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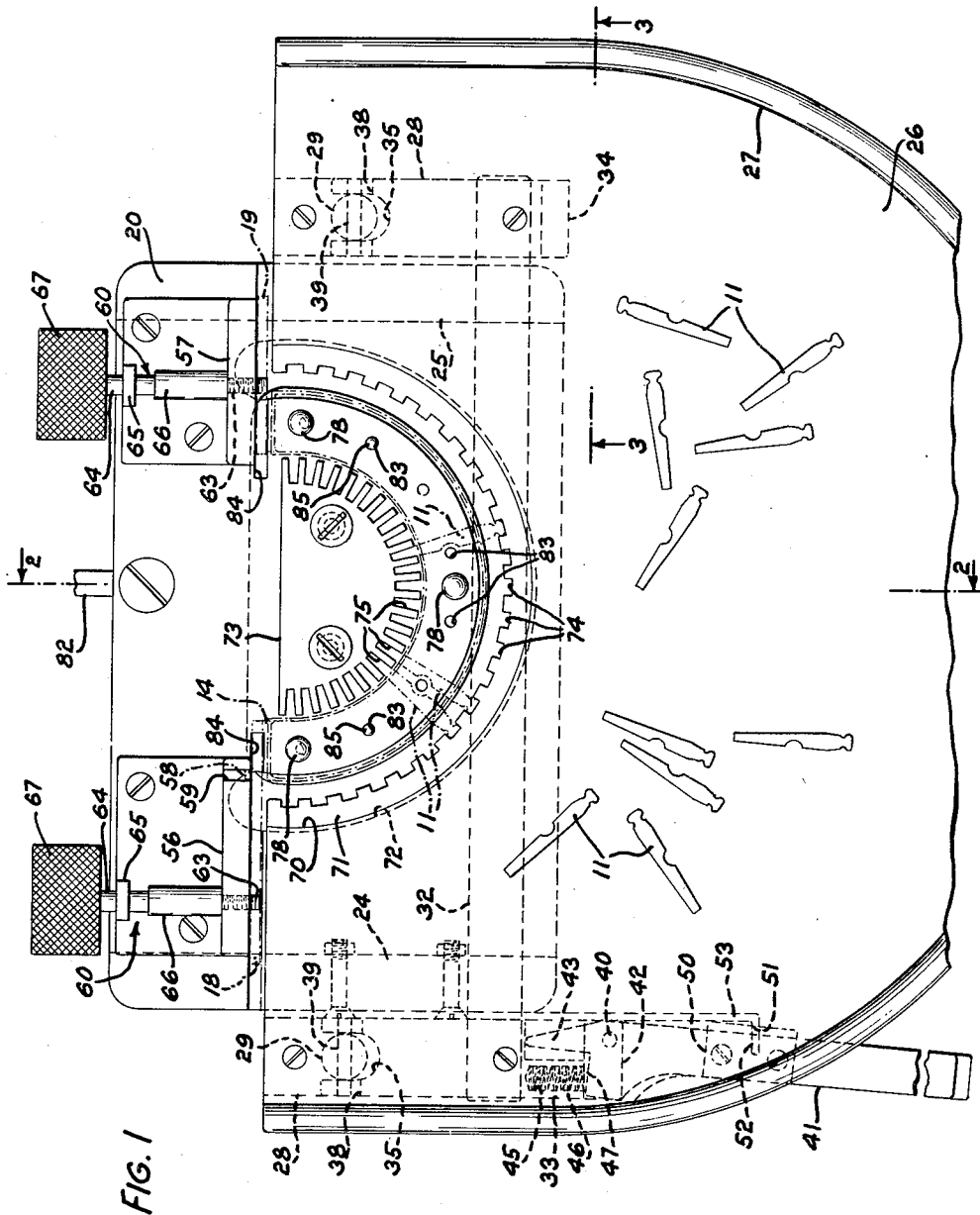
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ASSEMBLING APPARATUS

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2 Sheets-Sheet 1



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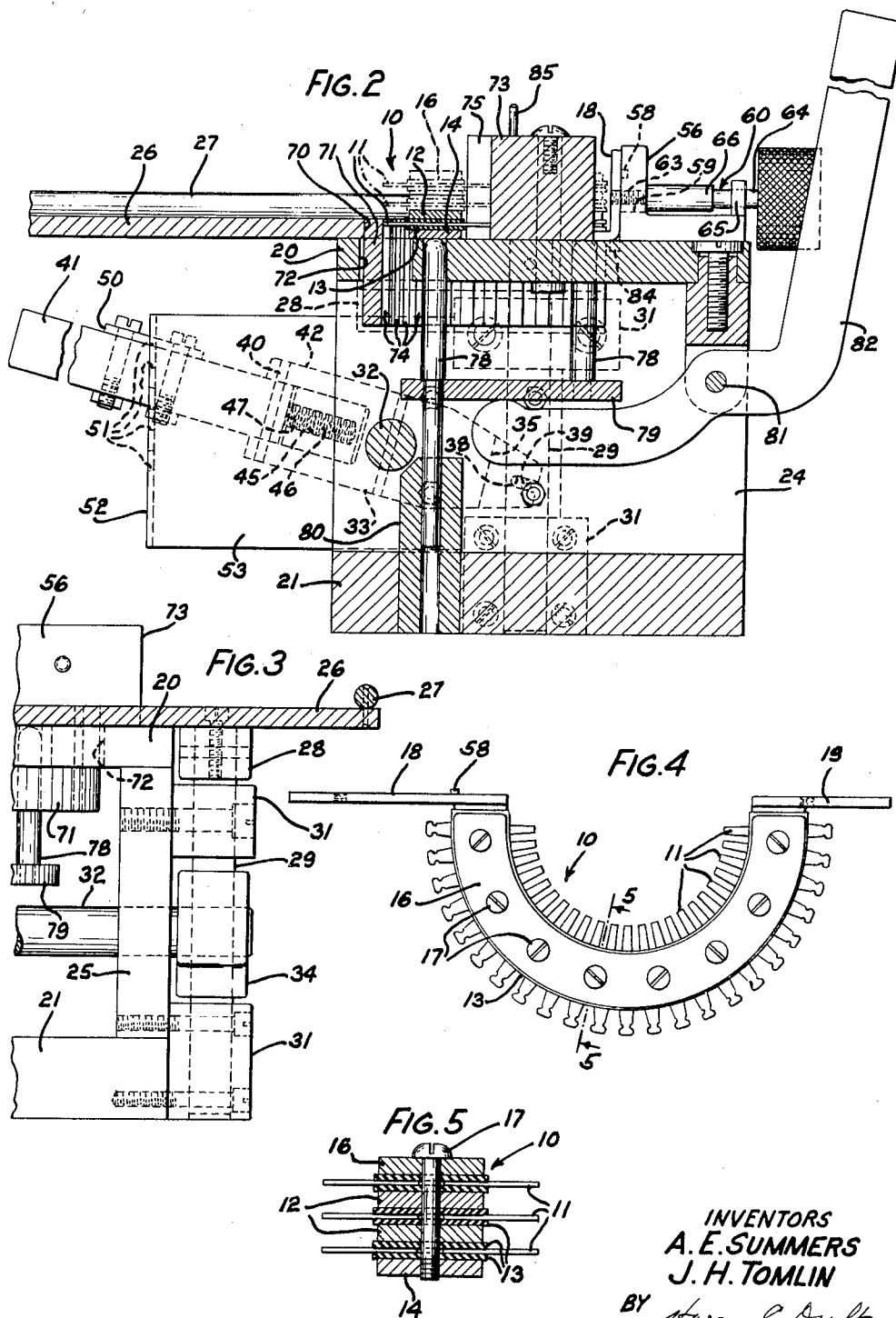
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ASSEMBLING APPARATUS

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4 Claims. (Cl. 29—84)

This invention relates to assembling apparatus, and more particularly to apparatus for assembling a plurality of superimposed rows of predeterminedly spaced electric terminal elements.

The features of this invention are particularly applicable to the assembling of terminal banks used in telephone machine switching apparatus. Such banks include in one type thereof a plurality of closely arranged superimposed or piled up rows of individual terminal elements and members of insulation and metal interposed between the rows of terminal elements, the whole being clamped between base and top plates and secured by a plurality of screws threaded into the base plate. In manual assembling of such terminal banks it is desirable that the assembly operations be performed with a minimum of fatigue to an operator as well as to the amount of time expended in order to economically produce such banks.

An object of the present invention is to provide a simple and practical apparatus for economically assembling in a facile manner superimposed rows of predeterminedly spaced electric terminal elements.

In accordance with one embodiment of this invention, as used for assembling the hereinbefore described terminal banks, there is provided an apparatus comprising a stationary support for a terminal bank base plate, means for clamping the base plate to the support, stationary and movable slotted members for predeterminedly positioning the terminal elements of each row in spaced relation on the base plate. The movable member is carried by an elevator table upon which a supply of terminal elements are placed so that they may be readily individually manually slid therefrom into predetermined closely adjacent positions into and between the slotted members. As each row of terminal elements with its insulators and metal spacing members are assembled the table is elevated from an initial lowered position a predetermined distance, retained thereat by a lever and latch mechanism, to position the upper surface of the table slightly above the level of the last row of assembled terminal elements and spacing members, whereby terminal elements may again be slid from the table from a level slightly above the plane of the last assembled terminal elements and spacer members into their assembled positions. Upon the complete assemblage of the terminal bank the clamping means is released and then a plurality of lever actuated knock-out pins

are operated to raise the bank to permit its ready removal from the apparatus. The elevator table is then moved to its lowermost initial position for the assembly of another bank.

The invention will be fully understood from the following description taken in conjunction with the accompanying drawings, in which

Fig. 1 is a fragmentary plan view of an assembling apparatus embodying the features of this invention, showing a terminal bank base plate clamped in position and a partial row of terminal elements assembled thereon, all shown in dotted outline, and a supply of terminal elements supported upon the elevator table;

Fig. 2 is a fragmentary vertical section taken on the line 2—2 of Fig. 1;

Fig. 3 is a fragmentary vertical section taken on the line 3—3 of Fig. 1;

Fig. 4 is a plan view of a telephone terminal bank in the assembling of which the apparatus of this invention is used, and

Fig. 5 is an enlarged vertical section taken on the line 5—5 of Fig. 4.

Referring now to the drawings in which an apparatus embodying the features of this invention is shown for use in assembling arcuate shaped telephone terminal banks 10 (Figs. 4 and 5), one of which is shown partially assembled in vertical cross section in Fig. 2. The terminal bank 10 comprises a plurality of closely arranged superimposed or piled up rows of individual metallic terminal elements 11 in close laterally spaced relation with arcuate metal plates 12 and arcuate insulating members 13 interposed between the rows of terminal elements. The assembled rows of terminal elements 11 are held between an arcuate metal base plate 14 and an arcuate metal top plate 16 and insulating members similar to the members 13, the whole being secured together by a plurality of screws 17 extending freely through suitably arranged openings in the metal plates 12 and 16 and the insulating members 13 and threaded into the base plate 14. Right angularly formed vertical mounting arms 18 and 19 are formed integral with the base plate 14 for securing the terminal bank 10 to its support on the telephone machine switching apparatus. In Fig. 1 a plan view of the base plate 14 is indicated in broken outline with a few terminal elements 11, also indicated in broken outline, in assembled relation around the arc-shaped portion of the base plate.

The assembling apparatus comprises an open frame like structure consisting of top and bottom plates 20 and 21 (Fig. 2) and side plates 24 and

25 (Fig. 1) suitably secured together. Resting upon the upper surface of the top plate 20 in the initial lowered position of the apparatus, as shown in the drawings, is an elevator table or platform 26 which is rounded at its forward or lower end, as shown fragmentarily in Fig. 1, and at opposite sides extends an appreciable distance beyond the side plates 24 and 25, its rear or upper end terminating appreciably short of the upper end of the corresponding end of the top plate 20, same figure. The table 26 at its forward end and sides is provided with a wall 27 in the form of a rod to prevent the supply of terminal elements 11 from slipping off the table. Depending from and secured to the bottom surface of the table 26 at the outer sides of the side plates 24 and 25 are plates 28 (Fig. 3) to which are secured depending slide rods 29 which are slidable in upper and lower bearing blocks 31 attached to the side plates. Journaled in the side plates 24 and 25 is a horizontally extending shaft 32 to the opposite ends of which are fixed levers 33 and 34 which are bifurcated at their outer ends, as indicated at 35 (Fig. 1), to embrace the slide rods 29. The furcations of the levers 33 and 34 are provided with slots 38 (Fig. 2) into which extend opposite ends of horizontal pins 39 carried by the slide rods 29.

Pivoted at 40, for movement in a horizontal direction, upon the left hand lever 33 (Fig. 1) is a hand lever 41 which extends at its inner end between furcations of a bifurcated outer end 42 of the lever 33. Within a pocket 45 formed in the outer end of the lever 33 is a compression spring 46 which bears against a surface 47 on the hand lever 41 to constantly urge the same in a counter-clockwise direction, as viewed in Fig. 1. Secured to the upper surface of the hand lever 41 is a latch plate 50 which is arranged to engage in suitably spaced and arranged notches 51 (Fig. 2) provided in an outwardly directed arm 52 of a plate 53 fixed to the side plate 24, the inner edge of the latch plate 50 being normally engaged in one or the other of the notches 51. To unlatch the hand lever 41 it is rocked clockwise (Fig. 1) about its pivot 40 to withdraw the latch plate 50 from a notch 51 and thereafter by depressing the hand lever the latch plate may be slide downward along the notched edge of the plate 53 to engage in the first notch 51 below the notch from which it was withdrawn. A depression of the hand lever 41 rocks the shaft 32 and attached levers 33 and 34 counter-clockwise (Fig. 2) and through the slotted lever ends engaging the pins 39 on the slide rods 29 the latter and the attached elevator table 26 are elevated a predetermined distance. The arrangement is such that when the table 26 is in its extreme lowered or normal position, as shown in the drawings, it may be intermittently raised in five successive steps, thus providing six levels for the table at each of which it may be latched to retain it in its predetermined position. To lower the table 26 to its normal position after being raised to its extreme upper position it is merely necessary to withdraw the latch plate 50 from its notch 51 and while retaining it withdrawn permit the table and slide rods 29 to return to their initial lowered position, by the action of gravity, in which position the table will be rested upon the upper surface of the top plate 20, whereupon the latch plate will ride into the top notch 51 in the plate 53 due to the spring 46 acting against the hand lever 41.

Secured in spaced relation upon the top plate 20 at its rear or upper end, as viewed in Fig. 1, 75

are L-shaped clamping members to vertical arms 56 and 57 of which the vertical mounting arms 18 and 19, respectively, of the base plate 14 are clamped. The mounting arm 18 (Figs. 1 and 4) is formed with a struck out aligning lug 58 which is also utilized for laterally aligning the base plate 14 upon the top plate 20. Thus, the vertical clamping arm 56 is formed with a slot 59 into which the lug 58 is entered in placing the base plate 14 upon the top plate 20. Journaled in the clamping arms 56 and 57 are shouldered clamping screws 60 each having a reduced threaded end 63 freely extending through an aperture in the arm and a reduced opposite end 64 which freely extends through an apertured vertical member 65 fixed to the clamping member. The clamping screw 60 intermediate its ends has an enlarged portion 66 which limits movement of the screw 60 longitudinally. The screw threaded ends 63 of the screws 60 are threaded into aligned threaded apertures in the base plate 14 by rotating handles 67 fixed to the ends 64 of the screws which serve to draw the base plate arms 18 and 19 against the clamping arms 56 and 57 to firmly clamp the base plate 14 on the top plate 20 preparatory to assembling the terminal elements 11 thereon.

Formed in the elevator table 26 at its rear or upper end (Fig. 1) is an arc-shaped opening 70 to the vertical wall of which is attached an arc-shaped member 71 arranged at its upper end in the plane of the upper surface of the table and depending for a distance therebelow (Fig. 2), the depending portion extending through an arc-shaped slot 72 formed in the top plate 20. Fixed to the upper surface of the top plate 20 is an arc-shaped block 73 which is concentrically arranged with the member 71. The opposed inner and outer faces of the member 71 and block 73 are formed with aligned radial vertical slots 74 and 75, respectively, which serve to predeterminedly position the terminal elements 11 relative to each other and to the base plate 14.

In order to facilitate the removal of the assembled terminal bank 10 from the apparatus a plurality of vertical knock-out pins 78 are reciprocally mounted in the top plate 20 in an arc-shaped path and arranged to engage the bottom surface of the base plate 14 of the terminal bank. At their lower ends the pins 78 are fixed to a plate 79 and the middle pin extends below the plate and into a bearing block 80 (Fig. 2) for guiding the group of pins and their supporting plate. Pivotally supported at 81 on the bottom of the top plate 20 intermediate the side plates 24 and 25 is a bell crank hand lever 82 having its horizontal arm extending under and engaging the plate 79 and its vertical arm extending upwardly at the rear of the apparatus and above the top plate 20 so that it may be readily grasped by an operator. It will be apparent that by rocking the lever 82 clockwise, as viewed in Fig. 2, the knock-out pins 78 will move upwardly and raise an assembled terminal bank 10 above the plane of the elevator table 26.

The top plate 20 is formed with a plurality of apertures 83 arranged in the arcuate path of the spaced knock-out pins 78 and aligned with the centers of the terminal bank retaining screws 17 for receiving the lower ends of the screws which project slightly from the bottom of the bank 10, upon completion of the assembly thereof, the two apertures in the rear or upper end of the top plate (Fig. 1) for the knock-out pins also serving to receive the lower ends of the end screws 17.

Also formed in the top plate 20 are clearance slots 84 for receiving lower edges of the mounting arms 18 and 19 which extend slightly below the bottom surface of the base plate 14 which rests upon the top plate (Fig. 2).

In order to accurately align the arcuate metal plates 12 and insulating members 13 and the top plate 17 of the bank terminal 10 during assembly with respect to the base plate 14, such plates and members being all apertured to freely receive the screws 17, a pair of removable aligning pins 85 are used which are inserted in the two apertures 83 directly below the two upper knock-out pin apertures, these two apertures 83 being shouldered to receive lower shouldered ends on the aligning pins 85.

In using the above described apparatus it is to be understood that the particular apparatus is designed to facilitate the assembling of terminal banks of from one to six superimposed or piled up rows of terminal elements 11, although the particular terminal bank 10 illustrated in the drawings comprises only three rows of terminals. To assemble the terminal bank 10 the elevator table 26 is initially in its lowered position resting upon the top plate 20, as shown in Figs. 1, 2 and 3, the latch plate 50 being latched in the upper notch 51 of the plate 53. After placing a supply of terminal elements 11 upon the table 26, a few of which are shown in Fig. 1, the operator positions and aligns a base plate 14 upon the top plate 20 and clamps it to the arms 56 and 57 of the U-shaped clamping members by means of the screws 60 in the manner previously described. After placing the aligning pins 85 in the shouldered apertures 83 the operator mounts an insulating member 13 upon the base plate 14 and then slides the terminal elements 11 from the table 26 onto the insulating member 13 entering opposite ends of the elements in the aligned radial vertical slots 74 and 75 of the arc-shaped member 71 and block 73, as shown in broken outline in Fig. 1, the elements as they are slid into position dropping slightly onto the insulating member which is below the plane of the table top. After a complete row of terminal elements 11 have been accurately arranged in spaced relation upon the insulating member 13, another member 13 followed by a metal plate 12 and another member 13 is placed over the row of terminal elements. The terminal elements 11 are notched along one side (Fig. 1) to clear the screws 17.

Thereafter the operator rocks the hand lever 41 clockwise (Fig. 1) to unlatch the same from the notched plate 53 and this is followed by a slight counter-clockwise movement (Fig. 2) to relatch it in the following latchable position in the manner previously described. In this last movement of the hand lever 41 the table 26 is raised by means of the operating connections previously described, to position its top surface slightly above the plane of the last assembled insulating member 13. A second row of terminal elements 11 and an insulating member, a metal plate and an insulating member, are then assembled and the table 26 is again raised and this is repeated until the required number of rows of terminal elements 11 have been assembled, not exceeding six rows, by the present apparatus. After the top row of terminal elements are in position and an insulating member placed thereover, the metal top plate 16 is mounted thereon. The assemblage is then secured together by the screws 17. Before re-

moving the aligning pins 85 a number of the screws are threaded into position to insure against displacement of the assembled parts and thereafter screws are threaded into the positions formerly occupied by the pins.

To remove the completely assembled terminal bank 10 from the apparatus the operator first unclamps the assemblage by turning the screws 60 out of the threaded apertures in the terminal bank mounting arms 18 and 19 by means of the handles 67 and then rocks the hand lever 82 clockwise (Fig. 2) which as previously described raises the knock-out pins 78 and therewith the terminal bank such a distance that the bottom surface thereof is above the plane of the elevator table 26 in which position it can be readily grasped by the operator and removed. Upon releasing the hand lever 82 it and the associated parts return by the action of gravity to their normal position, as shown in the drawings. To return the elevator table to its initial lowered position the hand lever 41 is first rocked clockwise (Fig. 1) to unlatch it whereupon while maintaining it unlatched the table and connected parts including the lever 41 return to their normal positions ready for the next assembling operation.

From the foregoing description, it will be apparent that a simple and practical apparatus is provided for economically assembling, in a facile manner, superimposed rows of predeterminedly spaced electrical terminal elements with a minimum of fatigue to an operator.

It will be understood that the embodiment herein described is merely illustrative of the invention and one application thereof, the invention being limited only by the scope of the appended claims.

What is claimed is:

1. In an apparatus for assembling parts in superimposed rows upon a base member, a stationary support for a base member, means for aligning and definitely positioning the base member upon said support, a vertically movable table for supporting a supply of parts to be slid therefrom onto the base member, cooperating spaced members carried by said table and support for predeterminedly positioning the parts relative to each other and the base member, and means for raising and holding the table in a predetermined plane after the assembling of each row of parts whereby the parts for the following row may be slid from the table into position between the cooperating members and over the last row of parts.

2. In an apparatus for assembling parts in superimposed rows upon a base member, a stationary support for a base member, means for clamping the base member in a definite position upon said support, a vertically movable table for supporting a supply of parts to be slid therefrom onto the base member, cooperating notched spaced members carried by said table and support for receiving opposite ends of the parts therebetween when slid from the table to predeterminedly position the parts relative to each other and the base member, and means for raising and holding said table in a predetermined plane after the assembling of each row of parts whereby the parts for the following row may be slid from the table into position between the cooperating members and over the last row of parts.

3. In an apparatus for assembling parts in superimposed rows upon a base member, a station-

ary support for a base member, a vertically movable table for supporting a supply of parts to be slid therefrom onto the base member, means for raising and holding said table in a predetermined plane after the assembling of each row of parts whereby the parts for the following row may be slid from the table into position over the last row of parts, and reciprocable means in said support for engaging the bottom surface of the base member for raising the same and the assembled rows of parts thereon from the support for removal from the apparatus.

4. In an apparatus for assembling parts in superimposed rows upon a base member, a station-

ary support for a base member, a vertically movable table for supporting a supply of parts to be slid therefrom onto the base member, cooperating spaced members carried by said table and support for predeterminedly positioning the parts relative to each other and the base member, and means for raising and holding said table in a predetermined plane after the assembling of each row of parts whereby the parts for the following row may be slid from the table into position between the cooperating members and over the last row of parts.

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