July 22, 1952 H. NELSON 2,603,856

METHOD AND MACHINE FOR ASSEMBLING VENETIAN BLIND HEADBARS

Filed Aug. 31, 1946 4 Sheets-Sheet 1

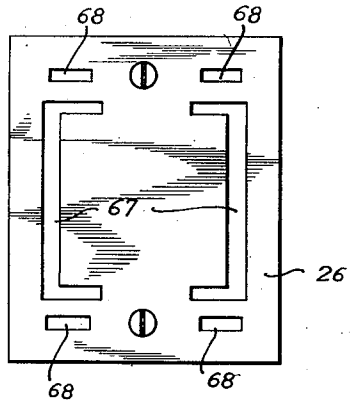


FIG. 7

FIG. 1

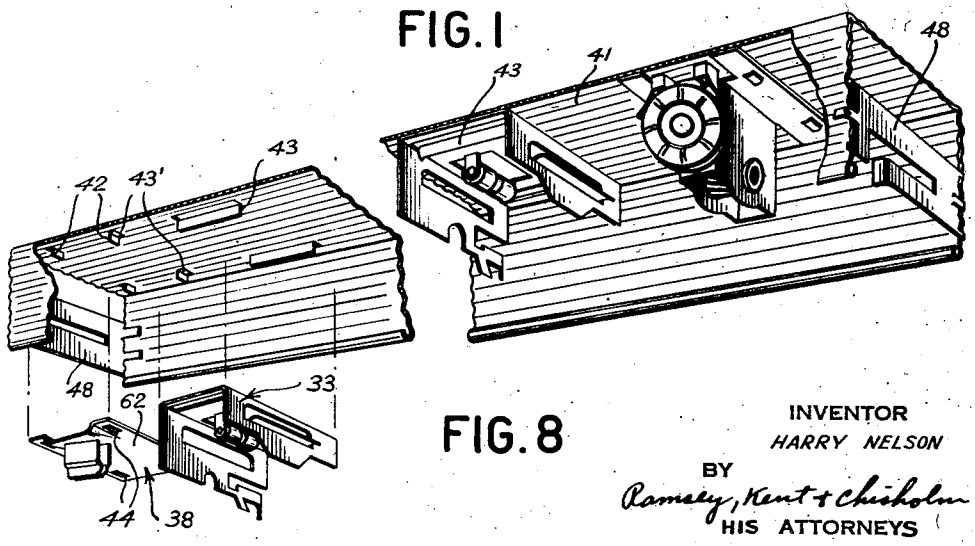


FIG. 8

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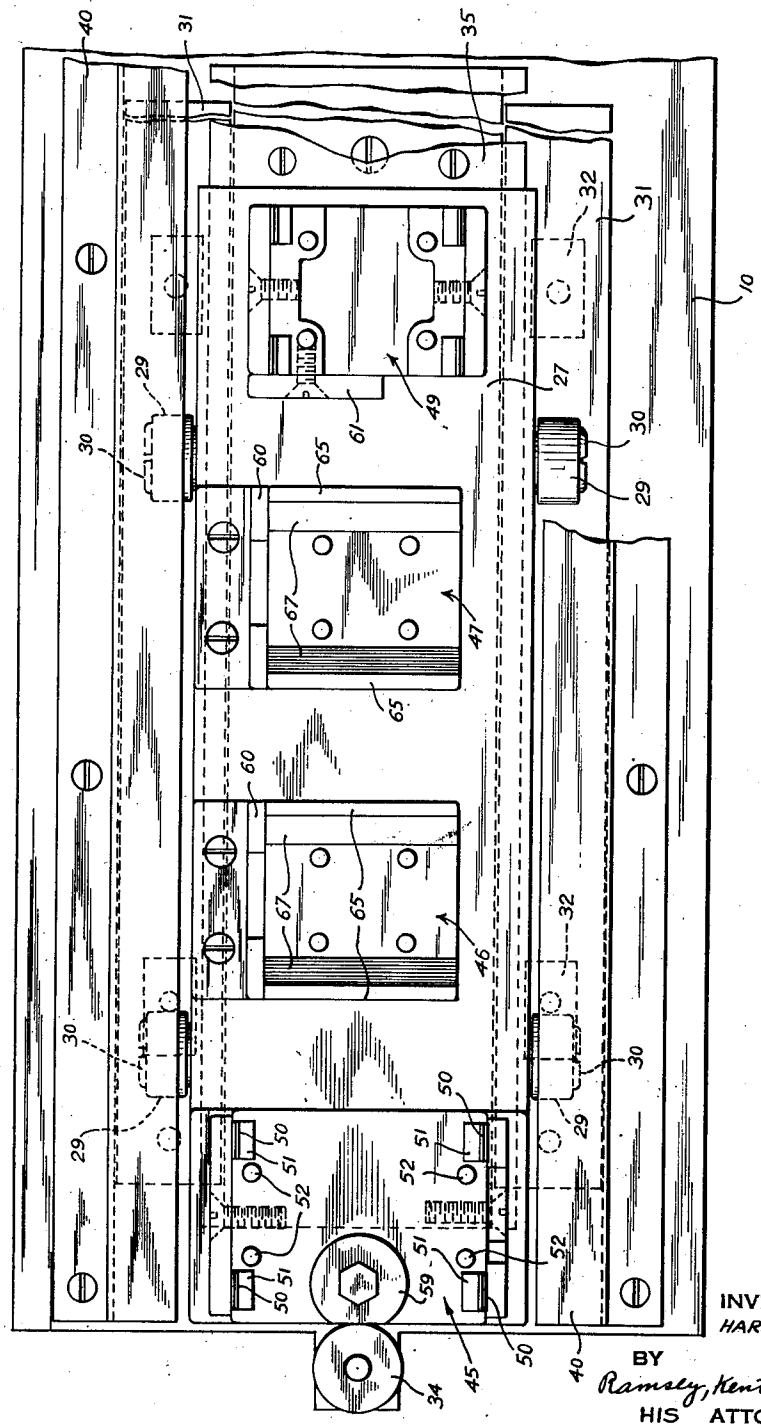


FIG. 2

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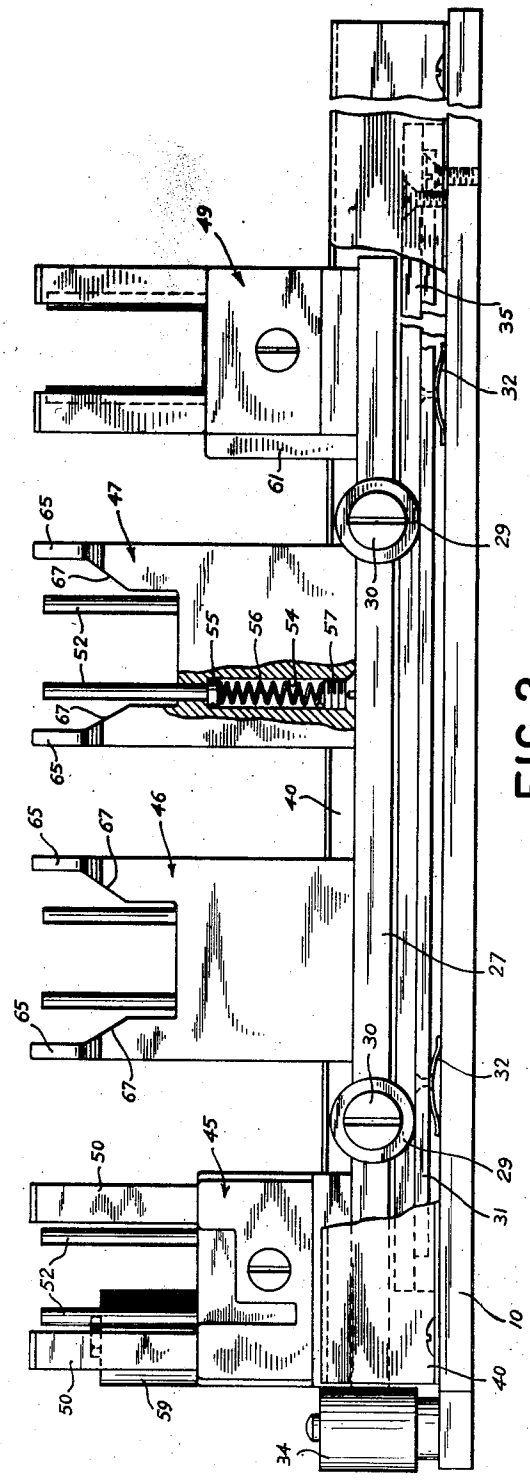


FIG. 3

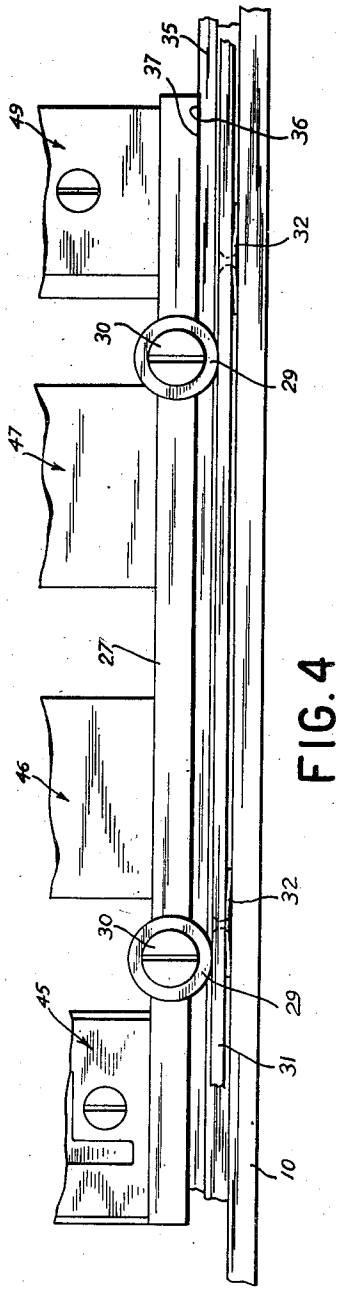


FIG. 4

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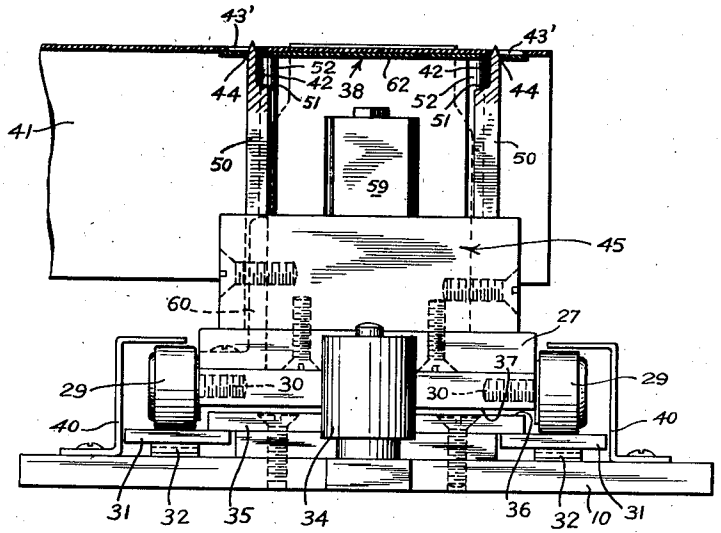


FIG.5

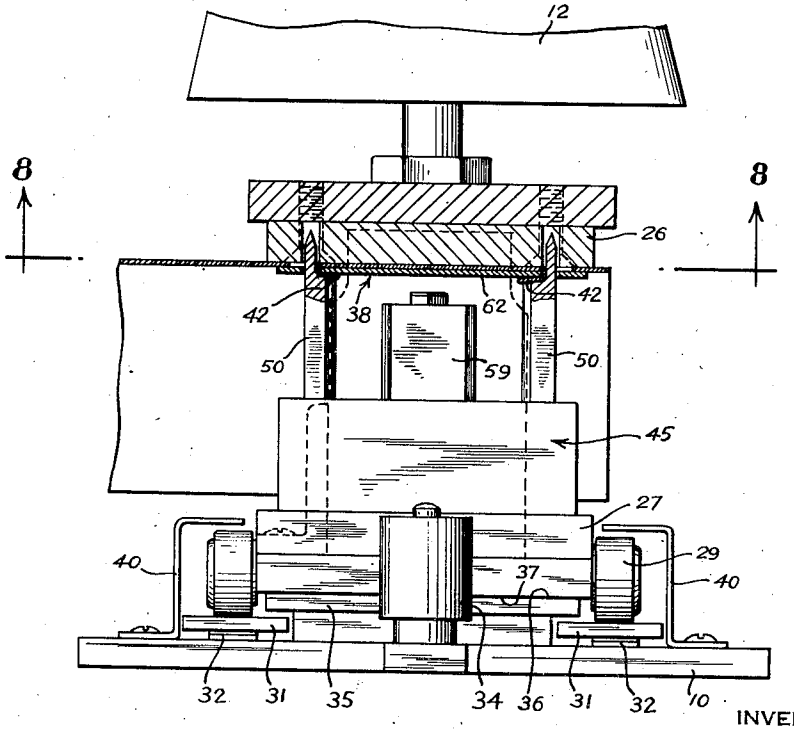


FIG.6

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Patented July 22, 1952 2,603,856

UNITED STATES PATENT OFFICE

2,603,856

METHOD AND MACHINE FOR ASSEMBLING VENETIAN BLIND HEADBARS

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Application August 31, 1946, Serial No. 694,237

10 Claims. (Cl. 29—148)

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This invention relates to a machine for assembling metal fittings on a Venetian blind head bar.

The invention is directed to the provision of a machine for quickly and accurately assembling fittings on a Venetian blind head bar on a production basis. It is particularly adapted to the assembly of fittings on the type of head bar disclosed in my pending application Ser. No. 601,671, filed June 26, 1945, Patent No. 2,455,135, granted November 30, 1948, such type of head bar being also shown in Fig. 8 of the drawings herewith. The fittings contemplated are pulleys, cord locks, tilter mechanisms, cradles, and other devices which it may be desired to assemble with a head bar.

In the form disclosed the machine comprises a structure in which a series of fixtures, which receive the fittings and act as anvil or die members, are mounted upon a carriage which is movable along a track so as to successively position each of the fixtures under an air operated plunger or pressure head. The pressure-applying surface of the plunger is so slotted as to telescopically cooperate with any of the fixtures. Each of the fixtures is adapted to receive a particular fitting. The head bar, which is preferably light gage sheet steel which has already been so stamped as to provide pairs of projecting tabs for insertion through and crimping over the fittings, is successively positioned over the several fixtures and the fittings carried thereby. The fixtures have upstanding portions which pass through slots formed in the head bar by the previous stamping operation, thus accurately positioning the head bar and guiding the tabs through the complementary apertures in the fittings. After the head bar has been positioned on a fixture, the fixture carriage may be pushed to a position beneath the air-operated plunger. Then, upon operation of the plunger, it applies pressure to force the head bar and fitting telescopically downwardly on the fixture, during which movement the projecting tabs of the head bar are crimped against the fitting to permanently and firmly secure the fitting to the head bar. This operation is similarly performed in connection with the other fittings and the fixtures on which they are positioned.

An object of this invention is to provide a machine for easily and quickly attaching fittings to a Venetian blind head bar.

Another object of the invention is to provide such a machine which will maintain correct relative position between a Venetian blind head bar

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and the fittings to be attached thereto during the attaching operation.

Another object of the invention is to provide a machine that will aid in rapidly and correctly positioning fittings on a Venetian blind head bar.

A further object is to prevent accidental transposition and/or reversal of fittings being installed along a Venetian blind head bar.

Further objects, and objects relating to details and economies of construction and operation will more definitely appear from the detailed description to follow.

My invention is defined in the appended claims. In the claims, as well as in the description, parts are at times identified by specific names for clarity and convenience but such nomenclature is to be understood as having the broadest meaning consistent with the context and with the concept of my invention as distinguished from the pertinent prior art. The best form in which I have contemplated applying my invention is illustrated in the accompanying drawings forming a part of this specification, in which:

Fig. 1 is a side elevation of a machine embodying the invention.

Fig. 2 is a top plan view of the track and carriage for moving the fixtures beneath the plunger or pressure head, the view having certain portions broken away to reveal details of construction.

Fig. 3 is a right-side elevation of the carriage and track, certain portions being broken away to reveal details of construction.

Fig. 4 is a fragmentary right-side elevation of the carriage and track, a portion of the track being omitted and the view showing the carriage in the depressed position which is imposed upon it by the action of the pressure head.

Fig. 5 is a front-end elevation of the carriage and track, showing a head bar and fitting in position for attachment.

Fig. 6 is a view corresponding to Fig. 5 but showing the position of the parts just after the pressure head has completed the attachment of the fitting to the head bar.

Fig. 7 is a bottom plan view of the plunger or pressure head.

Fig. 8 is a perspective view of a head bar channel in the inverted position it occupies during the attaching operation. The view shows two fittings attached, and two fittings in exploded relationship to the head bar.

Referring to the drawings, and particularly to Figs. 1 and 2, a track 10 is mounted in substantially horizontal position on a framework 11 which supports the track at a convenient height

from the floor for operation of the machine. An air motor 12 of conventional design is mounted on a bracket 14 which is secured to one side of the track 10, the motor being connected with a suitable supply of compressed air, not shown, by a pipe 15. A conventional air cleaner 16 and a conventional lubricator 17 may be used in the air line to supply properly conditioned air to the air motor 12. An adjustable pressure reduction valve 19 is preferably located in the air-supply line to regulate the pressure at which the air is delivered to the motor.

A valve 20 for controlling the operation of the air motor 12 is mounted thereon and is connected to a pedal 21 by a wire 22, the pedal being mounted on a pivot 24 on the framework 11 for convenient operation by the machine operator. The valve 20 is normally biased to closed position. A spring 25 normally maintains the pedal 21 in raised inoperative position, thus permitting the valve 20 to close, in which position a pressure head 26, which is mounted on the air motor 12 and reciprocated thereby, is in raised position. Depression of the pedal 21 opens the valve 20, admitting compressed air to the motor cylinder and causing the plunger or pressure head 26 to be forced downwardly. The pressure head 26 remains in lowered position until such time as the pedal 21 is released, whereupon valve 20 closes and the air motor 12 elevates the pressure head 26 to its raised position shown in Fig. 1.

A carriage 27 is mounted on rollers 29 for movement along the track 10. These rollers preferably consist of ball or roller bearings, the inner race of which is secured to the carriage 27 by bolts 30 threadedly engaged in the carriage, the outer race of the bearing serving as the peripheral surface of the roller. This furnishes a carriage which is easily rolled throughout the length of the track 10. The track 10 is preferably inclined very slightly to the front of the machine, i. e., to the left as viewed in Fig. 1, the inclination being such as to slightly bias the carriage to the front end of the track. A stop 34 secured to the track 10, prevents the carriage 27 from rolling off the front end of the track.

Two runways 31 are positioned above the top surface of the track 10 and serve as bearing surfaces for the rollers 29 throughout the length of the track. As best seen in Fig. 3 semi-elliptical springs 32, 32 are secured to the under side of each runway 31. These springs bear directly on the track 10, serving to maintain the runways 31 normally slightly raised from the top surface of the track 10. Any suitable arrangement may be employed to prevent displacement of the runways 31, 31 in a plane parallel to the top surface of track 10.

A raised central portion 35 runs longitudinally of the track 10 and serves to guide the rollers 29 along the runways 31, 31. The central portion 35 of the track 10 has an even upper surface 36 which is normally slightly spaced from a parallel lower surface 37 of the carriage 27, see Figs. 5 and 6. This space is slightly less than the space between the under surface of the runways 31, 31 and the runway-supporting surface of the track 10, for a purpose to be hereinafter explained. A stop 39, Fig. 1, may be positioned at the rear end of the track 10 to prevent the carriage 27 from being accidentally pushed off the rear end of the track. The track assembly is completed by two Z-shaped strips 40, 40 one flange of each of which is secured to the track 10 adjacent the runways 31, 31, the other flange of each overhanging the rollers 29 so as to protect the rollers from accidental damage and retain the carriage 27 against displacement from the track.

Referring to Fig. 8, the head bar which this machine is particularly adapted to assemble comprises a light gage metal channel 41 which has previously had a plurality of pairs of tabs, such as the dual pairs of tabs 42, 42 and the single pair of tabs 43, 43 struck from the bottom web and projecting inwardly approximately perpendicular to the bottom of the channel. The four tabs 42 are of such size and position as to cooperate with the four slots 44 of the Venetian blind fitting 38. The two tabs 43 are of such size and position to cooperate with slots in the fitting. The end braces 48, 48 may be applied by another machine prior to the operation described herein.

The carriage 27 has a fixture mounted thereon for each fitting to be positioned along the length of the head bar channel 41, the instant machine having four fixtures 45, 46, 47 and 49 positioned in spaced relation along the top face of the carriage. Each of the fixtures has a plurality of upwardly projecting fingers arranged to receive a particular fitting and index it on the channel. As to each fixture the size and arrangement of fingers is such that the fingers will pass through the respective holes in the fitting and thence through the respective slots left in the channel 41 by the striking up of the tabs such as tabs 42 and 43. The fixtures 45, 46 and 49 are of different shape for receiving different fittings. The fixture 47 in the machine shown is similar to the fixture 46, inasmuch as both of these fixtures are to receive similar fittings. While the various fixtures have certain differences, they possess many features of similarity. Accordingly, the fixture 45 will be described in detail, it being understood that the other fixtures are generally similar except as otherwise noted.

The fixture 45 has four upwardly projecting fingers 50 so arranged that the upper portions thereof will pass through the slots 44 in the fitting 38 as well as the slots 43' in the channel 41. Each of the fingers 50 is provided with a step or anvil portion 51 inwardly projecting at a slight inclination to the horizontal, as best shown in Fig. 5, all of the four step-portions 51 being at a common elevation and serving to deflect the downwardly projecting tabs 42 of the channel 41 into clinching position as will be hereinafter described.

The fixture 45 is provided with four strippers 52, see particularly Figs. 2 and 3. Similar strippers are incorporated in each of the other fixtures. Each stripper 52 is mounted for reciprocatory motion in a stepped bore 54 (Fig. 3) in the base of the fixture, the stripper having a head portion 55 to retain it within the bore 54. A compression spring 56, positioned within the bore 54, biases the stripper 52 upwardly so as to normally maintain the stripper in raised position. A plug 57, threadedly engeged in the lower end of the bore 54, serves to close the bottom of the bore and as an abutment for the spring 56. In normal raised position the upper ends of the strippers 52 are positioned at a level between the step portions 51 and the top of the fingers 50. The fixtures 46 and 49 are similarly provided with strippers and fingers, the size and position of the fingers varying, as well as the spacing of the strippers, to correspond with the fitting to be received.

The fixture 45 is provided with a block 59, best shown in Figs. 2 and 3, mounted between two of the fingers 50. The block 59 is so shaped and

positioned in relation to the configurations of the several fittings that only the fitting 38 will fit on this fixture, and this fitting in only one rotative position. This assures correct selection and assembly of the fittings on the channel 41. Similarly, blocks 60, 60 positioned on the fixtures 46 and 47 assure that the fittings to be positioned on these fixtures will be properly selected and properly positioned. Likewise a block 61 on the fixture 49 assures the correct selection and positioning of the desired fitting on this fixture.

The bottom face of the plunger or pressure head 26, shown in Fig. 7, has pairs of channels 67 and 68 of proper spacing and size to pass over the ends of the fingers 50, as well as the fingers on the other fixtures 46, 47 and 49, the same pressure head being used in conjunction with all of the fixtures. The pressure head 26 and air motor 12 are so positioned above the track 10 that, by rolling the carriage 27 rearwardly, any of the fixtures 45, 46, 47 and 49 can be positioned directly under the pressure head.

In the assembly of a head bar, as shown in Fig. 8, the several fittings are first positioned on the fixtures 45, 46, 47 and 49, the configuration of these fixtures as well as the spacing of the fingers assuring that the proper fitting is positioned in the proper position on each fixture as explained above. For example, the fitting 38 is placed in inverted position on the fixture 45, the fingers 50 projecting through the slots 44 thereof and the bottom plate 62 of the fitting resting on top of the strippers 52, see particularly Fig. 5. After positioning all of the fittings on the respective fixtures, the channel 41 is positioned over each of the fixtures successively, the channel being inverted as shown in Figs. 5 and 6 and extending generally horizontally transversely of the track 10. To aid in supporting the channel in this position, a horizontal rod 63 is positioned at the proper elevation each side of the carriage 27 and parallel to the track 10, each of these rods being supported from the bracket 14 as shown in Fig. 1. As shown in Fig. 5, the channel 41 is positioned with the tabs 42 projecting through the slots 44 in the fitting 38, the fingers 50 projecting through the slots 43' in the channel. Inasmuch as the spacing of the tabs is different for the several fittings which are different, each fixture will reject the channel 41 if the attempt is made to nest an incorrect zone thereof with the fixture.

After the channel 41 has been positioned on the fixture 45, the fitting 38 having already been positioned thereon, the channel 41 is pushed rearwardly, moving the carriage with it, until the channel contacts a stop 64 positioned on the bracket 14 at which time the fixture 45 will be in the proper position directly beneath the pressure head 26. After so positioning the fixture 45 the operator depresses the pedal 21, whereupon the pressure head 26 moves downwardly and forces the channel 41 and fitting 38 downwardly on the fixture 45, due to pressure applied to the channel. Upon the channel 41 and fitting 38 being forced downwardly, the tabs 42 of the channel contact the step portions 51 of the fingers 50 and are laterally deflected inwardly into the position shown in Fig. 6. In this position the tabs 42 have been clinched about the bottom plate 62 of the fitting 38, thus firmly securing the fitting in place on the channel.

As the pressure head 26 forces the assembly comprising the fitting 38 and the channel 41 downwardly, the strippers 52 are likewise depressed by the fitting 38, compressing the springs 56. Upon release of the pedal 21 the pressure head 26 returns to raised position, and as it returns, the springs 56 will return the strippers 52 to their normally raised position, thus raising the assembled channel 41 and fitting 38 to the upper portion of the fingers 50, from which the assembly may easily be removed by the operator. The strippers 52 also serve to maintain the fitting 38 firmly against the channel 41 during the clinching operation.

The carriage 27 moves along the track 10 on the rollers 29 as previously described. In order to more firmly support the carriage 27 and avoid a relatively large load on the rollers 29 during the clinching operation, the runways 31 have been mounted on springs as already described. As the plunger 26 descends, pressure on the fixture 45 first compresses the springs 32, thus serving to depress the runways 31 and lower the carriage 27 so that the under surface 37 of the carriage is in contact with the upper surface 36 of the raised central portion 35 of the track 10. This furnishes firm support for the fixture, passing the load from the pressure head 26 directly to the bed of the track without subjecting the rollers 29 to this load.

In similar manner the other fittings are successively assembled on the head bar 41 by use of the fixtures 46, 47 and 49. In the assembly operation, it has been found expedient to first position all of the fittings to be assembled on a single channel 41, on the several fixtures while the carriage 27 is resting against the stop 34 at the front of the track 10. The channel 41 is thereafter successively positioned on each of the fixtures 45, 46, 47, and 49; and while on each fixture and before being transferred to the next fixture, the channel 41 and carriage 27 are pushed rearwardly by the machine operator and pressure head 26 actuated to clinch the tabs of the channel around the fitting.

Whereas fixtures 45 and 49 each have four fingers, fixtures 46 and 47 each have two fingers 65 which extend for the width of the fixture, as shown in Fig. 2. This corresponds with the wide tabs 43 stamped from the channel 41 for attaching the center two of the four fittings. The step portion 67 of each of these fingers corresponding with the step portions 51 of the fingers 50 but extending the full width of the fixture, is preferably at a much greater angle with the horizontal, as shown in Fig. 3, than the portions 51. This is for the purpose of clinching the tabs 66 to a lesser extent, certain advantages in the completed head bar arising from such construction as is pointed out in my pending application previously identified.

While the form of the invention illustrated has been described in connection with the assembly of fittings on a channel-shaped metal head bar, the invention in its broader aspects is capable of application to other types of head bars as well as head bars in which the fittings are secured in place by means other than that shown and described herein.

I claim:

1. A machine for assembling fittings on a Venetian blind head bar, said machine comprising: a fixture adapted to support a fitting and a superimposed head bar having portions thereof telescoped with portions of the fitting, means for forcing the head bar and fitting against the fixture to deform the telescoped portions and secure the fitting on the head bar, a track for support-

ing and guiding the fixture to the forcing means, and means supporting the fixture for movement along the track, the fixture being resiliently mounted to permit it to bear directly against the track upon actuation of the forcing means.

2. A machine for assembling fittings on a Venetian blind head bar, said machine comprising: a fixture adapted to support a fitting and a superimposed head bar having portions thereof telescoped with portions of the fitting, means for forcing the head bar and fitting against the fixture to deform the telescoped portions and secure the fitting on the head bar, a track for supporting and guiding the fixture to the forcing means, and rollers movably supporting the fixture on the track, the track including resilient members deformable by the forcing means to permit the fixture to bear directly upon the track.

3. A machine for assembling a fitting on a Venetian blind head bar, said machine comprising a press having a pressure head movable in a fixed path for uniting a head bar and a fitting by deformation of a connecting tab, and a fixture positionable in the path of the pressure head and shaped to support a fitting with the base thereof exposed to receive the head bar, the fixture including a resilient support for the fitting that is displaceable to permit displacement of the fitting as the head bar is forced towards the fixture by the pressure head, the fixture also being provided with surfaces adjacent the fitting for deflecting tabs extending from the head bar as the head bar is forced towards the fixture by the pressure head, and the fixture additionally being provided with projecting tongues adapted to telescopically receive the fitting and the head bar to aid in maintaining the parts in assembled relation during the attachment.

4. A machine for assembling a series of fittings with a Venetian blind head bar and securing them thereto, the series of fittings including a plurality of dissimilar fittings, said machine comprising: a series of fixtures, each fixture being contoured to telescopically receive a fitting of the series in only one oriented position with the base of the fitting exposed, and each fixture being contoured to reject all dissimilar fittings of the series, a carriage mounting the fixtures, said carriage being supported for movement back and forth along a fixed path, and a press located at one point along the path of movement of the carriage for securing the fittings to the head bar by deforming portions of one of the parts into interlocking engagement with the other part, the fixtures being mounted side by side on the carriage and in alignment with its path of movement.

5. A machine for assembling a series of fittings with a Venetian blind head bar and securing them thereto, the series of fittings including a plurality of dissimilar fittings, said machine comprising: a series of fixtures, each fixture being contoured to telescopically receive a fitting of the series in only one oriented position with the base of the fitting uppermost, and each fixture being contoured to reject all dissimilar fittings of the series, a carriage mounting the fixtures, said carriage being supported for movement back and forth along a fixed path, and a press located at one point above the path of movement of the carriage and operating in a direction towards said path of movement for securing the fittings to the head bar by deforming portions of one of the parts into interlocking engagement with the other part, the fixtures being mounted side by side on the carriage and in alignment with its path of movement so as to be positionable in the operating path of the press.

6. A machine for assembling a series of fittings with a Venetian blind head bar and securing them thereto, the series of fittings including a plurality of dissimilar fittings, said machine comprising: a series of fixtures, each fixture being contoured to telescopically receive a fitting of the series in only one oriented position with the base of the fitting exposed, and each fixture being contoured to reject all dissimilar fittings of the series, a carriage mounting the fixtures, a horizontally extending track supporting the carriage for back and forward movement along the track in a fixed path, and a press located at one point above the track for securing the fittings to the head bar by deforming portions of one of the parts into interlocking engagement with the other part, the fixtures being mounted side by side on the carriage and in alignment with its path of movement along the track.

7. The method of assembling a series of fittings with a Venetian blind head bar and securing them thereto, the fittings in the completed assembly being distributed along the head bar and the series of fittings including a plurality of dissimilar fittings, said method comprising: arranging the fittings in the order in which they are to be distributed along the head bar and supporting them with their bases exposed on closely spaced individual fixtures, each fixture being contoured to receive a specific fitting of the series and to reject all dissimilar fittings of the series, placing the head bar in assembled relation with the first fitting, moving that fitting and its fixture, together with the head bar, to a position adjacent a force-applying means, utilizing the force-applying means to deform portions of the head bar into interlocking engagement with the first fitting, and then proceeding seriatim to the remaining fittings and assembling and securing each to the head bar by the aforesaid procedure used for assembling and securing the first fitting.

8. The method of assembling a series of fittings with a Venetian blind head bar and securing them thereto, the fittings in the completed assembly being distributed along the head bar and the series of fittings including a plurality of dissimilar fittings, said method comprising: supporting the fittings in succession with their bases exposed, on closely spaced individual fixtures, each fixture being contoured to receive a specific fitting of the series and to reject all dissimilar fittings of the series, placing the head bar in assembled relation with one of the fittings, moving that fitting and its fixture, together with the head bar, to a position adjacent a force-applying means, utilizing the force-applying means to deform a connector telescoped with one of the parts into interlocking engagement therewith, and then proceeding to the remaining fittings and assembling and securing each to the head bar by the aforesaid procedure used for assembling and securing the first fitting.

9. The method of assembling a series of fittings with a Venetian blind head bar provided with bendable tabs for receiving the fittings and bending the tabs to secure the fittings to the head bar, the fittings in the completed assembly being distributed along the head bar and the series of fittings including a plurality of dissimilar fittings, said method comprising: arranging the fittings in the order in which they are to be distributed along the head bar and supporting them with their bases uppermost on closely

spaced individual fixtures, each fixture being contoured to receive a specific fitting of the series and to reject all dissimilar fittings of the series, superimposing the head bar in inverted position on the first fitting with tabs of the head bar interfitted with the base of the fitting, moving that fitting and its fixture, together with the head bar, to a position beneath the press, utilizing the press to bend the tabs into interlocking engagement with the base of the fitting, and then proceeding seriatim to the remaining fittings and assembling and securing each to the head bar by the aforesaid procedure used for assembling and securing the first fitting.

10. The method of assembling a series of fittings with a Venetian blind head bar provided with bendable tabs for receiving the fittings and bending the tabs to secure the fittings to the head bar, the fittings in the completed assembly being distributed along the head bar and the series of fittings including a plurality of dissimilar fittings, said method comprising: supporting the fittings in regular order with their bases uppermost on closely spaced individual fixtures, each fixture being contoured to receive a specific fitting of the series and to reject all dissimilar fittings of the series, superimposing the head bar in inverted position on a fitting with tabs of the head bar interfitted with the base of the fitting, moving that fitting and its fixture, together with the head bar, to a position beneath the press, utilizing the press to bend the tabs into interlocking engagement with the base of the fitting, and then proceeding seriatim to the remaining fittings and assembling and securing each to the head bar by the aforesaid procedure used for assembling and securing the first fitting.

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