Feb. 15, 1966 G. K. ROSER 3,234,572

METHOD OF AND MEANS FOR MAKING NAILS, ON THE ORDER OF FINISHING NAILS, BRADS , AND THE LIKE

Filed Nov. 13, 1962 2 Sheets-Sheet 1

FIG. 5

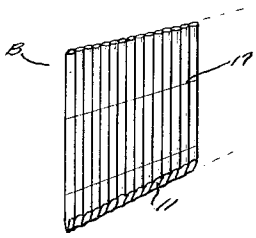


FIG. 1

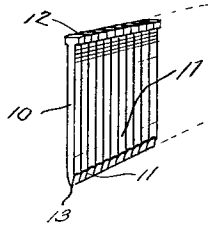


FIG. 3

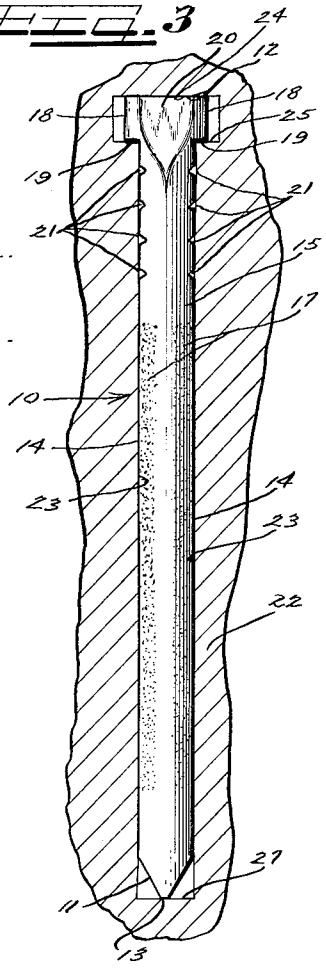


FIG. 4

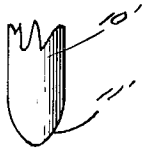


FIG. 2

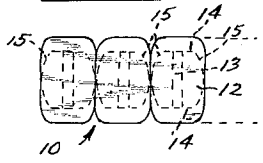
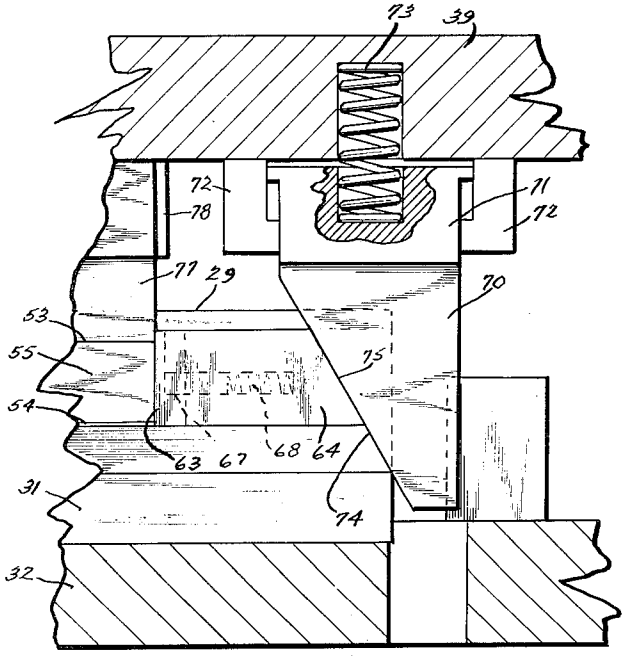


FIG. 8



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FIG. 6

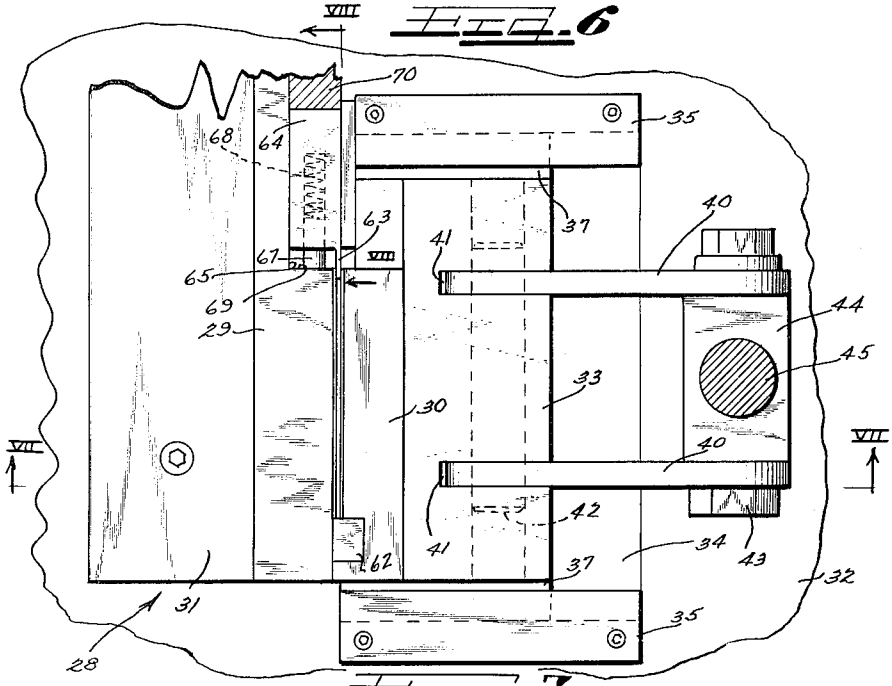
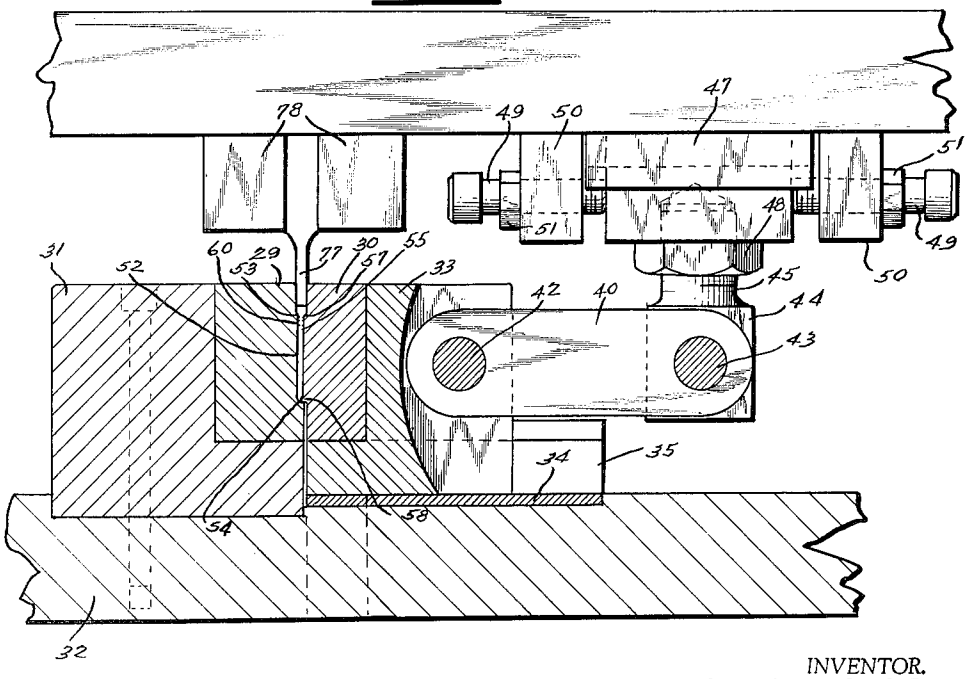


FIG. 7



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United States Patent Office 3,234,572 Patented Feb. 15, 1966

3,234,572

METHOD OF AND MEANS FOR MAKING NAILS, ON THE ORDER OF FINISHING NAILS, BRADS, AND THE LIKE

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Filed Nov. 13, 1962, Ser. No. 237,221
10 Claims. (Cl. 10—50)

The present invention relates to improvements in finishing nails, and more particularly concerns a novel so-called stick arrangement of adhered assemblies of such nails and a method of and means for making the same.

Conventional finishing nails have round cross-section shafts topped by round heads of limited diameter and substantial length or thickness. Such nails are generally driven individually by hand or are individually handled in a driving machine, that is, because of the heads which project uniformly beyond the entire perimeter of the shank are not susceptible of adhering into readily handled stick form in the manner that staples and headless pins are commonly arranged for convenience in packaging, handling and loading into a driving machine.

Nails have been produced with wing-like head structures in which the sides of the heads between the wing-like projecting portions of the heads are in coplanar relation to the shank perimeter. However, the heads of such nails have been individually fashioned and the nails then racked and abutted in side-by-side relation and adhered in stick form. This results in several disadvantageous features. In view of normal variations in material and the die tolerances, a certain amount of variation in size both as to length and head ear or lug dimensions occurs in the individual nails so that irrespective of how close tolerances may be maintained in the racking and adhering mechanism, there is substantial unevenness, roughness and lack of planar alignment of various surfaces of the nails in each stick. This requires excessive tolerances in the magazine structures of driving machines in order to avoid jamming and frequently provides such looseness that there is considerable jostling or movement of the stick of nails in the magazine during use, often referred to as "dancing," resulting not only in excessive wear of magazine parts and thus aggravting the condition of looseness as well as causing breaking apart of the nails unless excessive amounts of securing adhesive are used in forming the sticks. Further, the unevennesses and disalignments emphasize the abrasive, wearing projection of rough edges detrimental to the engaged surfaces of guide tracks and walls in the driving machine magazines. Furthermore, the individual die forming of the nail heads, as well as the nail tips generally results in a certain amount of burrs or roughness resulting in excessive wearing of the driving mechanism of driving machines.

It is, accordingly, an important object of the present invention to overcome the foregoing and other disadvantages of prior constructions and practices by providing sticks of nails and more particularly finishing nails on which the heads are formed simultaneously on all of the nails after the nail blanks have been adhered into stick form, thus attaining great uniformity as to dimensions and coplanar alignment of surfaces of the companion nails.

Another object of the invention is to provide a new and improved stick of nails in which the heads are simultaneously die formed whereby to achieve greatly improved uniformity and alignment.

A further object of the invention is to provide a new and improved stick of nails in which all of the nails in a stick are formed simultaneously in a common die and all of the points or tips of the nails are sized in the die simultaneously with forming of the heads to attain uniformity of shape and alignment in the tips.

Still another object of the invention is to provide a new and improved method of making nails and more particularly finishing nails.

A yet further object of the invention is to provide new and improved apparatus for making sticks of nails.

Other objects, features and advantages of the present invention will be readily apparent from the following detailed description of a preferred embodiment taken in conjunction with the accompanying drawings wherein

FIGURE 1 is a perspective view of a portion of a stick of finishing nails made according to the present invention;

FIGURE 2 is a substantially enlarged top plan view of some of the nails;

FIGURE 3 is an enlarged side elevational view of one of the nails;

FIGURE 4 is a fragmentary tip or point end elevational view of a nail showing a modified shape of the tip;

FIGURE 5 is a perspective view of a stick of nail blanks before heading of the blanks to provide the nails with heads;

FIGURE 6 is a top plan view partially in section of forming die apparatus according to the present invention, taken substantially on the line VI—VI of FIGURE 7;

FIGURE 7 is a vertical sectional detail view taken substantially on the line VII—VII of FIGURE 6; and

FIGURE 8 is a fragmentary vertical sectional elevational detail view taken substantially on the line VIII—VIII of FIGURE 6.

In FIGURES 1, 2 and 3, finishing nails **10**, embodying the present invention, are shown having straight shank portions with substantially V-shaped driving end tips **11** and flat top heads **12**. Each of the tips has its terminal extremity **13** flattened parallel to the flat top of the head **12**.

Each of the nails **10** has opposite parallel flat faces **14** on the same sides as the beveled faces of the driving tips **11**, while between the flat faces are circumferentially curved sides **15**. In the stick arrangement of the nails, the curved sides **15** are in abutment while the flat faces are coplanar and means such as suitable dry adhesive **17** secures the nails in the stick.

Each of the nail heads **12** comprises a pair of oppositely projecting head ears or lugs **18** respectively overhanging the flat faces **14**. Each of the head lugs **18** has a substantially square retaining shoulder **19** joining the adjacent end of the associated flat face **14** and facing in the same direction as the projection of the tip **11** of the nail. On their sides intermediate the head lugs **18**, the nail heads **12** are in straight alignment with the central abutment lines of the curved side surfaces **15** of the associated nail. Actually, each nail head has on each of its companion-nail adjoining side a flattened area **20** of generally lanceolate outline with the point running into the abutment center line of the associated curved side surface **15** substantially as shown in FIGURE 3. In view of the substantial length or thickness of the head **12** and the corresponding substantial length as well as the substantial width of the flat abutment surfaces **20** they afford desirable stability against bending of the adhered stick of nails transversely to its plane. This is advantageous in resisting undesired breaking apart of the stick of nails during handling and permits economizing in the amount of the adhesive **17** that need be employed for adequately holding the nails in the stick.

In each flat face **14** adjacent to the head **12** is provided a longitudinally spaced series of transverse preferably V-shaped notches or scorings **21** in the neck portion of the nail shank and serving as anchorages against pull-out in a member into which the nail is driven. The material of the secured member into which the nail is driven

expands into the notches 21 which are of substantial uniformity and depth.

Adhering of the nails 10 into stick form is, of course, primarily for the purpose of facilitating handling for loading into a supply magazine 22 (shown schematically in FIGURE 3) of a nail driving machine which may be of the popular portable type. In the magazine 22, by virtue of accurate formation of the nails 10 and accurate alignment of the various surfaces thereof in the stick, the various supporting and guiding surfaces of the magazine can be desirably related within fairly close tolerances to the dimensions of the nails 10. For example, guide wall surfaces 23 in the magazine 22 opposing the flat faces 14 of the nails can be disposed in a spaced relationship which will receive the nails in fairly close though free sliding relation. This assures that if any nail breaks loose from the stick it will be held against turning in the magazine and thus misalignment of the head lugs 18 in the driving passageway under the customary driving blade or member (not shown) of the machine. Furthermore, a head opposing guide surface 24 in the magazine can be disposed in close sliding relation to the aligned flat tops or crowns of the nail heads 12 and the spacing of such hold down surface 24 relative to either or both of supporting guide shoulders 25 for the head shoulders 19 and base surface 27 of the magazine opposing the terminals 13 can be readily ascertained and maintained in manufacturing the machine. Thereby, bouncing or dancing of the nails and more particularly the stick of nails in the magazine is virtually eliminated.

The blunt construction of the tip 11 is quite advantageous since it minimizes tendency toward splitting of hard wood into which the nail is driven. In this the flattened terminal 13 is a distinct advantage. Further, of course, the flattened terminal 13 facilitates sliding on the supporting and guiding surface 27.

Instead of a V-shape for the nail tip, a generally ovate rounded tip 11′ may be provided as shown on the nail 10′ of FIGURE 4. By its smoothness and blunt form, this tip affords similar advantages in avoiding tendency toward splitting of hard wood and smooth riding on the supporting surface of the magazine. In other respects, the nail 10′ will be understood to be the same as the nail 10 of FIGURE 3.

Attainment of a high degree of accuracy in dimensions and alignment of nail surfaces in the stick of nails results from my improved method of making the nails. This comprises initially providing elongated headless nail blanks B (FIG. 5) made from suitable gauge straightened wire stock cut to length sufficient to afford enough material for subsequent formation of the nail heads. In this preliminary formation of the nails the driving tips 11 are formed to generally wedge-shape. The nail blanks B are adhered together in stick form to the desired length of stick by means of the adhesive 17. Formation of the nail blanks B and adhering the same into stick form can be accomplished in high speed production in a pin making machine.

Thereafter, the sticks of pin-like nail blanks are further processed in suitable manner to simultaneously shape all of the blanks of an entire stick with the nail heads 12. Also simultaneously accurate shaping and sizing of the tips 11 of the nails is effected. In shaping the nail heads 12, the adjoining head end portions of the nail pin blanks back up one another to control the flow of metal into the head lugs 18. This enables use of a fairly simple, direct acting die assembly 28 (FIGS. 6–8).

In the die assembly 28, the stick of nail blanks B is thoroughly confined and axial pressure applied to the head end portions of the blanks to cause the metal thereof as controlled by the abutting sides of the head end portions to flow into and form the head lugs 18. To this end, the preformed stick of nail blanks is firmly clamped between opposing die blocks 29 and 30 engaging

the flat faces 14 af the nail blanks, and, in fact, placing the pin blanks under sizing, straightening pressure which eliminates any warpage from a flat plane. Both of the die blocks 29 and 30 are of a hardened construction for wear resistance. Support for the die block member 29 is afforded by a block 31 fixedly mounted on a bed plate 32 adapted to be supported on the bed or anvil of a suitable die press.

A reciprocable mounting is provided for the die block member 30 to enable opening and closing movement thereof relative to the die block member 29. To this end, the die member 30 is carried by a supporting block 33 reciprocably mounted on the bed plate 32 which carries a hardened bearing plate 34 underlying the block 33. Guiding of the block 33 for reciprocal movement toward and away from the stationary block 31 is effected by means herein comprising square-grooved strips 35 suitably secured to the bed plate 32 and slidably engaging respective complementary guide flanges 37 on the lower portions of the respective opposite sides of the block 35.

Reciprocal driving and compression stroking means for the die assembly 30, 33 is afforded by a toggle mechanism carried by a head plate 39 adapted to be mounted operatively on a reciprocating driving plunger or ram (not shown) of a punch press on the anvil of which the bed plate 32 is secured. A pair of toggle links 40 have one of their end portions extending into respective spaced rearwardly and at least upwardly opening slots 41 in the rear portion of the die carrying block 33 and pivotally secured therein as by means of an axle pin 42 on an axis parallel to the face of the bed plate 32.

At their opposite end portions, the links 40 are secured pivotally as by means of a pin or bolt member 43 on an axis parallel to the connecting pin 42 to adjustable motion transmitting mechanism including a pressure block 44 having a threaded central stem 45 threadedly adjustably secured into a head block 47, with a lock nut 48 maintaining the adjusted relationship. Attachment of the head block 47 in operative abutment with the pressure face of the head plate 39 is effected by means of adjustment screws 49 threaded through respective bracket bars 50 projecting fixedly from the head plate 39, the adjustment being maintained by lock nuts 51. In setting up, threaded adjustments between the pressure block 44 and the head block 47 assures proper inline pressure transmission line-up of the toggle links 40 with the die blocks 30, while adjustments effected by means of the retaining and adjustment screws 49 assures proper compression or pressure stroking of the reciprocal die assembly relative to the die block 29.

To accommodate a stick of the pin blanks B for sizing and heading, the stationary die block 29 is provided in its die face, that is the face which opposes the die block 30, with an inset portion or cavity 52 having a stepped head lug shaping counterrecessed shoulder 53 adjacent the head margin of the die face and a stepped tip shaping and sizing shoulder 54 on an offset base marginal portion of the die block and shaped to afford the desired tip shape for the nails, inclusive of one beveled or rounded side of the tip and the extremity of the tip. Each of the shoulders 53 and 54 extends straight throughout the predetermined length of the stick of nail blanks and in parallel relation to one another.

On its die face which opposes the die face of the die block 29, the die block 30 is provided with an offset portion 55 complementary to the die cavity or recess 52. In the head end portion of the die face projection 55 is an inset area affording a heading shoulder 57 complementary and opposite to the heading shoulder 53. On its base end portion, the die projection 55 is provided with a tip shaping rib 58 which projects into operative overlying relation to a short supporting extension of the shoulder 54.

By virtue of its recessed arrangement, the die cavity 52 facilitates loading of the die assembly with a stick of nail pin blanks B while the die set is open from the con-

dition shown in FIGURES 6 and 7 to a condition wherein the head plate or block 39 is substantially separated from the base plate 32 to an extent wherein the toggle mechanism through the toggle links 40 draws the die supporting block 33 and the die block 30 into a substantially spaced separated relation to the die block 39 enabling free access to the cavity 52. A stick of the blanks B is set into the cavity 52, tip edge down on the shoulder 54. Thereafter, the press is operated to drive the head plate 39 toward the base plate 32, whereby the toggle mechanism thrusts the block 33 and thereby the die block 30 toward the die block 29 so that the die projection 55 engages the shanks of the blanks with sufficient compressive pressure to straighten and accurately align the blanks in coplanar relation. The proper compressive force can be accurately adjusted during die set up through the threaded stem 45 and the head block 47 and the adjustment screws 49.

As the dies 29 and 30 engage the nail blanks 90 compressively, respective parallel, opposed spaced notching ridges 60 on the die members adjacent to but spaced inwardly from the respective shoulders 53 and 57 are driven into the neck portions of the nail blanks to form the notches 21 therein as straight line discontinuous grooves across the flat faces 14 of the blanks.

As the dies 29 and 30 are closed, the opposite ends of the stick of nail blanks are placed under positive confinement between a square abutment 62 carried by the die block 30 and a reciprocable thrust die blade 63 carried on and preferably integral with a nose projection from the forward end of a sliding cam block 64 mounted in a suitable recess 65 in a side extension of the die block 29. In width, the confining pressure blade 63 is substantially equal to the length of the nail blanks B and in thickness the blade is preferably slightly undersize with respect to the thickness of the blanks between the flat faces 14 so as to extend freely between the adjacent side margins of the opposing die faces of the die blocks 29 and 30.

Normally the cam die block 64 moves to a backed off or releasing position as biased by a thrust pin 67 projecting from its forward face under the influence of a biasing spring 68 and thrusting against an opposing thrust wall surface 69 at the inner end of the recess 65. Thrusting of the cam die member 64 in opposition to its normal bias, that is into the nail blank stick abutting, thrusting relation is effected by a driving cam member 70 having a flanged head 71 retained by L-brackets 72 secured to the pressure face of the head plate 39. A limited range of relative reciprocal movement of the cam actuator is afforded by the connection between the flanged head 71 and the retaining brackets 72, with one or more biasing springs 73 normally thrusting the cam member away from the head plate 39. This affords a range of take-up and self-adjustment for tolerances and avoids over-compression as a cam face 74 on the driving cam member 70 thrusts cammingly on a complementary rear end cam face 75 on the cam die member 64. Under the bias of the spring 73, the operating cam member 70 is normally projected to its maximum permitted by the retaining bracket 72 from the head plate 39. Then, as the head plate 39 drives toward die closing position, the actuating cam member 70 functions in advance of full closing of the dies 29 and 30 to drive the cam die member 64 forwardly and effect thrusting engagement of the adjacent end of the stick of nail blanks by the blade member 63 which thereby thrusts the stick toward the abutment 62. Having completed its actuating function, the actuating cam member 70 idles as the head plate 39 is driven in the remainder of its die closing and compression stroke, and the compression spring or springs 73 increase the resistance to upward displacement of the cam member 70 to a maximum.

In the final increments of die closing and compression stroke of the head plate 39, a heading punch blade member 77 attached as by means of securing blocks 78 to the compression face of the head plate is driven between the

dies 29 and 30 into heading, upsetting, swaging engagement with the head ends of the nail blanks B in the confined stick. This causes the material in the head end portions of the blanks to be displaced and spread by flowing of the material over the heading shoulders 53 and 57 to form the head lugs 18 of the nails. By virtue of the firm confinement of the shank portions of the stick of blanks between the opposing faces of the dies 29 and 30, and the ends of the stick between the abutment 62 and the pressure blade 63, the contiguous head portions of the blanks back up one another and in effect serve as opposing die surfaces to control the flow of metal in the formation of the head lugs 18. This results in the clearly visible lanceolate flattened areas 20 at the interfaces of the completed nail heads in parallel alignment with the substantially longitudinal line contacts on the rounded surfaces 15 of the nail shanks.

Simultaneously with the heading operation, the longitudinal pressure applied to the blanks drives the tip ends thereof against the tip shaping die shoulders 54 and 58 and completes the shaping and sizing of the tips 11 including the flattened terminals 13.

During the heading stroke of the heading punch 77, the scoring ribs 60 serve as restrainers against longitudinal overcrowding of the nail blanks, that is the scoring ribs coact with the tip shaping shoulders 54 and 58 to resist longitudinal compression effected by the heading punch and thus substantially equalize the effects of compression thrust on the nail shanks and afford a high degree of uniformity in the metal flow and shaping of the nail heads 12.

At the completion of the heading stroke, the head plate 39 is backed off relative to the base plate 32, which causes the heading punch 77, the die member 33 and the cam die member 64 to be backed away from the completed stick of nails.

As a result of the shaping and sizing of all of the nails 10 of an entire stick simultaneously by the common die members and forming surfaces exceptional uniformity is observed in the nails. More particularly, by the simultaneous shaping and sizing of all of the nails of the entire stick exceptional uniformity of alignment and size is observed in the nails of the stick. Thus, every nail of every stick of nails produced will caliper within exceptionally close tolerances in every dimension subject to die shaping and sizing. In every stick, a straight edge placed on any of the aligned surfaces of the nails will show virtually perfect coplanar alignment. As has been previously indicated, this is highly desirable for magazine feed in driving machines since a magazine can be utilized affording much closer tolerances than is practicable with respect to nails that are completely preformed before adhering thereof into stick relationship. Advantageously closer tolerances can be maintained in the nail driving mechanism of the machine without danger of jamming or excessive wear, as a direct result of the much improved uniformity of dimensions inherent in the nails of the present invention.

It will be understood that modifications and variations may be effected without departing from the scope of the novel concepts of the present invention.

I claim as my invention:

1. In a nail making die set,

a pair of opposed die members having opposed gripping surfaces for gripping the sides of a stick of headless nail blanks confiningly therebetween except for limited head end portions of the blanks,

means for confiningly engaging the ends of the stick including the head end portions of the endmost blanks in the stick while the stick is gripped between said surfaces,

and die structure operable to engage and simultaneously upset all of the head end portions of the blanks into nail heads while the stick of blanks is confined between said surfaces and said end confining means.

2. In a die structure for heading a stick of headless wire nail pin blanks,
a die member having a stick receiving recess in one face thereof including a shoulder for receiving the tip ends of the blanks and a recessed heading shoulder,
a second die member having a complementary projecting surface portion including a tip forming shoulder and a heading shoulder complementary to the shoulders of the first die member,
one of said die members providing an end abutment for the stick of blanks,
a third die member engageable with the opposite end of the stick of blanks to drive it confiningly against said abutment,
a single heading die engageable with all of the head end portions of the blanks of the stick for simultaneously swaging all of said head end portions into heads against said heading shoulders,
and means for operating said die members in coordinated sequence.

3. In a die structure for heading a stick of headless wire nail pin blanks,
a die member having a stick receiving recess in one face thereof including a recessed heading shoulder,
a second die member having a complementary projecting surface portion including a heading shoulder complementary to the shoulder of the first die member,
one of said die members providing an end abutment for the stick of blanks,
a thrid die member engageable with the opposite end of the stick of blanks to drive it confiningly against said abutment,
a single heading die engageable with all of the head end portions of the blanks of the stick for simultaneously swaging all of said head end portions into heads against said heading shoulders,
and means for operating said die members in coordinated sequence.

4. In a die structure for heading a stick of headless wire nail pin blanks,
a first die member for engaging one face of the stick,
a second die member for engaging the opposite face of the stick whereby to clamp the stick between said die members,
at least one of said die members having a recessed heading shoulder,
an end abutment for the stick of blanks,
a third die member engageable with the opposite end of the stick of blanks from said end abutment and operative to drive the stick of blanks confiningly against said abutment,
said abutment and said third die member positively confining the head end portions of the blanks in the stick against spreading in the plane of the stick,
heading die means engageable with the head end portions of the blanks in the stick as clamped between said first and second die members and as confined between said abutment and said third die member for swaging the head end portions against said heading shoulder,
and means for operating said die members and said heading die means.

5. In a die structure for heading a stick of headless wire nail pin blanks having preformed tapered driving tips and opposite head end portions,
a first die member for engaging one face of the stick,
a second die member for engaging the opposite face of the stick whereby to clamp the stick between said die members,
at least one of said die members having a recessed heading shoulder,
an end abutment for the stick of blanks,
a third die member engageable with the opposite end of the stick of blanks from said end abutment and

operative to drive the stick of blanks confiningly against said abutment,
sizing and tip blunting means for engaging said preformed taper driving tips of the blanks,
said abutment and said third die member positively confining the head end portions of the blanks in the stick against spreading in the plane of the stick,
heading die means engageable with the head end portions of the blanks in the stick as clamped between said first and second die members and as confined between said abutment and said third die member for swaging the head end portions against said heading shoulder and thrusting the blanks into tip sizing and blunting relation to said sizing and blunting means,
and means for operating said die members and said heading die means.

6. In a method of making nails,
preforming a series of unheaded wire nail blanks to provide thereon tapered driving tips,
assembling the preformed blanks into stick form in contiguous side-by-side coextensive relation and with the driving tips aligned,
supporting the stick series of blanks in a tip sizing and tip end blunting die structure and confined against displacement in any lateral direction from the stick including firm confinement of the head end portions of the blanks against displacement endwise relative to the stick but leaving the head end portions free at least along one side of the stick for heading displacement,
and applying heading pressure against the head end portions of the blanks whereby to shape said head end portions into heads toward the unconfined side of the head end portions while simultaneously and by the same pressure driving the tips of the blanks into sizing and tip blunting engagement with the sizing and blunting die structure.

7. In nail making die apparatus,
a pair of compression dies to receive therebetween and grip a series of headless pin-like wire nail pin blanks which are arranged in stick relationship but with head portions of the blanks free,
means for confiningly engaging at least the head end portions of the blanks at the opposite ends of the stick series of blanks while the stick series of blanks is gripped between said compression dies,
means supporting one of said dies in stationary position,
guide means on said supporting means reciprocably mounting the other of said dies for movement toward and away from said one stationary die,
a reciprocable stroking member strokingly operable relative to said supporting means,
a toggle mechanism connecting said reciprocable die with said stroking member,
and a heading punch carried by said stroking member and engageable with all of the free head end portions of the blanks in the stick series of blanks confined between said dies and said end confining means and operable in coordinated sequence with said reciprocable die as actuated by said toggle mechanism.

8. In a method of making nails,
providing a series of headless pin-like substantially coextensive wire nail blanks in a stick relationship,
confining the head end portions of all of the blanks in one longitudinal edge of the stick against spreading in the longitudinal direction of said edge,
and heading said head end portions to spread laterally of said edge.

9. In a method of making nails,
confining a series of unheaded nail blanks in contiguous side-by-side coextensive relation,
supporting the series of blanks substantially against endwise movement,

and applying heading pressure against head end portions of the blanks while confining the head end portions of all of the blanks including those at each end of the series against spreading in the plane of the series,

whereby to effect displacement of material at the head ends of the blank into head lugs projecting laterally from the plane of the series and without any spreading of the head end material beyond the contiguous sides of the blanks nor beyond the free sides of the endmost blanks in the series.

10. In a method of making nails,

providing a stick relationship of a predetermined series of coextensive straight headless pin wire nail blanks,

subjecting the stick of blanks to straightening compression on the faces of the stick,

maintaining the faces of the stick under compression except for a limited extent on one margin of the stick to leave common head end portions of the blanks free to spread laterally normal to the plane of the stick,

confining the ends of the stick against spreading and thereby confining all of the head end portions of the blanks against spreading in the plane of the stick,

and while thus maintaining the stick in face confinement and endwise confinement swaging the head end

portions of all of the blanks to effect flow and displacement of the material of the head end portions to spread laterally relative to the faces of the stick and confined against spreading in the plane of the stick by the head end portions in mutual opposition.

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