

June 14, 1955

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POWER SCAFFOLDS

2,710,418

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2 Sheets-Sheet 1

Fig. 1

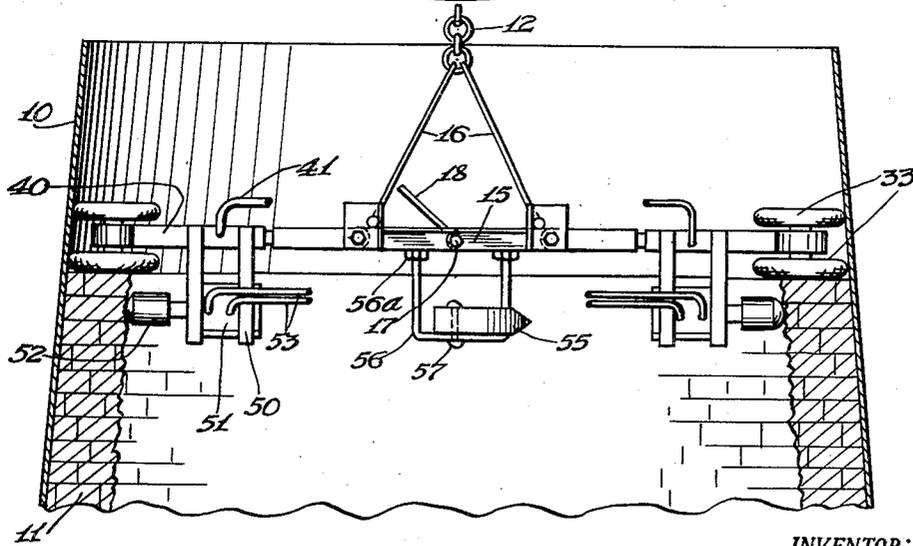
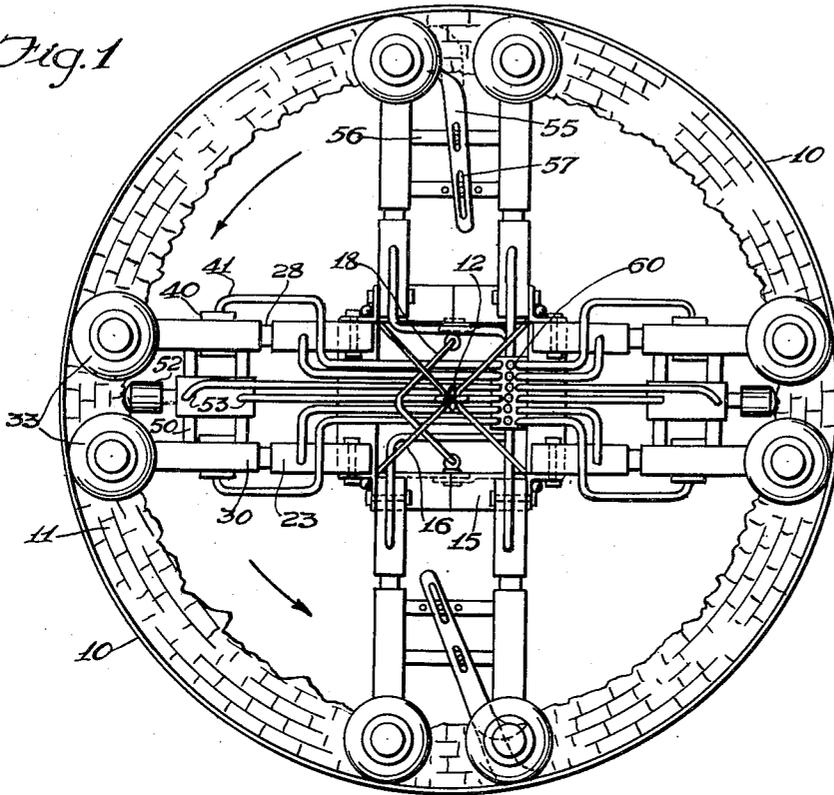


Fig. 2

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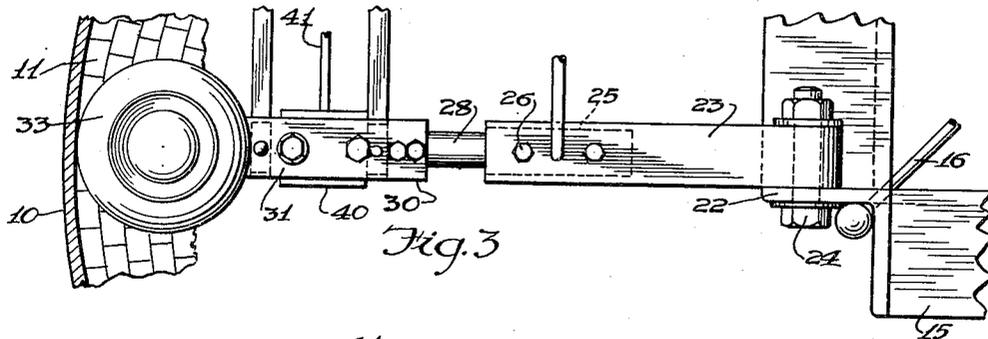


Fig. 3

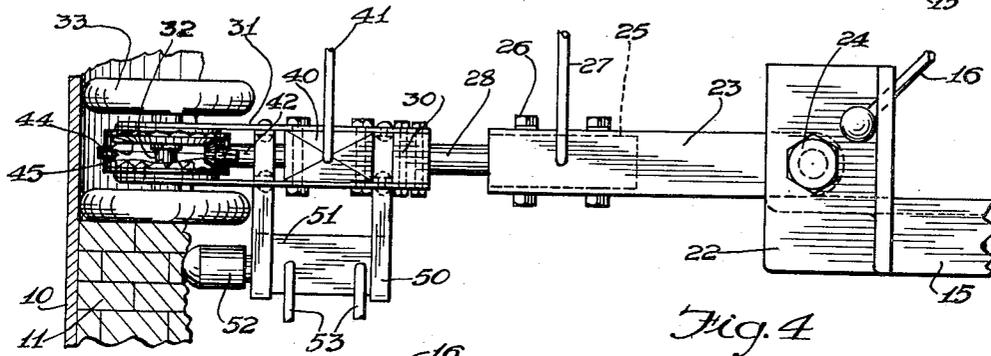


Fig. 4

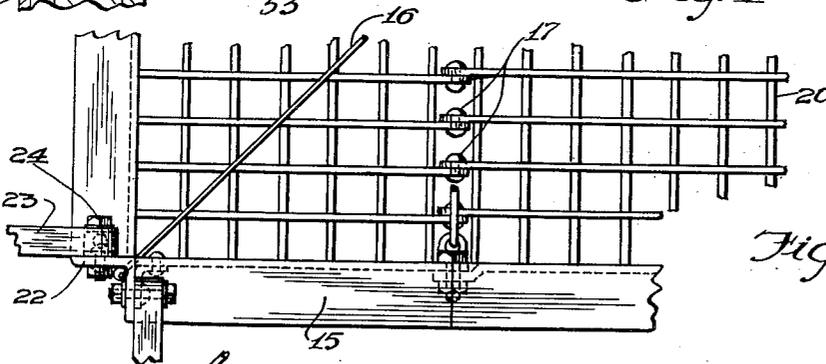


Fig. 5

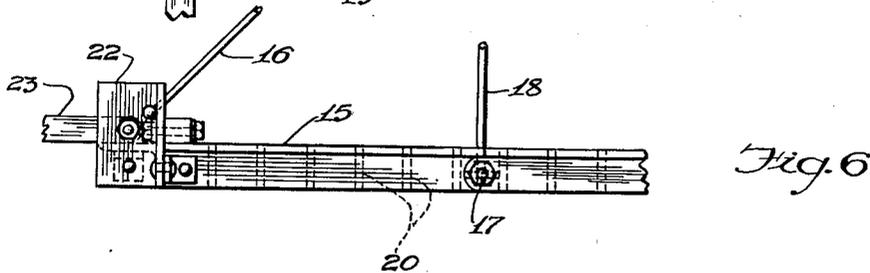


Fig. 6

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2,710,418

POWER SCAFFOLDS

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13 Claims. (Cl. 15—104.07)

My invention relates to the removal of brick or masonry linings of circular structures, such as smokestacks, blast furnaces, tanks and the like, when such linings have become worn, cracked or badly burned. Ordinarily, manual labor is employed for such removal, and a scaffold is lowered into the structure with men using sledge hammers and other tools to break down the lining, the scaffold being lowered further from time to time. In many cases, the task of lining removal is a formidable one, requiring the use of many laborers over a considerable period of time, so that the job is a slow and expensive one.

In view of the above conditions, it is one object of the present invention to provide a scaffold which carries a series of power-operated appliances which are controllable by a single operator standing on the scaffold to accomplish the removal of the brick or masonry efficiently and expeditiously.

A further object is to design a scaffold of the above character which may be lowered by a crane or other suitable means into the top of the circular structure and adjusted to descend from time to time and to be foldable for easy removal when the job has been finished.

Another object is to design a scaffold structure which has means for delivering a succession of hammer blows against the brick or masonry and means for travelling from time to time in order to distribute the hammer blows in a horizontal path around the work.

An additional object is to incorporate a set of scraping elements which detach brick which has been loosened by the hammer blows, so that such brick may fall away and permit access of the hammer elements to deeper layers of the work.

A still further object is to construct the novel scaffold with operative units which follow well established principles of mechanics.

With the above objects in view, a better understanding of the invention may be had by reference to the accompanying drawings, in which —

Fig. 1 is a top plan view of a circular structure in which the scaffold has been lowered to a partial extent, a grating detail of the scaffold platform being omitted for the sake of clarity;

Fig. 2 is a vertical section of the showing in Fig. 1 and limited to the zone in which the scaffold is active;

Fig. 3 is an enlargement of the left-hand portion of Fig. 1 just below center, showing one operative unit of the scaffold;

Fig. 4 is a front elevation of the showing in Fig. 3, with portions illustrated in greater detail than is practicable in the smaller illustration in the left-hand portion of Fig. 2;

Fig. 5 is an enlarged duplication of a fragment just below the central portion of Fig. 1, illustrating the grating previously mentioned; and

Fig. 6 is a front elevation of the showing in Fig. 5.

In accordance with the foregoing, specific reference to the drawings indicates the smokestack, tank or other

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circular structure at 10. The brick lining of the structure is shown at 11, and Fig. 2 shows that a portion of the same in the top of the structure 10 has been removed. The novel scaffold is shown positioned above the remaining portion of the lining, and the scaffold is lowered from time to time as brick from such portion is broken up and cleared away.

The scaffold in the present environment is suspended by a chain 12 or other suitable tackle from a crane or other conventional lowering mechanism which need not be shown or described. Fundamentally, the scaffold is in the form of a platform 15 from whose sides rise suspension bars 16 which are linked to the chain 12, as shown in Fig. 2. The platform is in two sections which are hinged at the middle, as indicated at 17, in a manner to fold when the platform is raised by means of a bail 18. Thus, when the scaffold has completed the brick removal job ending at the bottom of the structure 10, the lifting tackle is applied to the bail 18 for the folding of the platform, in order that the controlling instrumentalities of the scaffold may become gathered and enable the scaffold to be lifted out of the circular structure with dispatch.

Fig. 5 shows that the surface of the platform is in the form of a grating 20 in order to simplify the platform and permit light to pass through the same into the lower region of the work. The platform is formed with angle bars 22 at the corners to permit the application of the operative units. One such unit is illustrated in Figs. 3 and 4 and originates with a housing 23 which is bolted to a flange of the angle bar 22, as indicated at 24. The housing 23 incorporates an air cylinder 25 secured by bolts 26 or other suitable means, a compressed air feed conduit 27 leading into the cylinder to operate a plunger 28 in outward direction. The plunger 28 is formed with a carriage 30 from which journals 31 project for a cross-shaft 32 carrying a pair of rollers 33 at its ends. Fig. 2 shows that these rollers are in engagement with the wall of the smokestack 10. The operative unit just described is duplicated on four sides of the platform 15, as shown in Fig. 1. Therefore, with the rollers 33 applied as stated, it may be assumed that the platform and units are rotatable in a horizontal plane around the inside of the smokestack; and by controlling the air pressure, the engagement of the rollers may be maintained with a desired pressure or in a wider circle as the scaffold is lowered from time to time and meets the widening wall of the smokestack.

Means are provided to rotate the scaffold as just mentioned, such means originating with a rotary air motor 40 forming part of the carriage 30. Such motor receives a compressed air feed conduit 41 and secures the rotation of a shaft 42 in the zone between the rollers 33. Here, the shaft enters a gear box 44 in which a set of bevel gears 45 procures the rotation of the roller shaft 32. Thus, by applying pressure in the feed line 41, the lateral travel of the rollers 33 along the wall of the smokestack is induced, such as from an area where the brick removal has been finished to an adjacent area where it is to be continued.

The carriage 30 has attached to it a hanger 50 which carries a pneumatic motor 51 for operating an air hammer 52, feed and outlet connections 53 to the motor being provided. It is thus apparent from Fig. 4 that the air hammer may be operated at will to break down a brick area just below the roller assembly 33; and that the latter may be operated to move the air hammer over to the next area for a similar operation.

It is apparent from Fig. 1 that a set of diametrically opposed operative units—the horizontal ones—carries the air hammers 52. The other set carries a pair of scrapers 55 on hangers 56, the scrapers being adjustable

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radially along these as indicated at 57 or in any other suitable manner. The scrapers are pointed in the direction of the scaffold rotation, as indicated by arrows in Fig. 1; and their function is to loosen and separate layers of brick which have been knocked loose by the air hammers 52, so that such layers may drop into the lower portion of the smokestack. The hangers are attached by suitable couplings 56a to make the hangers easily detachable from the platform sections.

Fig. 1 shows a network of the air conduits which lead from the platform to the various elements of the operative units; and a row of control levers 60 is indicated between the conduits and in a location of access to the operator of the scaffold. It is thus apparent that the latter may be first lowered on the smokestack in a position to apply the air hammers 52 to the topmost layers of brick, so that a clearance is formed by the demolition of the same for the scaffold to enter the smokestack and assume a position such as shown in Fig. 2. It is understood that, as the smokestack widens, the proper controls will be operated to extend the radial position of the operative units, whereby to utilize the inner side of the smokestack wall 10 as a guide for the horizontal rotation of the scaffold. As previously mentioned, the latter is designed to be folded by a lift of the bail 18 after the brick-removing job has been completed. In such event, the hangers 56 for the scraper may be detached from the carriages 30 in order to permit the folding action of the platform. The operative units may also be detached by the removal of the bolts 24 and uncoupling the air conduits to facilitate the raising and removal of the apparatus; and it is preferable, when the next job is taken on, to first lower the platform into the structure, and then attach the operative units and air conduits.

It is now apparent that the novel scaffold constitutes a machine which to all intents and purposes eliminates the conventional arduous task of removing brick or masonry linings from smokestacks and other circular structures by manual labor. Thus, instead of requiring a considerable number of men to work from an ordinary scaffold with hand tools, and consume many hours or even days to complete the job, the present apparatus merely requires one man on the platform to work the controls of the operative units and another man above to operate the lifting tackle. A tremendous saving in time and labor is thus accomplished, lending the apparatus a high degree of efficiency.

While I have described the invention along specific lines, various minor changes or refinements may be made therein without departing from its principle, and I reserve the right to employ all such changes and refinements as may come within the scope and spirit of the appended claims.

I claim:

1. A scaffold for the progressive removal of fire-brick linings in round smokestacks and the like, comprising a platform adapted to be lowered into the smokestack, air hammers projecting laterally from the platform and operative against the firebrick, means in the platform for controlling said air hammers, and means for rotating the platform in a horizontal course.

2. A scaffold for the progressive removal of firebrick linings in round smokestacks and the like, comprising a platform adapted to be lowered into the smokestack, air hammers projecting laterally from the platform and operative against the firebrick, means in the platform for controlling said air hammers, means for rotating the platform in a horizontal course, and scrapers carried by the platform and engageable with firebrick loosened by the air hammers to dislodge and remove such firebrick.

3. A scaffold for the progressive removal of firebrick linings in round smokestacks and the like, comprising a platform adapted to be lowered into the smokestack, air hammers projecting laterally from the platform and operative against the firebrick, means in the platform for

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controlling said air hammers, means for rotating the platform in a horizontal course, said air hammers being carried by the platform on opposite sides in diametrical relation to the smokestack, and scrapers carried by the platform similarly to the air hammers and at points between the latter, such scrapers being engageable with firebrick loosened by the air hammers to dislodge and remove such firebrick.

4. A scaffold for the progressive removal of firebrick linings in round smokestacks and the like, comprising a platform adapted to be lowered into the smokestack, air hammers projecting laterally from the platform and operative against the firebrick, means in the platform for controlling said air hammers, and means for guiding the platform for rotation in a horizontal course along the inner wall of the smokestack.

5. A scaffold for the progressive removal of firebrick linings in round smokestacks and the like, comprising a platform adapted to be lowered into the smokestack, air hammers projecting laterally from the platform and operative against the firebrick, means in the platform for controlling said air hammers, outward extensions of the platform in a horizontal plane, and horizontal rollers carried by the extensions, the platform being rotatable in said plane with guidance by said rollers along the inner wall of the smokestack.

6. A scaffold for the progressive removal of firebrick linings in round smokestacks and the like, comprising a platform adapted to be lowered into the smokestack, air hammers projecting laterally from the platform and operative against the firebrick, means in the platform for controlling said air hammers, outward extensions of the platform in a horizontal plane, horizontal rollers carried by the extensions, the platform being rotatable in said plane with guidance by said rollers along the inner wall of the smokestack, and means carried by the extensions to rotate the rollers and cause the platform to be rotated as stated.

7. A scaffold for the progressive removal of firebrick linings in round smokestacks and the like comprising a platform designed to be lowered into the smokestack, and a series of operative units projected outwardly from the platform in the direction of the smokestack inner wall, each unit comprising a housing containing an air-operated plunger, a carriage supported by the plunger, a horizontal roller assembly applied to said inner wall and carried by a cross-shaft, a journal for the latter extended from the carriage, an air-operated motor in the latter, a shaft and gearing between the motor and cross-shaft to rotate the latter and cause said rollers to travel along said inner wall, rotating the platform accordingly, and means attached to the carriage for breaking the lining loose.

8. A scaffold for the progressive removal of firebrick linings in round smokestacks and the like comprising a platform designed to be lowered into the smokestack, and a series of operative units projected outwardly from the platform in the direction of the smokestack inner wall, each unit comprising a housing at the inner end of each unit and containing an air-operated plunger, a carriage supported in outward direction by the plunger, a horizontal roller assembly applied to said inner wall and carried by a cross-shaft, a journal for the latter extended from the outer portion of the carriage, an air-operated motor in the carriage, a shaft and gearing between the motor and cross-shaft to rotate the latter and cause said rollers to travel along said inner wall, rotating the platform accordingly, and means attached to the carriage for breaking the lining loose.

9. The structure of claim 7, said means comprising an air hammer suspended from the carriage.

10. The structure of claim 7, said units being removably attached to the carriage.

11. The structure of claim 7, said units being projected in companion pairs.

12. The structure of claim 7, said platform being sub-

stantially square, and said units being projected in companion pairs from each side of the carriage.

13. A scaffold for the progressive removal of firebrick linings in round smokestacks and the like which increase in diameter on the way down, comprising a platform adapted to be lowered into the smokestack, air hammers projecting laterally from the platform and operative against the firebrick, means in the platform for controlling said air hammers, and means to advance the hammers outwardly to meet the widening firebrick lining when the scaffold is lowered.

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