

March 22, 1966

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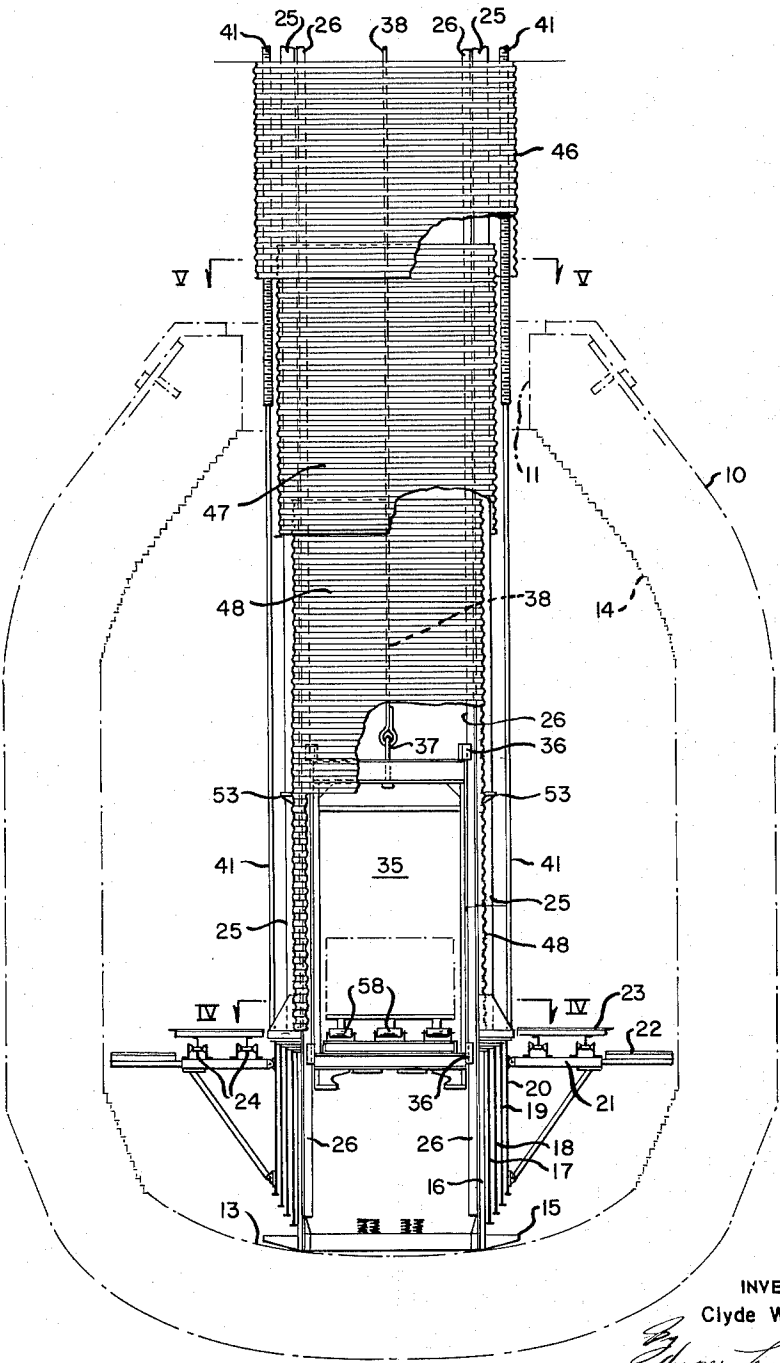
3,241,634

PORTABLE SCAFFOLDS

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3 Sheets-Sheet 1

Fig. 1(a).



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3,241,634

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3 Sheets-Sheet 2

Fig. 2.

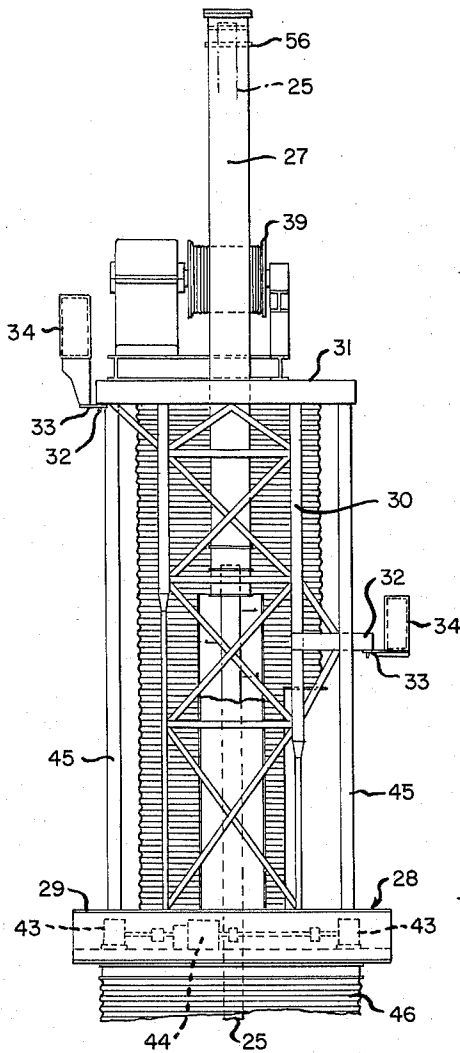
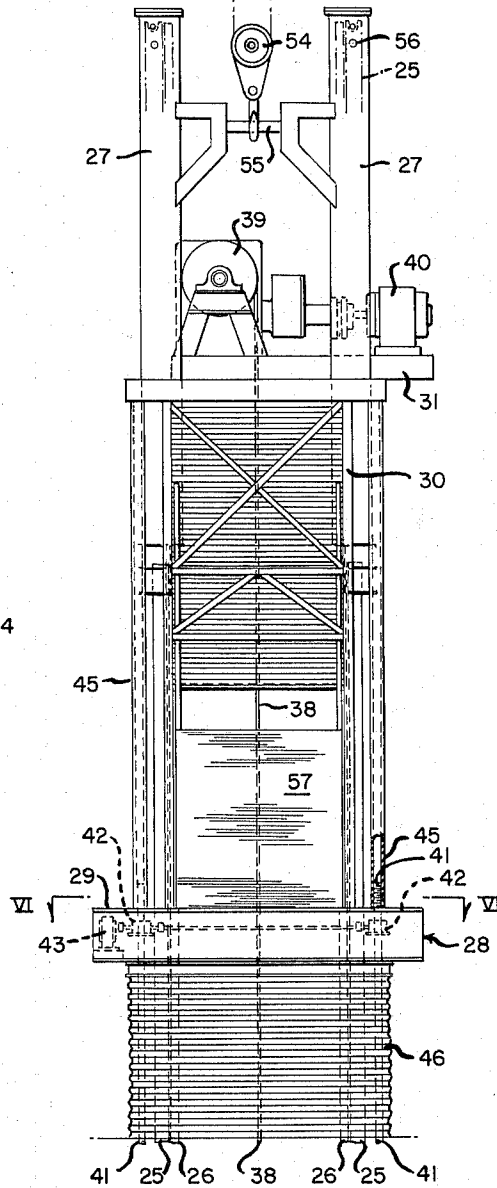


Fig. 1(b).



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Filed Feb. 1, 1965

3 Sheets-Sheet 3

Fig. 6.

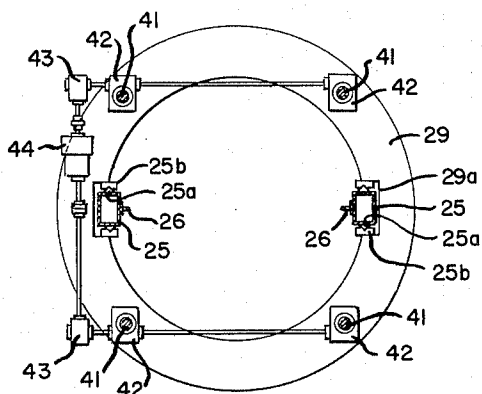


Fig. 5.

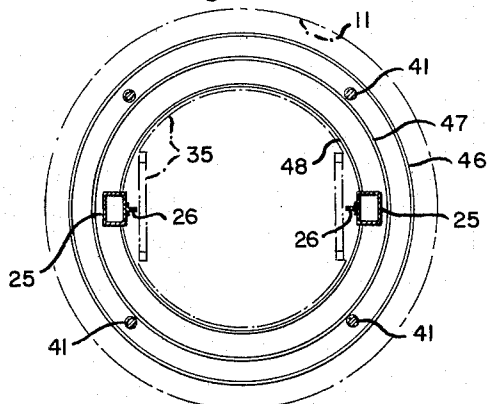


Fig. 4.

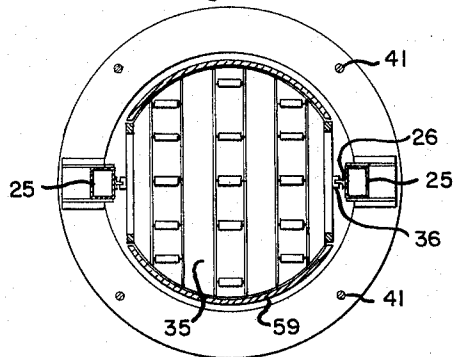
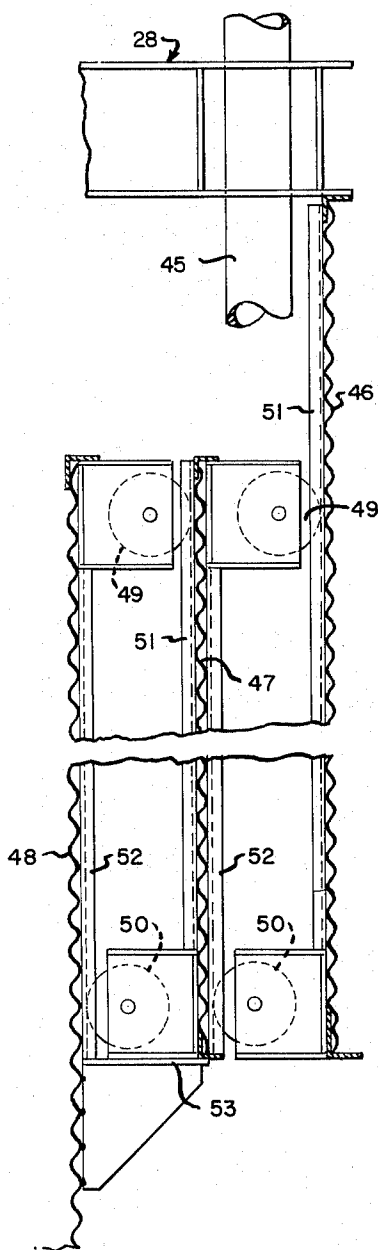


Fig. 3.



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1

3,241,634

PORTABLE SCAFFOLDS

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8 Claims. (Cl. 182-144)

The present invention relates to portable scaffolds and particularly to a portable scaffold structure and elevator device for carrying material to the scaffold as the scaffold is moved within the work and is a continuation-in-part of my co-pending application Serial No. 230,595, now Patent No. 3,168,163, filed October 15, 1962. The invention is particularly directed to scaffolds for use in vessels having an opening smaller than the interior diameter such as is found in the Kaldo furnace, L.D. vessels, Bessemer converters, blast furnaces and the like. These furnaces vary in diameter from top to bottom. The L.D. furnace is typical of such structure. In the L.D. furnace the opening is smaller than the diameter of the furnace intermediate the two ends and at the bottom is again reduced in a truncated cone-like form. The lining of these furnaces creates a very real problem in scaffold structure because of the need for a cantilever construction at the mid-area of the vessel. In the past, this has required continuous scaffolding; first, for the purpose of removing the old lining and then to place the new lining. This required that the scaffold be built and then torn down piece by piece as the old lining was removed and, thereafter, rebuilt piece by piece until the new lining was installed, and then finally torn down piece by piece for final removal. Since these furnaces must be relined frequently, usually after a week's run, this scaffolding problem has become quite expensive and serious. In addition, there is the associated problem of delivering supplies to the workmen and removing debris. This has in the past been done by conventional crane hooks lowering a container through the opening of the furnace down to the scaffold level. The workmen had to be removed in order to safely operate the crane or take the risk of serious injury in any slip occurred in the rigging carrying the materials and supplies.

I have invented a scaffold and elevator structure which overcomes the problems mentioned above and which is simple, inexpensive and readily portable. Preferably I provide a plurality of hollow, elongated scaffold members telescoping within one another, cooperating lock means on the top and bottom of each said member adapted to hold the bottom of one member adjacent the top of the next smaller member in extensible position, support arms hinged at the top of the largest member adapted to be raised to the horizontal position and held there, removable grating means on said arms, vertically extending guide means on the said largest member extending above said member and adapted to receive a cage means movable therebetween, cage means slidably engaging said vertically extending guide means, a plurality of telescoping cover members surrounding said guide means and adapted to rest within one another, one of said cover members being attached to the largest scaffold member extending transversely from the plane of the top end thereof to form with the telescoping members an adjustable elevator shaft, cage means movable within said telescoping guide members surrounding the guide means, a support platform spaced from the largest member of the scaffold members and carrying the cover member remote from the one fixed to the largest scaffold member, extensible means between the largest member of the scaffold members and the support platform whereby the distance between said largest member and said support platform may be selectively adjusted, means on said

2

support platform slidably and guidingly receiving the end of the guide members remote from the largest member and yoke means on the support platform adapted to receive a crane. The scaffold members may take the form illustrated in my Patent 3,058,543, issued October 16, 1962.

In the foregoing general description I have set out certain of the objects, advantages and purposes of my invention. Other objects, purposes and advantages will be apparent from a consideration of the following description and the accompanying drawings in which,

FIGURES 1(a) and 1(b) are side elevations, partly in section of a furnace and scaffold and elevator unit according to my invention with the scaffold in its lowest position;

FIGURE 2 is a side elevation of the support platform viewed from the left of FIGURE 1(b);

FIGURE 3 is a fragmentary vertical section through a section of the telescoped cover member;

FIGURE 4 is a section on the line IV—IV of FIGURE 1(a);

FIGURE 5 is a section on the line V—V of FIGURE 1(b); and

FIGURE 6 is a section on the line VI—VI of FIGURE 1(b).

Referring to the drawings, I have illustrated a furnace 10 of the L.D. type having a truncated top terminating in a reduced opening 11 and a truncated bottom. The furnace is lined with brickwork 14. A scaffold base 15 is adapted to rest on the bottom 13. A plurality of cylinders 16, 17, 18, 19 and 20 are held together by a series of removable pins as described in my Patent 3,058,543 or by equivalent means and telescoped one about the other so as to rest on the base 15. Each of the cylinders 16 through 20 are provided at the top and bottom with cooperating openings at the top and at the bottom through which locked pins may be inserted, all as described in my Patent 3,058,543. The top of the outer cylinder 20 is provided with hinged arms 21 adapted to fold against the sides of the cylinders. These arms when extended are adapted to receive removable grating sections 22 which form a work surface and rotatable work table 23 mounted on rollers 24 adapted to receive pallets of brick. Vertical guide members 25 are mounted on the top of the outer cylinder 20 with a guide rail 26 extending along the inner wall of said guide members 25. The opposite ends of the guide members 25 are received in sleeves 27 mounted on a support platform 28. The support platform 28 is made up of a base 29, a vertical frame 30 and a machinery platform 31. Mounting trunnions 32 are mounted on frame 30 to engage holding members 33 on holding frame members 34 permanently attached to a building structure in which the device is used. A cage 35 is adapted to slide between guides 26 on guide shoes 36. The cage is provided with a lift ring 37 adapted to receive a lift cable 38 which extends from a drum 39 on machinery platform 31. The drum 39 is driven by a motor 40.

The supporting platform is adjustably positioned from the top of the outer cylinder 20 by hanger members 41 threaded at the upper end to threadingly engage rotary nuts 42 on base 29 driven through right angle gear boxes 43 by motor 44 on base 29. Protective tubes 45 are provided over the threaded portion of hanger members 41.

A corrugated cylindrical telescoping cover is provided around the guide members 25 between base 29 and the top of outer member 20 of the telescoping platform. The telescoping cover is made up of an outer cover member 46 fixed to the bottom of the supporting platform. An intermediate cover member 47 is slidably received in outer cover 46. An inner cover 48, twice the length of

cover members 46 or 47, is fixed to the top of outer member 20 of the telescoping scaffold.

The members 46, 47 and 48 are provided with inner rollers 49 and outer rollers 50 rolling on guide strips 51 and 52, respectively, on the inner and outer walls of the cover members. The inner cover member 48 is provided with lift lugs 53 intermediate its length to engage the bottom of intermediate cover 47 to lift it as the lower cover 48 is raised as hereinafter described.

When it is desired to use the scaffold, the scaffold is lowered through opening 11 by a crane hook 54 engaged on lift arm 55 between cylinders 27 until the mounting trunnions 32 are in place on holding members 33 on the holding frame 34. Lock pins 56 are removed from the ends of guide members 25 and cylinders 27. The motor 44 is energized to drive the nuts 42 which in turn lower the hanger members 41 until the base 15 of the scaffold rests on the bottom of the furnace with guides 25 lowered out of cylinders 27 through openings 29a in base 29. The arms 21 are then raised to their extended position as shown in FIGURE 1 and the removable gratings 22 and rotary work table 23 are positioned on the arms 21. The cage 35 is raised by hoist drum 39 to the level of base 29. A loading gate 57 provided in frame 30 and operated by any conventional elevator gate mechanism is opened and work materials such as brick on pallets are loaded onto the cage. In order to facilitate the handling of such pallets rollers 58 may be provided on the floor of the cage. The loading gate is closed and the cage lowered to the level of the top of outer cylinder 20 where gates 59 in cover member 48, operated by any conventional gate operating mechanism, are opened and the load removed from the cage to the rotary work table 23.

When it is necessary to raise the scaffold, the pins between two successive scaffold members, e.g., 16 and 17, are removed, the motor 44 is energized to drive nuts 42 which in turn raise hanger members 41 until the scaffold members are moved to proper position at which time the locking pins are reinserted. The first such raise of scaffold members move only the lower cover member 48. Successive raises, as for example between scaffold members 17 and 18 and 18 and 19 causes the lift lugs 53 to engage the bottom of intermediate cover member 47 to raise it telescopically within outer cover member 46 until the last raise of scaffold completely telescopes member 47 within outer member 46 and the guides 25 within cylinders 27. In this way the elevator guides and cage are always completely enclosed and a fixed guide for the cage always provided. The openings 29a in base 29 provide a firm guiding support in blocks 25b which cooperate with guide strips 25a on guides 25 to center guides 25 as they are raised and lowered so that no deviation in the guides occurs and the cage is provided with a firm operating guide on which to move without any danger of jamming or failure.

In the foregoing specification I have illustrated and described a present preferred embodiment of my invention. It will be understood, however, that this invention may be otherwise embodied within the scope of the following claims.

I claim:

1. A portable scaffold particularly adapted for use in furnaces having an opening smaller than the interior diameter comprising a plurality of hollow elongated scaffold members telescoping within one another, cooperating lock means on the top and bottom of each said member adapted to hold the bottom of one member adjacent the top of the next smaller member in extensible position, support arms hinged at the top of the largest member adapted to be raised to the horizontal position and held there, removable platform means on said arms, vertically extending guide means on the said largest member extending above said member and adapted to receive a cage means movable therebetween, cage means slidably engaging said vertically extending guide means, a plurality of telescop-

ing cover members surrounding said guide means, one of said cover members being attached to the largest scaffold member extending transversely from the plane of the top end thereof to form with the plurality of cover members an adjustable length elevator shaft surrounding the guide means, a support platform spaced from the largest member of the scaffold members and carrying the cover member opposite the one fixed to the largest scaffold member, extensible means between the largest member of the scaffold members and said support platform whereby the distance between said largest member and said support platform may be selectively adjusted, means on said support platform slidably and guidingly receiving the end of the guide members remote from the largest member and yoke means on said support platform adapted to receive a crane hook whereby said assembly of support platform, cover members, guide members and telescoping scaffold members may be lifted from and placed in a furnace.

2. A portable scaffold particularly adapted for use in furnaces having an opening smaller than the interior diameter comprising a plurality of hollow elongated scaffold members telescoping within one another, cooperating lock means on the top and bottom of each said member adapted to hold the bottom of one member adjacent the top of the next smaller member in extensible position, support arms hinged at the top of the largest member adapted to be raised to the horizontal position and held there, removable grating means on said arms, a removable rotatable work table on said arms above the removable grating means, vertically extending guide means on the said largest member extending above said member and adapted to receive a cage means movable therebetween, cage means slidably engaging said vertically extending guide means, a plurality of telescoping cover members surrounding said guide means, one of said cover members being attached to the largest scaffold member extending transversely from the plane of the top end thereof to form with the plurality of cover members an adjustable length elevator shaft surrounding the guide means, a support platform spaced from the largest member of the scaffold members and carrying the cover member opposite the one fixed to the largest scaffold member, extensible means between the largest member of the scaffold members and said support platform whereby the distance between said largest member and said support platform may be selectively adjusted, means on said support platform slidably and guidingly receiving the end of the guide members remote from the largest member, lift means on the support platform raising and lowering the cage means and yoke means on said support platform adapted to receive a crane hook whereby said assembly of support platform, cover members, guide members and telescoping scaffold members may be lifted from and placed in a furnace.

3. A portable scaffold particularly adapted for use in furnaces having an opening smaller than the interior diameter comprising a plurality of hollow elongated scaffold members telescoping within one another, cooperating lock means on the top and bottom of each said member adapted to hold the bottom of one member adjacent the top of the next smaller member in extensible position, support arms hinged at the top of the largest member adapted to be raised to the horizontal position and held there, removable grating means on said arms, vertically extending guide means on the said largest member extending above said member and adapted to receive a cage means movable therebetween, cage means slidably engaging said vertically extending guide means, a plurality of telescoping cover members surrounding said guide means, one of said cover members being attached to the largest scaffold member extending transversely from the plane of the top end thereof to form with the plurality of cover members an adjustable length elevator shaft surrounding the guide means, a support platform spaced from the largest member of the scaffold members and carrying the cover mem-

5

ber opposite the one fixed to the largest scaffold member, extensible hanger means between the largest member of the scaffold members and said support platform whereby the distance between said largest member and said support platform may be selectively adjusted, said hanger means including an elongated threaded member threadingly engaged in rotatable nut means on the support platform, drive means for rotating said nut means, means on said support platform slidably and guidingly receiving the end of the guide members remote from the largest member, lift means on the support platform raising and lowering the cage means and yoke means on said support platform adapted to receive a crane hook whereby said assembly of support platform, cover members, guide members and telescoping scaffold members may be lifted from and placed in a furnace.

4. A portable scaffold particularly adapted for use in furnaces having an opening smaller than the interior diameter comprising a plurality of hollow elongated scaffold members telescoping within one another, cooperating lock means on the top and bottom of each said member adapted to hold the bottom of one member adjacent the top of the next smaller member in extensible position, support arms hinged at the top of the largest member adapted to be raised to the horizontal position and held there, removable grating means on said arms, vertically extending guide means on the said largest member extending above said member and adapted to receive a cage means movable therebetween, cage means slidably engaging said vertically extending guide means, a plurality of telescoping cover members surrounding said guide means, one of said cover members being attached to the largest scaffold member extending transversely from the plane of the top end thereof to form with the plurality of cover members an adjustable length elevator shaft surrounding the guide means, a support platform spaced from the largest member of the scaffold members and carrying the cover member opposite the one fixed to the largest scaffold member, extensible means between the largest member of the scaffold members and said support platform whereby the distance between said largest member and said support platform may be selectively adjusted, means on said support platform slidably and guidingly receiving the end of the guide members remote from the largest member, yoke means on said support platform adapted to receive a crane hook whereby said assembly of support platform, cover members, guide members and telescoping scaffold members may be lifted from and placed in a furnace and fixed hanger means above the furnace removably receiving the support platform to support the scaffold within the furnace.

5. A scaffold as claimed in claim 3 wherein the means on the support platform receiving the end of the guide members includes closed cover members, said cover members having locking means engageable in the ends of the guide members to lock said guide members against movement.

6

6. A scaffold as claimed in claim 3 wherein the telescoping cover members are provided with rollers therebetween spacing said members apart for free movement.

7. A scaffold as claimed in claim 5 wherein the closed cover members are cylinders and the locking means is a pin removably extending through the cylinders and the end of the guide members therein.

8. A portable scaffold particularly adapted for use in furnaces having an opening smaller than the interior diameter comprising a plurality of hollow elongated scaffold members telescoping within one another, cooperating lock means on the top and bottom of each said member adapted to hold the bottom of one member adjacent the top of the next smaller member in extensible position, support arms hinged at the top of the largest member adapted to be raised to the horizontal position and held there, removable grating means on said arms, vertically extending guide means on the said largest member extending above said member and adapted to receive a cage means movable therebetween, cage means slidably engaging said vertically extending guide means, a plurality of telescoping cover members surrounding said guide means, the smallest in diameter of said cover members being attached to the largest scaffold member and extending transversely from the plane of the top end thereof to form with the plurality of cover members an adjustable length elevator shaft surrounding the guide means, said smallest diameter cover member being longer than the remaining members by an amount substantially equal to the height of the cage, a support platform spaced from the largest member of the scaffold members and carrying the largest diameter cover member of the telescoping cover members, extensible means between the largest member of the scaffold members and said support platform whereby the distance between said largest member and said support platform may be selectively adjusted, means on said support platform slidably and guidingly receiving the end of the guide members remote from the largest member and yoke means on said support platform adapted to receive a crane hook whereby said assembly of support platform, cover members, guide members and telescoping scaffold members may be lifted from and placed in a furnace.

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