

July 30, 1968

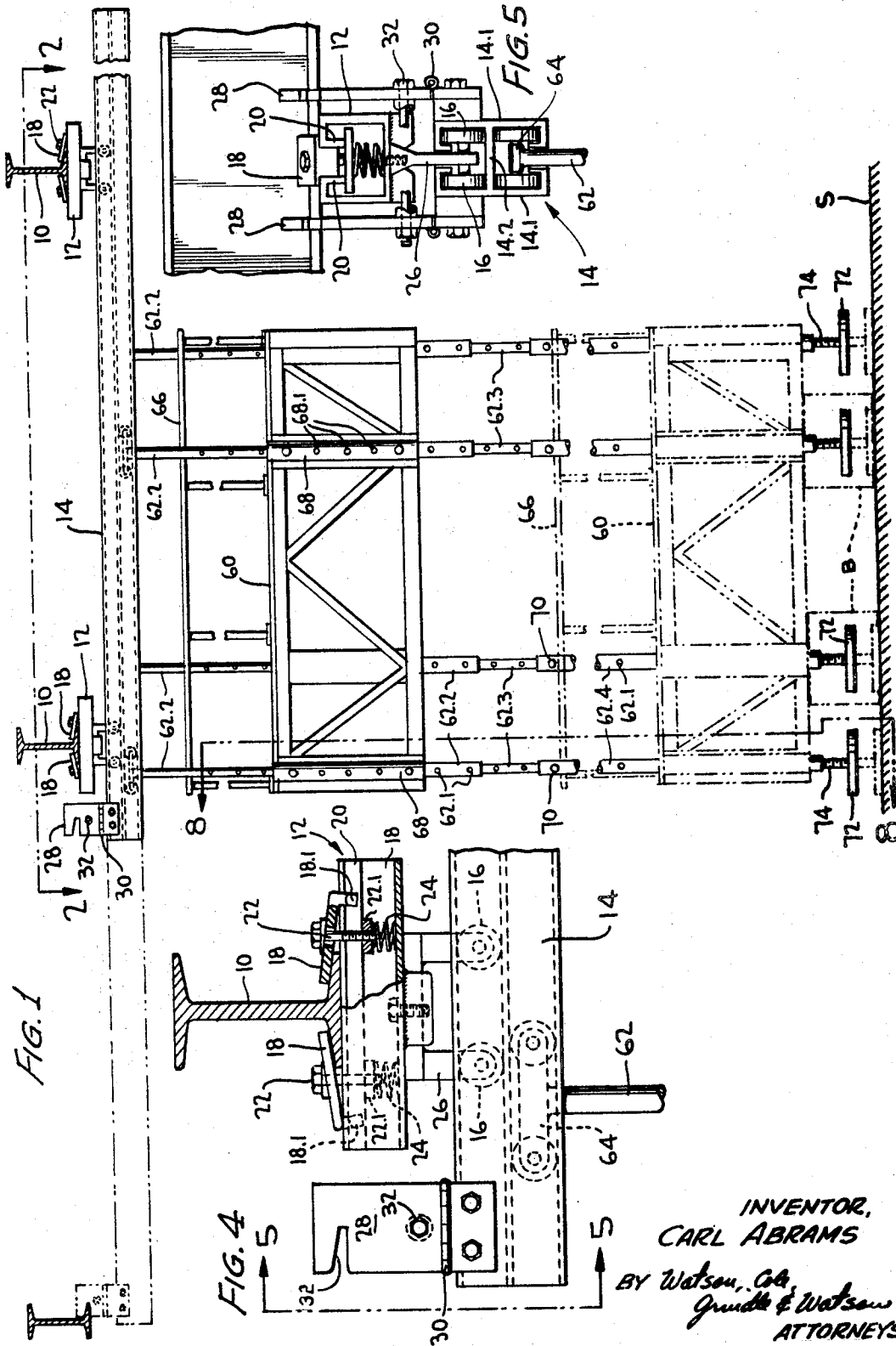
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3,394,776

SUSPENDED TRAVELING SCAFFOLD

Filed March 22, 1967

3 Sheets-Sheet 1



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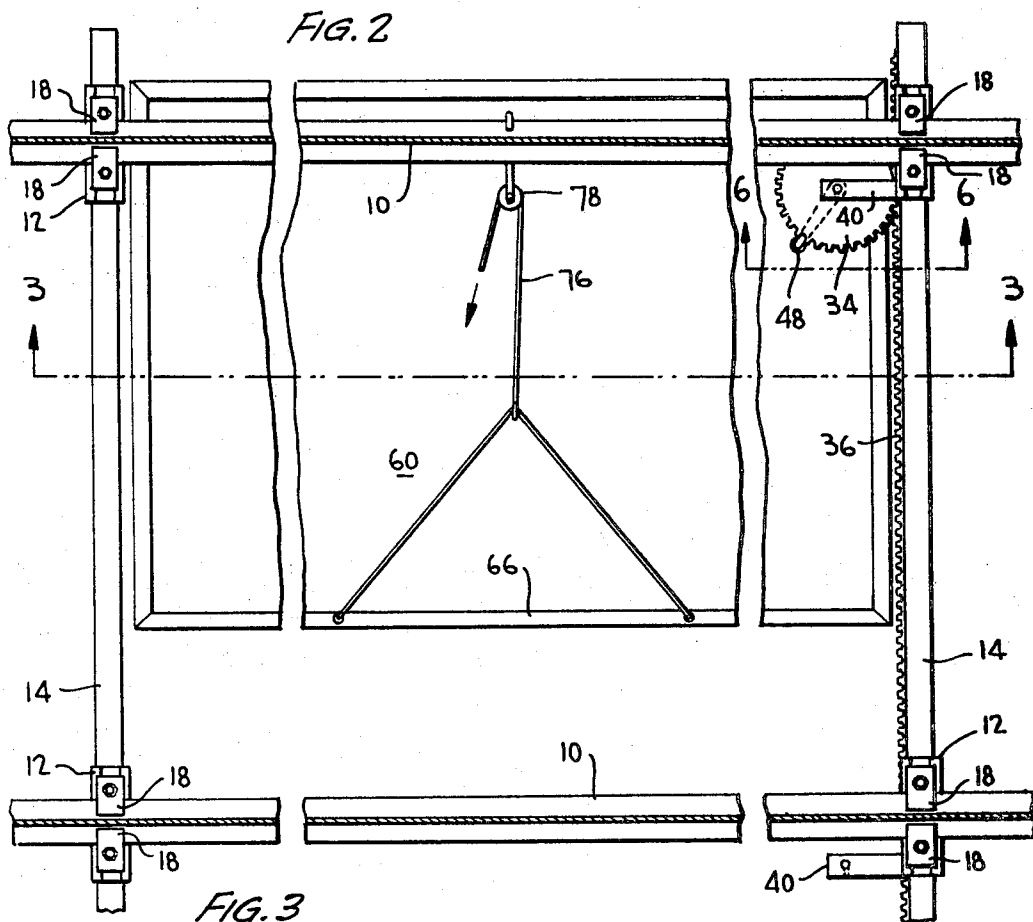
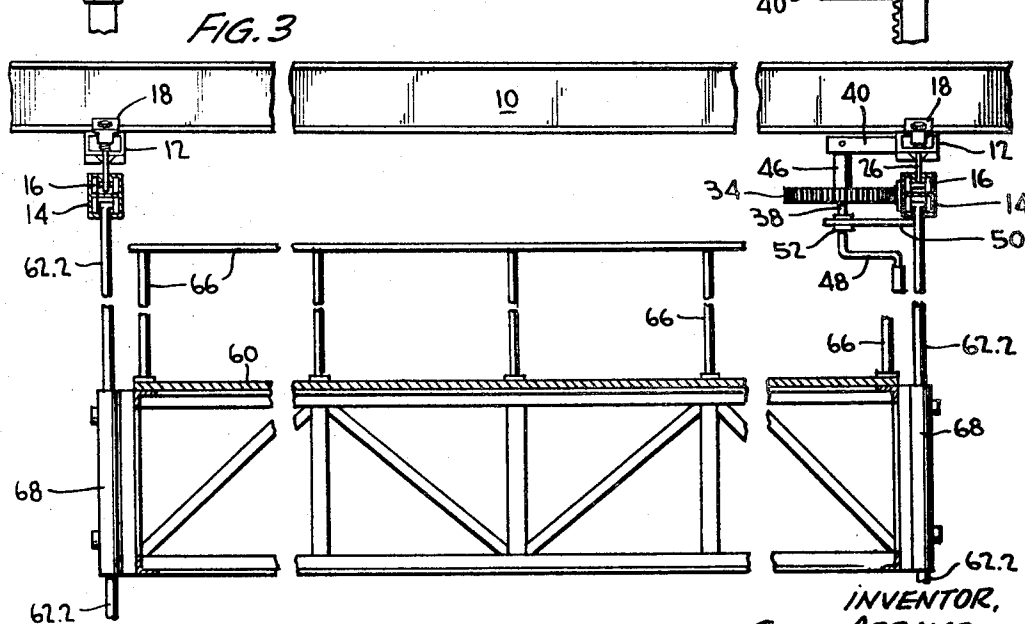
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3 Sheets-Sheet 2



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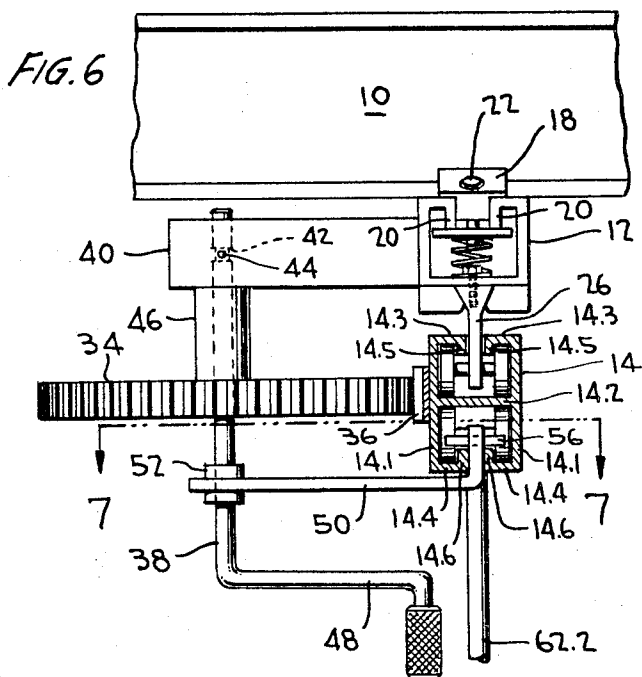
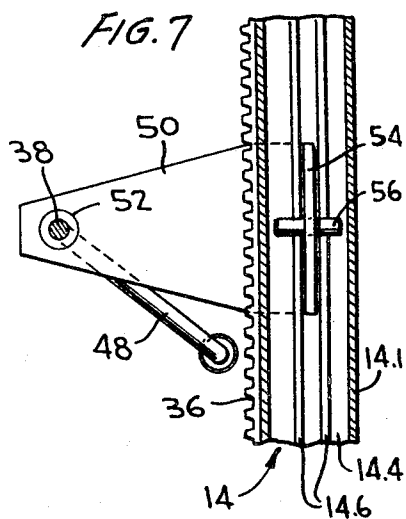
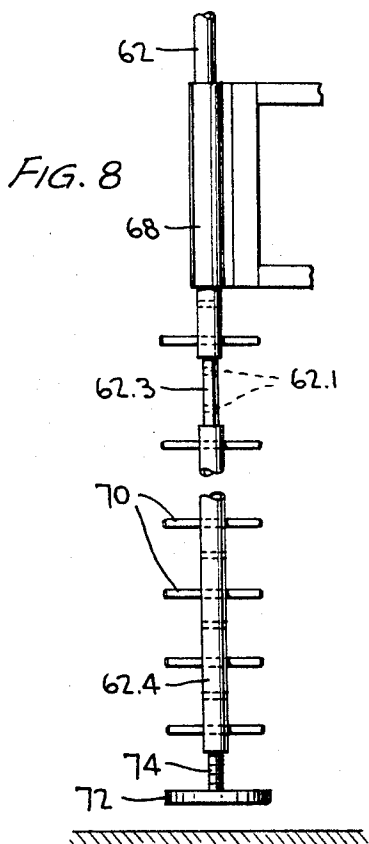
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3 Sheets-Sheet 3



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3,394,776

SUSPENDED TRAVELING SCAFFOLD
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10 Claims. (Cl. 182—36)

ABSTRACT OF THE DISCLOSURE

A traveling scaffold suspended from and movable along tracks of predetermined length which are releasably attached to the roof joists of a building for shifting movement in the direction of their lengths by workers on the scaffold, in successive steps, to thus permit movement of the scaffold throughout the full length of the roof structure. Vertically extensible and contractible standards, each comprising separable upper and lower sections, are guided for relative vertical movement with respect to the scaffold platform, whereby the platform may be hoisted on and supported by the standards for suspension at the desired level from carriages movable along the tracks. The ground engaging ends of the standards are then raised just sufficiently to permit free horizontal movement of the scaffold, while providing a stand-by support for the scaffold platform in the event of failure of the suspension means.

Background of the invention

In the prior art use of scaffolds on building structures, it has been customary to provide stationary scaffold structures in which the scaffold platform is supported for horizontal movement along guide rails as well as for vertical adjustment to various operating levels. In such event, the horizontal movement of the scaffold platform has been limited by the length of the supporting rail or rails from which it is suspended; and, in order to permit its traversal of the entire length or breadth of a building or other structure, it has been necessary to have the supporting rails or tracks co-extensive with the dimensions of the particular building or structure.

Further, such suspended scaffolds, when employed to support workers at substantial heights, have involved a risk of injury to the worker or workers in the event of failure of the scaffold suspension mechanisms.

Further, the erection of the scaffold generally has been required to be carried out without assistance from the platform itself which, being generally the last element to be assembled to the scaffolding, was unavailable for use prior to substantial completion of the scaffolding.

The present invention has been conceived with the foregoing difficulties in mind and accordingly it makes provision for a scaffold structure employing a suspended traveling platform in which the tracks, from which the platform is suspended, are releasably attached to the roof joists or other supporting structure of the building for horizontal movement in the direction of their lengths by workers on the scaffold platform, so that a relatively short track section or sections may be caused to traverse the entire length or width of the building.

To minimize the risk of injury to workers from failure of the suspension means for the scaffold platform, there is provided a novel arrangement of standards depending from the platform with their lower ends terminating merely a sufficient distance above the ground or other supporting surface to permit free horizontal movement of the platform and yet to support the platform from such surface after but a minimum and harmless drop thereof in the event of failure of the platform suspension mechanism.

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A further important feature consists in the double utilization of the above-mentioned standards in combination with the platform itself in a manner such that the platform and standards mutually position each other, the standards being guided for vertical movement with respect to the platform and the platform in turn being guided on the standards as the platform is raised to or lowered from operative position for suspension from the tracks.

In accordance with further novel features of the invention, the standards are each formed in separable sections, telescopically or otherwise interconnected for relative extension and contraction. In the preferred form of the invention, the said telescopically interconnected sections are respectively provided with uniformly spaced transverse openings for the reception of locking pins to secure them in various relative positions; and such pins are of sufficient length to project outwardly horizontally from the standards to serve as the rungs of ladders. In addition, each of the movable tracks is provided with means adjacent one end thereof for automatically coupling said end to a roof joist incident to the advancement of the track in the direction of its length.

Brief description of the drawings

In the accompanying drawings:
FIGURE 1 is a side elevation of a suspended traveling scaffold suspended from the roof joists in a building structure, and shown in broken lines, the movable track advanced to and temporarily supported at its leading end from one of the joists;

FIGURE 2 is a plan section on the line 2—2 of FIGURE 1;

FIGURE 3 is a cross section on the line 3—3 of FIGURE 2;

FIGURE 4 is an enlarged fragmentary view, partly in section and partly in elevation, of a portion of the structure shown in FIGURE 1;

FIGURE 5 is an end elevation of the structure shown in FIGURE 4 as seen from the plane designated by the line 5—5 in FIGURE 4;

FIGURE 6 is an enlarged view, partly in section, illustrating the preferred means for advancing the track from one position to the next;

FIGURE 7 is a sectional view on the line 7—7 of FIGURE 6; and

FIGURE 8 is a fragmentary side elevational view showing how one or more of the supporting and guiding standards for the scaffold structure can be adapted for use as a ladder.

Description of the preferred embodiment

Referring now in detail to the accompanying drawings, a suspended traveling scaffold, in accordance with the preferred embodiment of the invention, is shown in a typical installation wherein it is suspended from the roof structure of a building.

The roof structure, which is shown in part only, comprises among other parts a plurality of uniformly relatively spaced parallel joists 10, all of which normally are disposed in a common horizontal plane well above the level of the horizontal surface S which may designate either the floor of the building or the ground level or sub-grade of a building under construction.

For the purpose of the present description, it will be assumed that the joists 10 are disposed in a direction transversely of or across the width of the roof and are spaced apart uniformly in the direction of its length. Suspended by rail guides 12 from and transversely to the joists are a pair of relatively parallel elongated tracks 14—14 which are preferably longitudinally coextensive with each other and each of a length to extend beneath

at least three of the joists 10, whereby they may cooperate with the rail guides or other suitable suspension means 12 removably affixed or secured to each of the joists.

In its preferred form, each track 14 comprises a rigid member which advantageously may be of aluminum or other light-weight material of generally H cross section. Thus, each track 14 considered in cross section (and as illustrated in FIGURE 5) includes vertical side walls 14.1 interconnected by a medially located horizontal cross piece 14.2. From the upper and the lower edges respectively of each of the vertical walls 14.1, there are provided inwardly opposed oppositely directed flanges 14.3—14.3 and 14.4—14.4 respectively defining horizontal trackways spaced apart to define between them a groove parallel with the length of the track. If desired, these trackways may be reinforced by inwardly directed vertical flanges 14.5—14.5 and 14.6—14.6 at their relatively opposed inner edges, which flanges function also as guides or retainers for the wheels of the carriages hereinafter referred to.

With the arrangement above described, each track 14 is, in effect, divided by the horizontal cross piece 14.2 into upper and lower track sections symmetrical to the cross piece of which the upper track section 14.3—14.3 is adapted for cooperation with the rollers 16 of the rail guides 12, each of which is detachably secured as by releasable clamps 18 to the lower flanges of its roof joist 10 which is here shown in the form of a conventional I-beam.

In the embodiment here shown, each of the guides 12 comprises a beam of generally rectangular cross section, having its major axis disposed transversely to the length of the joist and clamped therebeneath. The upper surface of each guide 12 is formed with an elongated slot extending lengthwise of the beam and defined by opposed downwardly directed vertical flanges 20—20 supported from the top wall of the beam. Each of the relatively opposed clamps comprises a clamp plate 18 fulcrumed at one end on the beam and provided with a positioning stud 18.1 which projects and is movable between the opposed flanges 20—20. For swinging each clamp 18 to bring it into operative engagement with its associated flange of the joist 10, there is provided a bolt 22 extending loosely through an opening in the clamp plate with its head in abutment with the plate and with its lower end threaded through a nut 22.1 which is located within the beam and proportioned to span the slot between flanges 20—20 in a manner such that it abuts the lower edges of the flanges at either side of the slot. If desired, each nut 22.1 is resiliently urged and maintained in raised position against the flanges by means of a spring 24 compressed between the nut and the bottom wall of the guide beam.

It will thus be seen that, by obvious manipulation of the bolts 22, the clamps 18 may readily be released or engaged to support the guides from the beams as desired.

Normally, each track 14 will be supported from at least three such guides 12 at different locations along its length for movement beneath the joists 10 in the direction of its length. The means for thus movably supporting the tracks from the guides comprises, in connection with each guide, a yoke or frame 26 fixedly secured to the lower wall of the guide 12 and depending into the interior of the rail through the upwardly directed slot between its flanges. From this depending portion are journaled pairs of laterally opposed rollers 16 in rolling engagement with the downwardly presented faces of the tracks defined by the upper flanges 14.3—14.3 of each track.

It will thus be apparent that the several sets of rollers 16 thus associated with each track 14 support the latter for endwise movement beneath the joists in a comparatively friction-free manner and with a high degree of safety.

It will be readily apparent that the guides may be posi-

tioned on the respective joists throughout the entire length of the building in accurate alignment with the respective tracks whereby each track, though of a length considerably shorter than the building, may be moved for the entire length of the building.

However, rather than to thus have all joists 10 of the roof structure respectively equipped with such lines of guides, the arrangement of the scaffold mechanism in the present invention is preferably such that each joist may have a guide applied thereto only after the advance or leading end of a track 14 has been advanced to such joists. In order to temporarily support the leading end of the track from each new joist 10, pending the application to such joist of a guide 14, the advance end of each track 12 is provided with a temporary support 28 which, as shown in FIGURES 4 and 5, is substantially in the form of a hook. In the form here shown, there are two such hooks, each hinged to the track at 30 for movement between operative positions as shown, and retracted positions in which they are positioned to pass freely beneath the joists 10. In its operative position, each such member projects above the track in position for reception in its mouth or recess 32 of the adjacent lower flange of the joist as the end of the track moves therebeneath. At this time, it will be seen that the upper and forwardly directed portion of each such hook will ride over the lower flange to support the end of the rail as long as the track is maintained in its forwardly projected position. The opposed supports are releasably interconnected by a bolt 32, or otherwise maintained in their erected operative positions.

With the tracks thus positioned, it will be apparent that the guide 12 at the trailing end of the track may be removed from its associated joist by releasing of its clamps 18—18 and repositioned on the new joist with its rollers operatively received in the leading end of the same track in operative engagement with the lower faces of the flanges. With the guides of both tracks thus positioned, the respective supports 28 may be disengaged from the joists and folded downwardly to inoperative positions in which they do not project appreciably above the track.

For advancing each track 14 to position its leading end at a location beneath a new joist 10 to which it is to be attached, there may, if desired, be provided suitable track advancing mechanism operable by workers on the scaffold platform. As is best shown in FIGURES 6 and 7, such advancing means or mechanism is here exemplified by a drive wheel 34 rotatably supported from the guide in peripheral driving engagement with the track. Preferably the wheel 34 is in the form of a spur gear and the track is provided with a longitudinally extending rack 36 adapted to mesh with the gear in order to secure positive traction. The gear wheel is affixed on a crank shaft 38, the upper end of which is rotatably supported through a vertical bore in a rigid arm 40 welded or otherwise affixed to the guide 12 and projected outwardly from the side wall thereof. The shaft 38 is provided around its upper end portion with a groove 42 for reception of the free end of a set screw 44 which is threaded through the side wall of the arm and is loosely received in the groove to permit free rotation of the crank shaft while preventing its axial displacement. In order to assist in vertically locating the drive gear and rack with respect to each other, there is provided a spacer sleeve 46 between the gear and the arm.

At its lower end, the shaft 38 is provided with a conventional manually actuated crank arm 48. In order to prevent displacement of the lower end of the shaft away from the track, such as would tend to discontinue the engagement of the gear wheel 34 with the rack 36, the lower end portion of the shaft 38 is preferably connected to the track by means of a bracket 50 having a bushing or bearing 52 encircling and rotatably receiving the shaft. This bracket in effect constitutes a slide associated with and movable along the track and to this end is provided

with a vertically projecting guide plate 54 which extends upwardly into the lower track section through the longitudinal slot thereof, being restrained from the vertical displacement as by means of a cross pin 56 extending therethrough and resting on the tops of the vertical flanges 14.6—14.6.

Thus, rotation of the crank 48 in well known manner will act through the driving engagement between the wheel or gear 34 and the track 14 to move the track on its supporting rollers 16 in the direction of the track length, each of the guides being affixed to its supporting joist against displacement in this direction.

The operating crank may conveniently be located at a level for use by a worker on the scaffold platform 60, the platform in such event being restrained against movement with the track, as by being temporarily secured or tethered to one of the joists.

Now considering the structure of the scaffold itself in more detail, it will be seen that the scaffold platform 60 is suspended by the upper sections of the rigid standards 62 from wheeled carriages 64 which are guided for movement in and along the lower track section of each track 14. The carriages 64 thus are disposed for movement with a minimum of frictional resistance along the tracks in the direction of the track length. It will be apparent that the wheels of these carriages are guided for movement along the lower trackways 14.4 thereof, being guided between the upwardly projecting flanges 14.6 and vertical side walls 14.1 respectively.

The horizontal platform 60 of the scaffold may be of any suitable rigid construction, preferably being equipped with marginal railings for safety purposes. A section of these railings may be removable to facilitate entry of personnel and equipment.

For cooperation with the several vertical standards 62, the platform 60 has affixed thereto a plurality of vertical metal guide sleeves 68, each slidably receiving one of the standards and guiding same in a vertical path during relative vertical movement of the platform and standard.

The several standards 62 are of identical construction, each being longitudinally extensible and contractible, as by formation from telescopically interconnected tubular sections.

For supporting the platform at any of various selective levels, the several guide sleeves 68 of the platform and their associated standards 62 respectively are provided with uniformly spaced transverse bores or holes 62.1 and 68.1 respectively therethrough for the reception of transverse locking pins 70. Preferably, these openings or bores extend throughout substantially the entire length of each standard to facilitate interlocking of the telescoping sections of each standard at the desired positions of adjustment by means of pins 70 through each of the uniformly spaced bores, the pins preferably being of sufficient length to project outwardly from opposite sides of the standard and its associated platform sleeves, thus to cooperate with at least one of the standards in defining a ladder which may be conveniently employed by workers for gaining access to and leaving the platform.

As will be readily apparent, the lower portions of the standards depend from the platform and are provided with pedestals 72 having threaded stems 74 operatively received in the lower ends of the bottom sections of the respective standards such that the pedestals can be raised or lowered by rotation together with their threaded stems. When the scaffold platform 60 is operatively positioned, the pedestals 72 at the lower ends of the standards are raised several inches from the supporting horizontal surface S to permit free horizontal movement of the scaffold along the tracks. However, in the event of failure of the suspension means or mechanism, the scaffold platform is permitted to drop only an extremely short distance before the pedestals 72 engage the supporting surface at several laterally spaced points, thus providing a standby support which immediately comes into operation in-

cident to such failure and thus prevents injury to workmen on the scaffold platform.

In order to erect the scaffolding, the tracks 12 are initially positioned beneath and attached to their respective joists 10 through the use of ladders, hoists, or the like, the actual attaching or securing being a quite simple operation due to the necessity only of fastening the clamp members 18 of the guides 12 to the respective joists 10, the guide 12 for each track having been positioned thereon in substantially its intended location before the track is raised to operative position beneath the joists. The several carriages 64 will then be positioned in the lower section of each double track with the upper section of its associated standard depending from each carriage.

The remaining erection operations may be conducted primarily from the supporting surface S in the following manner:

The platform 60 is first supported as by blocks B in horizontal position spaced some ten inches or a foot above the surface S. The lower section of each standard minus the pedestal 72 thereof is then inserted vertically downward through its associated sleeve 68, following which it is threaded a few turns onto the vertical stem of its pedestal which will have been positioned immediately beneath the sleeve. With all of the lower section 62.4 of the standards thus positioned, such sections are connected to the respective upper sections thereof by means of the intermediate sections 62.3 which are telescopically disposed in the lower sections 62.4 but have threaded upper ends for cooperation with internally threaded bores in the lower ends of tubular upper sections 62.2. Thereupon, the scaffold platform may be raised to the desired elevation by conventional hoist means or block and tackle means connected between the platform and either the upper ends of the respective standards or the joists or other portions of the roof structure. The cross pins 70 are then inserted to secure the platform at a fixed level on the standards and to provide fixed connections between the several sections of each standard. The pedestals 72 are rotated a few turns to raise them clear of the surface S, so as to permit horizontal movement of the scaffold platform.

It will be apparent that horizontal positioning and movement of the platform is attained by suitable means such as a hoist of which there is shown a portion of the hoisting cable 76 connected to the platform, it being understood that such cable will be extended around a pulley 78 at a horizontal location such as to achieve movement of the platform in the desired direction. A similar arrangement may obviously be employed to prevent the platform from moving with the tracks during advancement of the latter from one position to the next.

In this application, I have shown and described merely the preferred embodiment of the invention, while recognizing that the invention is capable of other embodiments, and that various of its individual elements may be altered in form, or in some cases omitted, without departing from the invention. Accordingly, the foregoing disclosure is to be considered as merely illustrative of the invention and not as exclusive of other modifications falling within the scope of the appended claims.

Having thus described my invention, I claim:

1. In a building roof structure which includes a plurality of relatively uniformly spaced parallel joists in a common horizontal plane, a horizontal elongated track, means suspending said track beneath and transversely to at least several of said joists for movement in the direction of its length, coupling means at the leading end of said track for automatically engaging a joist to provide a temporary vertical support for said leading end as the latter is moved to said joist, a scaffold platform and means supporting said platform from the track for movement lengthwise of the track.

2. The combination defined in claim 1, wherein said means suspending the track comprise a plurality of guides

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for said track respectively secured to the several joists, rollers carried by the respective guides, said track including a trackway portion cooperatively engaging said rollers whereby to support the track for movement in the direction of its length.

3. The combination defined in claim 2, further including means carried by one of said guides and operable from said platform for advancing the said track beneath said joists in the direction of the track length.

4. The combination defined in claim 3, wherein said means for advancing the track comprises a driving wheel rotatably carried by said one guide in peripheral driving engagement with said track and means for rotating the driving wheel.

5. The combination defined in claim 4, wherein said driving wheel comprises a gear and said track includes a rack secured thereto in meshing relation with the gear.

6. The combination defined in claim 5, which further includes a vertical shaft for said gear spaced from and to one side of said track, said shaft being in driven relation with the gear and means respectively above and below the said gear for rotatably supporting same with its rotational axis in fixedly spaced relation from said track.

7. The combination defined in claim 2, in which said scaffold includes wheeled carriages guided for movement on the said track in a direction lengthwise thereof.

8. The combination defined in claim 2, including a pair of said tracks supported from the joists in relatively spaced parallel relation for movement in the direction of their lengths, a pair of wheeled carriages movable along each track in spaced relation to each other, a

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scaffold platform and means depending from said carriages and supporting the said platform therefrom in a horizontal plane below the tracks.

9. The combination defined in claim 8, in which said means for supporting the platform comprise rigid standards depending from the respective carriages, with the lower terminal ends of said rigid standards respectively in a common horizontal plane spaced just sufficiently above the level of a fixed horizontal supporting surface to provide a stand-by supporting means for the scaffold in the event of disconnection of the scaffold from said tracks.

10. The combination defined in claim 9, in which said scaffold includes a horizontal platform having vertical guide sleeves affixed thereto, said guide sleeves vertically slidably receiving the respective standards, said standards respectively being selectively extensible and contractible in length, means for maintaining said respective standards selectively in any of a plurality of lengths, and means for fixedly supporting the scaffold platform in various selected levels on the respective standards.

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