unit 40. Stop plates 220 of different sizes may be used to accommodate dowels 20*a* having jackets 26 of different lengths.

The transfer tray 54 is supported by an arm 222 (Fig. 10) secured to and extending rearward from the bracket 196, a pair of screws 224 serving to secure a bottom plate 226 of the tray to said flange, said bottom plate having a forward beveled end which fits in the lower end portion of the guideway 198 of the guide bar 192.

The bottom plate 226 of the tray 54 is provided with an upstanding flange 228 (Fig. 3) which bridges an opening between the rear and front swaging units 38, 40 and forms, with left side faces of the units, a right side of a passage 230 (Figs. 3, 10 and 14) of the tray 54. A cover 232 of the tray 54 has formed in it a notch 234 which overlies the upstanding flange 228 and is adapted to receive a screw 236 threaded into said flange. The cover 232 also has formed in it an opening 238 for receiving a screw 240 threaded into an opposite upstanding flange of the bottom plate 226, the cover being slid into place over the bottom plate and held in position by the screws 236, 240. It is desirable that the width of the passage 230 of the tray 54 shall be varied to accommodate dowels of different lengths and, accordingly, the width of this passage may be varied by securing guide plates 190 (Fig. 14) of different widths to the bottom plate 226 of the tray by means of screws 242 (only one shown).

In order to stop preformed dowels 20 from sliding down a passage 244 of the chute 42 preparatory to making repairs for example to the machine, there is secured to said chute by a screw 246 (Fig. 6) a leaf spring 248 which has an unsupported end fitting in a slot 250 in the chute and a hump portion 248*a* projecting above said chute. Slidingly mounted on the chute 42 is a manually operated sleeve 252 which, when moved to its retracted position on the chute, as shown in Fig. 6, is spaced from the hump portion 248*a* of the leaf spring 248 and which, when moved to a position in which it overlies said hump portion, causes the unsupported end of the spring to be forced against one of the dowels in the passage thereby holding this dowel and the dowels above it against downward movement in the passage 244.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. In a machine for use in the manufacture of dowels, a primary swaging unit comprising a fixed die having a concave cylindrical operating face and a plurality of dies movable respectively between retracted and projected positions and having concave cylindrical operating faces which, when the dies are in their projected positions, form

with the operating face of the fixed die a cylindrical cavity, a secondary swaging unit comprising a fixed die having a concave cylindrical operating face and a plurality of dies movable respectively between retracted and projected positions and having concave cylindrical operating faces which, when the movable dies of this unit are in their projected positions, form with the operating face of the fixed die a cylindrical cavity, said fixed and movable dies of the secondary swaging unit having crimping portions which, when the movable dies of this unit are in their projected positions, project into said cylindrical cavity, said swaging units being arranged adjacent to each other with axes of their operating faces of their dies arranged in substantially parallel relation, a magazine for holding dowels each of which comprises a wood core and a thin metal jacket wrapped around a lengthwise median portion of the core, a transfer tray which is adapted to receive successively dowels operated upon by said primary swaging unit and from which the dowels are transferred to said secondary swaging unit, said tray comprising a dowel receiving passage which is substantially of the same width as the lengths of the dowels and which has a trough-shaped end and has at an opposite end a spring for forcing a leading dowel in said passage against said trough-shaped end, mechanism for successively transferring the dowels from the magazine into the primary swaging unit and for causing dowels which have been acted upon by said primary swaging unit to be forced against the action of the spring of said transfer tray into the passage of the tray behind a trailing dowel in said tray, mechanism for successively transferring leading dowels at the trough-shaped end of the tray into the secondary swaging unit and for causing dowels which have been acted upon by said secondary swaging unit to be ejected from this unit, power operated means for operating the movable dies of said units, and means operative in timed relation with said power operated means for simultaneously operating the dowel transferring mechanisms.

2. In a machine for use in the manufacture of dowels, a primary swaging unit, a secondary swaging and crimping unit, each of said units comprising fixed and reciprocable dies having respectively concave cylindrical operating faces, said swaging units being arranged side by side with axes of their cylindrical faces of their dies respectively arranged lengthwise in parallel relation, a transfer tray having a passage extending along one side of each of the units and open to the fixed dies respectively of said units, said tray comprising a spring adapted to urge step-by-step a plurality of partially completed dowels which are arranged side by side in line in the passage of the tray from a position in which they are received from the cylindrical operating face of the fixed die of the primary swaging unit to a leading position in said passage and from which they may be transferred to the cylindrical operating face of the fixed die of said secondary unit, a magazine for receiving preformed dowels, ramming mechanism for successively delivering the preformed dowels from the magazine onto the operating face of the fixed die of the primary swaging unit and for simultaneously therewith causing said dowels which have been operated upon in said primary unit to be moved against the action of said spring to an end of said line of dowels in the transfer tray, a second ramming mechanism for successively moving leading dowels in the transfer tray onto the operating face of the fixed die of the secondary unit and for transferring dowels which have been operated on in said secondary unit from this unit, power means for simultaneously operating said movable dies of said units to cause the dowels respectively in said units to be operated upon simultaneously, and means responsive to movement of said power means for operating said ramming mechanisms to effect simultaneous transfer of the dowels respectively from said primary swaging unit to the tray and from said tray to said secondary unit.

3. In a machine for use in the manufacture of dowels, a primary swaging unit and a secondary swaging and crimping unit, each of said units comprising fixed and reciprocable dies having respectively concave cylindrical operating faces, said swaging units being arranged side by side with axes of their cylindrical faces of their dies respectively arranged lengthwise in parallel relation, a transfer tray having a passage which extends along one side of each of the units and is open to the fixed dies respectively of said units and has a width slightly greater than the length of the dowels being operated upon, said tray comprising a spring adapted to urge step-by-step a plurality of partially completed dowels, which are arranged side by side in line in the passage of the tray, from a position in which they are received from the cylindrical operating face of the fixed die of the primary swaging unit to a leading position in said passage and from which they may be transferred to the cylindrical operating face of the fixed die of said secondary unit, a magazine for receiving preformed dowels, ramming mechanism for successively delivering the preformed dowels from the magazine onto the operating face of the fixed die of the primary swaging unit and for simultaneously therewith causing said dowels which have been operated upon in said primary unit to be moved against the action of said spring to an end of the line of dowels in the transfer tray, a second ramming mechanism for successively moving leading dowels in the transfer tray onto the operating face of the fixed die of said secondary unit and for transferring dowels which have been operated upon by said secondary unit from this unit, power means for simultaneously operating said movable dies of said units to cause the dowels respectively in said units to be operated upon simultaneously, means responsive to movement of said power means for operating said ramming mechanisms to effect simultaneous transfer of the dowels respectively from the magazine to the fixed die of the primary swaging unit and from said primary swaging unit to the tray as well as from said tray to said secondary unit and from said secondary unit, said tray having a side plate which forms an outer portion of said passage, and means for interchangeably securing side plates of different widths to the tray to vary the width of said passage in accordance with the length of the dowel to be accommodated.

4. In a machine for use in the manufacture of dowels, a fixed die having a concave cylindrical operating face, means for delivering to said face a preformed dowel having a cylindrical wood core and a thin metal jacket wrapped about a lengthwise median portion of said core, a plurality of reciprocable dies which have concave cylindrical operating faces respectively and are mounted for movement toward and away from the fixed die, said dies having pairs of transversely extending channels formed respectively in their operating faces, crimping blocks which have salient and set back concave cylindrical operating faces respectively, filler pieces which have concave cylindrical operating faces respectively, means for positioning one of the crimping blocks and one of the filler pieces in each of the channels of the dies with the said set back operating face of said block and the operating face of the filler piece in alinement with the operating face of the associated die and in opposed relation respectively to the set back operating faces of the blocks and the operating faces of the filler pieces in opposed channels of the other dies, and with the salient operating face of said block in transverse alinement with and projecting slightly beyond the operating face of the associated die and in opposed relation to the salient operating faces of the crimping blocks in the opposing channels of the other dies, means for arranging the filler pieces and the crimping blocks in a plurality of different positions in the channels respectively of the dies to cause the salient operating faces of the crimping blocks to be positioned different distances from the transverse median planes of said dies in accordance with the lengths of the jackets of the dowels being operated upon, means for securing

the crimping blocks and the filler pieces in their operating positions in the channels of the dies, means for operating the reciprocable dies to cause the jacket to be pressed to substantially its full thickness into the wood core and to cause end portions of the jacket to be pressed with crimping action somewhat below adajacent uncovered portions of the periphery of the wood core, and means for ejecting the dowels operated upon in the unit from the machine.

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