

[54] NAILING MACHINE

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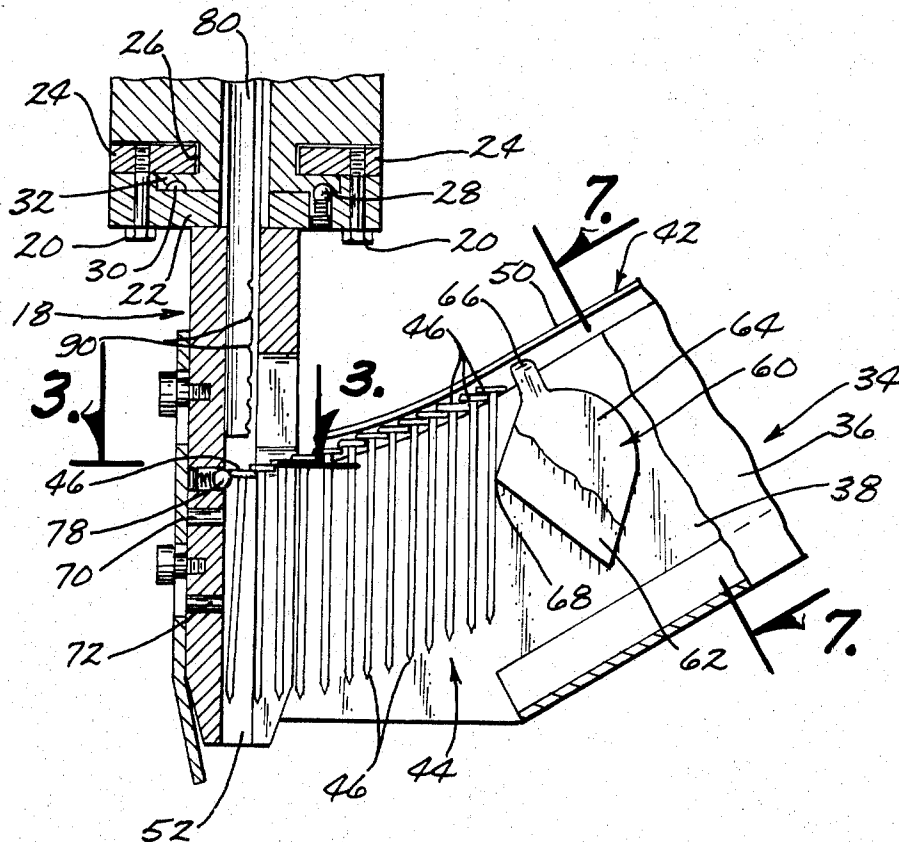
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[57] ABSTRACT

A driving pin is positioned in the bore of a barrel and a pneumatic power means reciprocates the driving pin against nail heads fed into the bore from a guide ex-

tending at an angle to the bore upwardly and outwardly. A ball detent stop means is provided in the wall of the bore opposite the guide to engage the lower side of the nail head and a pair of magnets is positioned with opposite poles adjacent the nail shank to maintain the shank in the bore. The driving pin includes at least one transversely extending groove providing a shoulder which engages the head of the nail when the driving pin is retracted thereby pivoting the nail such that the shank moves into the field of magnets and is held there until it is driven by the driving pin. The nails are fed from the guide into the bore by gravity and a weight is positioned in the guide to engage the nails and maintain them in contiguous relationship. The weight is U-shaped and the bight portion straddles a wall of the guide and if the guide is positioned to extend downwardly the weight pivots in such a manner that the bight portion wedges against the top edge of the wall and the cover plate preventing the nails from moving in the guide away from the bore. The driving pin is circular in cross section but is flattened along the side having the transverse groove and the lower end is tapered downwardly and inwardly to facilitate contact with the nail head in the bore only since the nails in the guide have their heads in overlapping relationship. The barrel on the head of the nailing machine is rotatable to maintain the guide in an upwardly extending position when the gun is being used to nail at various angles.

18 Claims, 8 Drawing Figures



NAILING MACHINE

Typical nailing machines utilize only specially designed nails which frequently are supplied in special magazines thus the expense involved in using this type of special equipment is substantially greater than in using conventional ordinary stock nails.

A further problem with conventional equipment is in maintaining the nail in axial alignment with the driving member in the barrel since there is a tendency for the nail to move out of position.

The nailing machine of this invention is capable of using stock nails as opposed to a specially designed nail and does not require the use of special magazines or clips. Instead, a nail guide is provided on the side of the barrel for feeding the nails by gravity into the bore of the barrel. A ball detent engages the lower side of the nail head to releaseably hold the nail in position to be driven while a pair of magnets secure the shank against the barrel side wall. The problem of positioning the shank of the nail against the magnets is overcome by the driving member having a groove and associated shoulder whereby when the driving member is being retracted the head of the next nail engages the shoulder of the groove and the nail is pivoted towards the magnets whereupon the magnets then maintain the shank in alignment in the bore. The driving member is retracted out of engagement with the head and is then ready to drive the nail on its next stroke. The lower end of the driving member is tapered downwardly on the flattened side of the circular in shape driving member. This allows for the end of the driving member to engage only the exposed portion of the nail head and not engage the head of the next nail in the row of nails which is partially overlapping the head of the nail in the bore.

Gravity is utilized for maintaining the nails in contiguous relationship in the guide and a weight is positioned in the guide at the end of the row of nails to engage the nails and move with the nails down the guide. This weight will also function to limit the nails against outward movement should the guide be pointed downwardly at anytime. The barrel of the machine is rotatably attached to the head such that the machine may be pointed in various directions and still maintain the guide in a position extending upwardly thereby utilizing the forces of gravity to maintain the feeding of the nails into the bore.

This invention consists in the construction, arrangements and combination of the various parts of the device, whereby the objects contemplated are attained as hereinafter more fully set forth, specifically pointed out in the claims, and illustrated in the accompanying drawings in which:

FIG. 1 is a perspective view of the nailing machine of this invention.

FIG. 2 is an enlarged in scale fragmentary cross sectional view of the barrel and its connection to the machine head and also illustrates the nail guide.

FIG. 3 is a cross sectional view taken along line 3 — 3 in FIG. 2.

FIG. 4 is a cross sectional view taken along line 4 — 4 in FIG. 3.

FIG. 5 is a cross sectional view taken along line 5 — 5 in FIG. 4.

FIG. 6 is a perspective view of the weight element.

FIG. 7 is a cross sectional view taken along line 7 — 7 in FIG. 2; and

FIG. 8 is a view of the weight element in the nail guide with the nail guide extending downwardly downwardly.

The nailing machine of this invention is referred to generally in FIG. 1 by the reference numeral 10 and includes a power head 12 having a handle 14 to which a pneumatic air line 16 is connected.

A barrel 18 is connected on the lower end of the head 12 by bolts 20 and the barrel includes a member 22 secured by the bolts 20 to a retaining plate 24 received in an annular slot 26. Spring biased ball detents 28 lock the barrel in a yieldable stationary position by engaging recesses 30 in an annular shoulder 32 on the lower end of the head 12.

A nail guide 34 is mounted to the side of the barrel 18 and includes spaced apart side walls 36 and 38 defining therebetween a passageway 40. An L-shaped cover plate 42 is mounted on the outside surface of side wall 38 and extends over the passageway 40 in spaced relationship to the upper longitudinal side wall edges. A row of nails 44 is provided in the passageway 40 and have their heads 46 in overlapping relationship. The lower edges of the nails ride along the upper longitudinal edges of the guide side walls 36 and 38. The horizontal portion 50 of the retainer element 42 prevents the nails from falling out of the passageway 40. The row of nails is fed into the bore 52 of the barrel 18 by gravity as the guide 34 extends outwardly and upwardly from the barrel 18. To further facilitate the row of nails maintaining their contiguous relationship, a weight element 60 is provided which is U-shaped and includes spaced apart legs 62 and 64 bridged together by a bite portion 66 straddling the upper edge of wall 36. The weight element engages the nails at a corner 68 and is shaped to pivot towards the row of nails to maintain them in engagement with each other, as seen in FIG. 2. Should the guide 34 be positioned to extend downwardly, as seen in FIG. 8, the weight element will pivot counterclockwise and the bite portion 66 will engage the portion 50 of the cover wall 42 and the longitudinal edges of the guide walls 36 and 38 to hold the row of nails in position and prevent their falling out the outer end of the guide.

It is further seen in FIG. 4 that a pair of oppositely disposed north-south rod-type magnets 70 and 72 are positioned in spaced relationship in the barrel side wall opposite the passageway 40 to attract the shank portions 74 of the nails. The two magnets 70 and 72 having their opposite poles facing the nails provide greater holding action than if the magnets were arranged with like poles facing the nail shank 74.

A spring biased ball detent 78 is also mounted above the magnets in the barrel side wall in a position to engage the lower side of the nail head 46 to hold the nail in the barrel in a position to be driven by the driving member 80.

The driving member 80 is circular in cross section but includes a flattened surface 82 facing the row of nails and is tapered at 84 longitudinally downwardly and inwardly such that the end of the driving member conforms substantially to the exposed area of the nail head 46 in the bore 40 considering that the next nail head 46 overlaps the nail head in the bore and it is desired to have the driving member 80 engage only the head of the nail in the bore.

The shanks 74 of the nails in the guide 34 are free to swing until they come within the forces of the magnets 70 and 72. The driving member 80 is provided with a series of longitudinally spaced apart transversely extending grooves 90 having shoulders 92 which engage the adjacent edge of the nail head 46 as the driving member 80 is being retracted as seen in FIG. 4, thereby causing the nail shank 74 to pivot towards the barrel side wall having the magnets 70 and 72. The driving member 80 continues to move upwardly and is disengaged from the nail head. The nail is now locked in position in the barrel bore 40 by the magnets and the ball detent 78 ready to be driven by the plunger 80 on its next downward stroke, as seen in FIG. 2.

Thus it is seen that conventional stock nails may be manually fed into the guide 34 and in turn fed into the bore 52 of the barrel 18 by gravity and with the assistance, if desired, of the weight elements 60. The feeding may be manual or automatic by connecting a continuous supply of nails onto the outer end of the nail guide 34. As illustrated, the nailing machine may be positioned at any angle and the weight element 60 will pivot to the position of FIG. 8 to lock the nails against falling out of the guide. The vibration of the gun during operation causes the nails and the weight to move down the guide toward the barrel. The gun may be turned to the position desired to maintain the guide extending upwardly at an angle by rotating the barrel relative to the head and then locking the members in the desired position through use of the ball detents 28, seen in FIG. 2.

The machine is jam proof in that as the driving member 80 is retracted each time it positions the next nail securely in the bore 52 ready to be driven on the next downward stroke. The ball stop 78 yieldably engages the underside of the nail head 46 while the vertically spaced apart magnets 70 and 72 secure the shank of the nail against the bore side walls seen in FIG. 4. The critical step is in the driving member 80 pivoting the nail into a position to be held by the magnets as the driving member 80 is retracted. In retracting the driving member 80 the nail head 46 of the next nail in the row of nails 44 catches in at least the last groove 90 and pivots away from the row of nails towards the magnets whereby the magnets take over and hold the nail in position in the bore to be driven by the next downward stroke of the driving member 80.

I claim:

1. A nailing machine, comprising,
a barrel having an elongated bore and an opening at one end and having a slot on one side of the bore,

a driving pin in said bore,
power means for reciprocating said driving pin,
a nail guide having an elongated passageway in communication with said slot,

said passageway adapted to contain a row of nails, with one nail being positioned in said bore,
a releasable stop means on the side of said bore engaging the bottom side of the head of the nail in said bore,

magnetic means in the side of said bore opposite said passageway for attracting the shank of said nail in said passageway,

feed means for successively feeding nails in said row of nails into said bore after each reciprocation of said driving pin, and

releasable gripping means adjacent the lower end and on the side of said driving pin adjacent said passageway for engaging the head of the next nail in said passageway as said driving pin moves away from said open end in said bore and after having driven the nail in said bore whereby the pull on the head of said next nail pivots the shank of said next nail into said bore where it is held by said magnet means and said releasable stop means.

2. The structure of claim 1 wherein said releasable gripping means is further defined as being a laterally extending groove in the side of said driving pin and said groove having a shoulder for engaging said head of said next nail in said passageway.

3. The structure of claim 2 wherein said groove is one of a series of spaced apart laterally extending grooves on said driving pin adjacent the lower end thereof.

4. The structure of claim 1 wherein said releasable stop on the side of said bore is further defined as being a ball detent spring biased into said bore.

5. The structure of claim 1 wherein said magnetic means is further defined as including a pair of spaced apart rod magnets having opposite poles adjacent said base.

6. The structure of claim 1 wherein said driving pin is cylindrical in shape.

7. The structure of claim 6 wherein said cylindrical driving pin is further defined as having a flattened side adjacent said passageway.

8. The structure of claim 7 wherein said driving pin is further defined as having a tapering surface on its lower end extending from said flattened surface longitudinally inwardly to provide clearance relative to the next nail in said passageway when said driving pin is moving towards said bore open end and past said passageway.

9. The structure of claim 8 wherein said passageway is adapted to contain said row of nails with their heads in overlapping relationship whereby less than a full nail head is exposed to said driving pin.

10. The structure of claim 1 wherein said passageway is defined by a pair of spaced apart walls having upper longitudinal edges on which said nail heads ride in moving along said passageway into said bore.

11. The structure of claim 10 wherein a retaining wall extends over and parallel to said nail heads to maintain said nails in said passageway.

12. A nailing machine, comprising,
a barrel having elongated bore and an opening at one end,

a driving pin in said bore,
power means for reciprocating said driving pin,
a nail guide having an elongated passageway in communication with said bore, said passageway adapted to contain a row of nails with one nail being in said bore, said passageway extending upwardly at an angle to said bore whereby said row of nails will gravity feed into said bore,

a releasable stop means on the side of said bore engaging the bottom side of the head of the nail in said bore,
magnetic means in the side of said bore opposite said passageway for attracting the shank of said nail in said passageway,

feed means for successively feeding nails in said row of nails into said bore after each reciprocation of said driving pin, and

a releasable stop means on the side of said bore engaging the bottom side of the head of the nail in said bore,

magnetic means in the side of said bore opposite said passageway for attracting the shank of said nail in said passageway,

feed means for successively feeding nails in said row of nails into said bore after each reciprocation of said driving pin, and

5

releasable gripping means adjacent the lower end and on the side of said driving pin adjacent said passageway for engaging the head of the next nail in said passageway as said driving pin moves away from said open end in said bore and after having driven the nail in said bore whereby the pull on the head of said next nail pivots the shank of said next nail into said bore where it is held by said magnet means and said releasable stop means.

13. The structure of claim 12 wherein said feed means is further defined as including a weight means in said passageway adapted to provide engagement with the last nail in said row for pushing said row of nails towards said bore.

14. The structure of claim 13 wherein said weight means comprises a U-shaped member and said passageway is defined by a pair of spaced apart side walls, said U-shaped member straddling one of said side walls with the bight of said U-shaped member engaging the upper edge of said one side wall.

15. The structure of claim 14 wherein a retaining wall extends closely adjacent the heads of said nails and the bight of said U-shaped member pivots said U-shaped member on said one wall and said bight wedges against said retaining wall thereby holding said nails in said passageway.

16. The structure of claim 1 wherein said barrel is on a gun structure including said power means for reciprocating said driving pin, and said barrel is rotatably connected to said gun structure.

17. The structure of claim 16 wherein said guide extends outwardly and upwardly relative to said barrel whereby said feed means is adapted to gravity feed said

6

nails into said bore as said gun structure is moved to different positions.

18. A nailing machine, comprising, a barrel having elongated bore and an opening at one end,

a driving pin in said bore, power means for reciprocating said driving pin, a nail guide having an elongated passageway in communication with said bore, said passageway adapted to contain a row of nails with one nail being in said bore, said passageway extending upwardly at an angle to said bore whereby said row of nails will gravity feed into said bore,

feed means for successively feeding nails in said row of nails into said bore after each reciprocation of said driving pin, and

said feed means including a weight means in said passageway adapted to provide engagement with the last nail in said row for pushing said row of nails towards said bore, said weight means being a U-shaped member and said passageway being a pair of spaced apart side walls; said U-shaped member straddling one of said side walls with the bight of said U-shaped member engaging the upper edge of said one side wall, a retaining wall extends closely adjacent the heads of said nails and the bight of said U-shaped member pivots said U-shaped member on said one wall and said bight wedges against said retaining wall thereby holding said nails in said passageway when the outer end of said guide extends downwardly.

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