

Nov. 8, 1927.

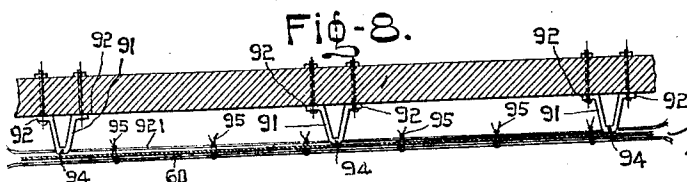
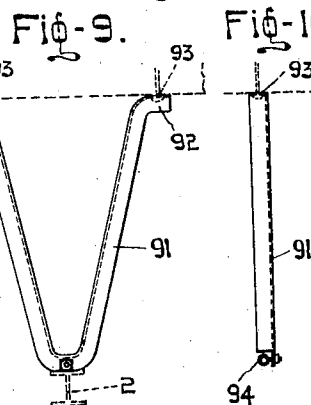
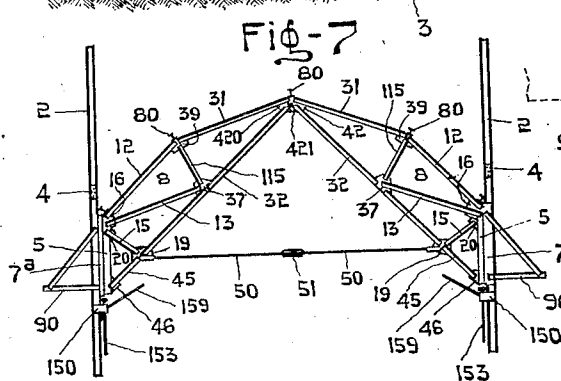
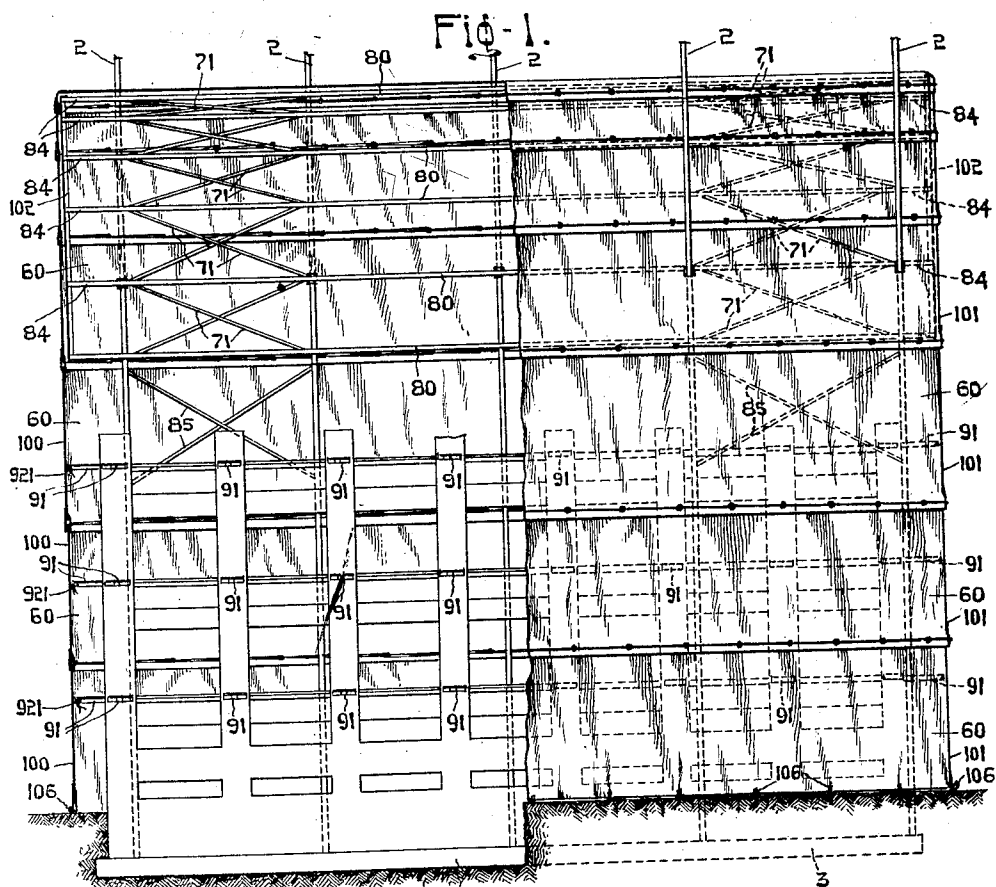
1,648,724

F. W. DAKIN

BUILDING INCLOSURE

Filed April 28, 1925

4 Sheets-Sheet 1



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4 Sheets-Sheet 2

FIG-2.

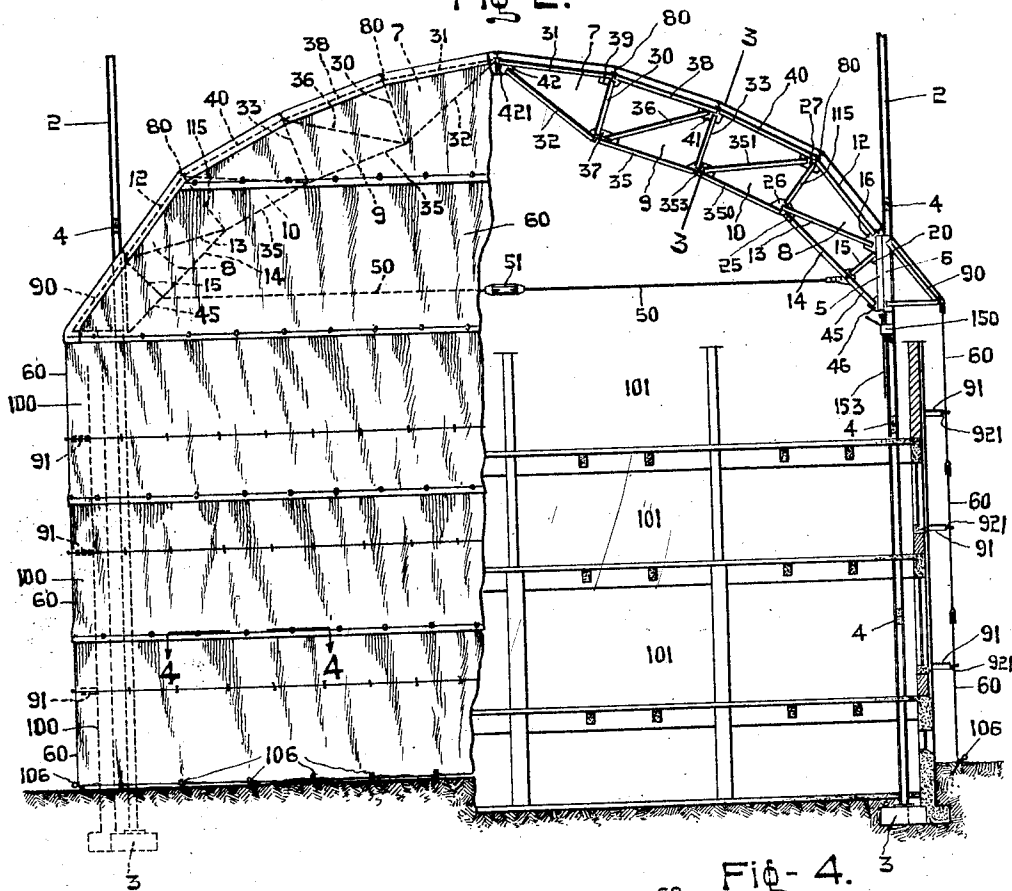


FIG-4.

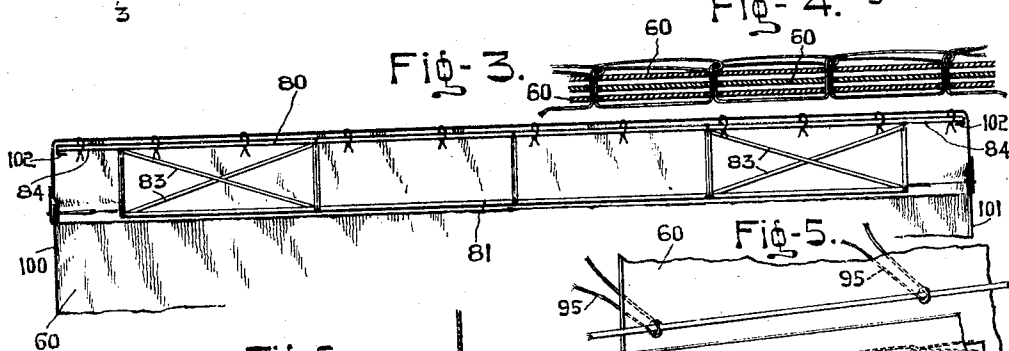


FIG-3.

FIG-5.

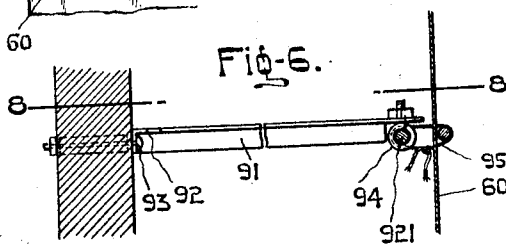
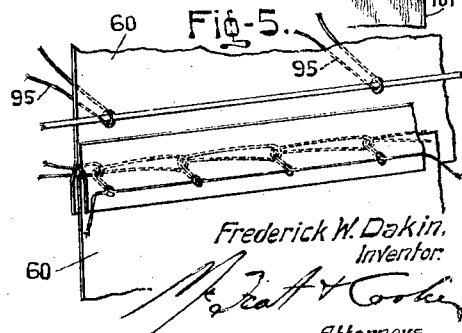


FIG-6.



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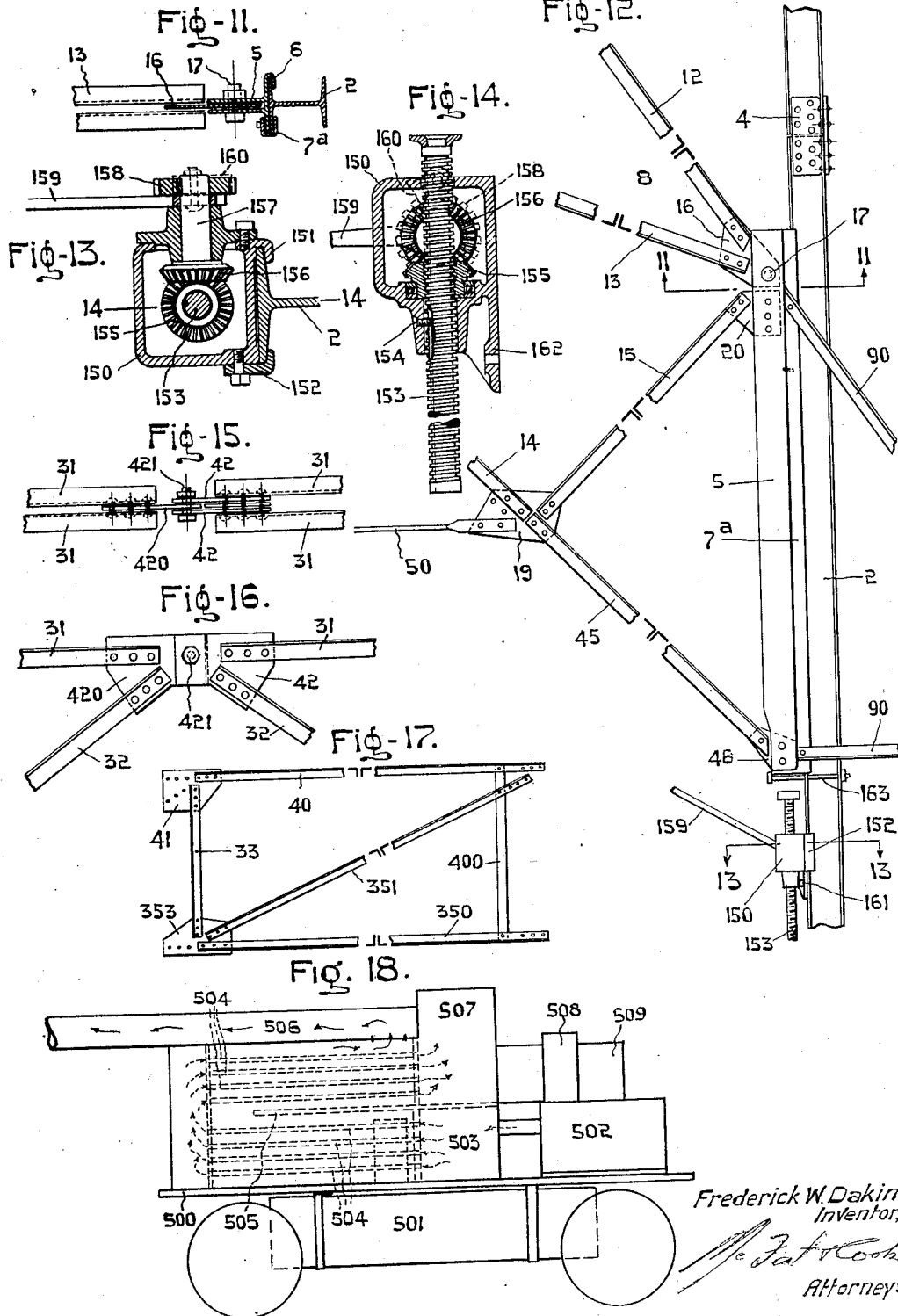
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BUILDING INCLOSURE

Filed April 28, 1925

4 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE.

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BUILDING INCLOSURE.

Application filed April 28, 1925. Serial No. 26,380.

My invention relates particularly to the protection of the men, material and implements, etc., employed in the erection of buildings, against damage from the weather.

5 Heretofore it has been the practice of contractors to hang canvas sheeting over the window openings and fresh work during the erection of buildings. Although this is the method in common use for the protection of buildings, etc., during erection
10 nevertheless the advantage is almost negligible. It has been proposed, though without beneficial result, to employ the steel frame of a building in the course of erection to
15 support the inclosing material, and this frame is incorporated in the walls of the building as they are built up or molded. This precludes the possibility of a portable inclosure complete in itself and capable of
20 being used successively in the erection of a number of buildings. It has also been suggested to erect a sectional canvas cover to form a temporary inclosure for the ruins of a building partially destroyed by fire and
25 where a part of the four walls and foundation are left. Or it may be applied to a building in the course of erection. The idea involves the use of uprights fastened to the wall remnants, and with ropes and the
30 canvas sections which are united in a large canopy. This canopy is supported so as to cover the lower floors while rebuilding is carried on, or in the case of a new building, while the erection proceeds. These ideas
35 have failed to obtain the desired results principally because the ideas could be applied only where a building was partly erected.

According to my invention I provide a
40 building of knock-down form with side and end walls and roof. This building is set up on the ground where a permanent building is to be erected. Its area may be either slightly less than that required for the permanent building or slightly greater so long
45 as its uprights will be in close proximity to the walls being erected. These uprights are in the form of extensible columns which carry frames adapted to be adjusted vertically thereon. The frames carry the ends
50 of transverse arches which are variable in length to accommodate buildings of different widths; while bracing and purlins unite the arches, and the ends of the purlins extend beyond the ends of the buildings to
55 provide supports. The arches, bracing and

purlins serve as the roof frame. Canvas curtains cover the roof from the longitudinal middle line of which they extend laterally and hang down to the ground at each side
60 of the building; and curtains hang down from a rod carried by the projecting ends of the purlins. Top and auxiliary brackets are provided to space the curtains outwardly from the uprights so as to accommodate the
65 walls being erected. This inclosure is an effective protection against any kind of weather and may be supplemented with heaters during the winter season. If desired the inclosure may be designed to have
70 its columns stand outside of the area intended for the building, in which case the top brackets may be dispensed with and the curtains anchored directly to the columns, the latter in this case being braced by the
75 auxiliary brackets.

For full comprehension, however, of my invention reference must be had to the accompanying drawings in which similar reference characters indicate the same parts
80 and wherein:

Figure 1 is a side elevation partly in section of my improved inclosure;

Figure 2 is an end elevation also partly
85 in section;

Figure 3 is a longitudinal sectional view of the roof on line 3-3 Figure 2;

Figure 4 is a sectional view taken on line 4-4 Figure 2;

Figure 5 is a detail fragmentary view of
90 the adjacent edges of two canvas sections illustrating the manner in which they are fastened together;

Figure 6 is a detail view illustrating the method of fastening the canvas to the
95 building when the walls of the building are erected outside the columns;

Figure 7 is a detail view of a pair of columns and a vertically adjustable arch frame
100 mounted thereon;

Figure 8 is a sectional view taken on line 8-8 Figure 6 and drawn to a smaller scale;

Figures 9 and 10 are detail views of the canvas-fastening brackets;

Figure 11 is a sectional view taken on line
105 11-11 Figure 12;

Figure 12 is a detail view of the adjustable mount for each arch frame;

Figure 13 is a sectional view taken on line
110 13-13 Figure 12;

Figure 14 is a sectional view taken on line 14-14 Figure 13;

Figures 15 and 16 are detail views of the fastening between the two middle panels of each arch frame;

Figure 17 is a detail view of one of the intermediate panels of each frame;

Figure 18 is a side elevation of the portable heat generator;

Figure 19 is an elevation illustrating a modified form of fastening the canvas in place;

Figure 20 is a part elevation and part sectional view illustrating the fastening means disclosed in Fig. 19; and

Figures 21 and 22 are detail views of one of the brackets for fastening the canvas in place.

In the preferred embodiment of my invention I employ a knock-down frame constructed of columns 2 standing on concrete bases 3 on the floor of the excavation for the basement of the building to be erected and within the boundary of the area of that building. These columns are arranged in pairs at opposite sides, one at each side of the building, and they are preferably constructed of I-beams in comparatively short lengths united by plates 4. A vertically adjustable frame is carried by each column and is illustrated in detail in Figures 11 and 12. Each frame consists of a member 5 of T-cross section, one cross arm of which is bent as at 6 around one flange of the column and the opposite arm is provided with a U-bar 7^a bolted to the arm of the member 5 and clasping the other flange of the column. In this manner a sliding engagement is effected between the frame and column. The sliding frames on each pair of the opposite columns carry between them a transverse arch. There are therefore as many transverse arches as there are columns along each side of the projected building.

The several arches are the same in all respects and each is a three-hinge arch structure. Each consists of a series of panels composed of middle panels 7 and end panels 8 between which in the present embodiment of my invention a pair of intermediate panels 9 and 10 are located. These intermediate panels are removable to reduce the length of the arch and may be exchanged for other panels of different length or have additional intermediate panels inserted in the arch to increase its length to accommodate a wider building. Each end panel is composed of a top chord 12, bottom chord 13, and a radial member 115, the chords being connected to the frame 5 by a plate 16 to which these members are riveted while the plate is connected to the frame 5 near its top by a hinge pin 17 to permit this panel to be moved to different angular positions relatively to the remainder of the arch to accommodate the lengthening or shortening of the latter. The upper end of the brace 14

is detachably connected preferably by bolts 25 to a gusset plate 26 to which the lower end of the radial member 115 is connected, the upper end of which is connected to a plate 27 to which the upper end of the top chord 12 is also connected. The middle panel 7 consists of a radial member 30, a top chord 31 and a bottom chord 32. This radial member 30 is common to the middle panel 7 and one of the intermediate panels 9 as the radial member 115 is also common to the intermediate panel 10 and the end panel 8. The panels 9 and 10 each includes a radial member 33 common to both. The radial member 30 is connected to the chord 32 and the bottom chord 35 of the intermediate panel 9 and the brace 36 of this intermediate panel, by a gusset plate 37; while the upper end of this radial member as well as the top chord 31 of panel 7 and the top chord 38 of panel 9 are connected together by a gusset plate 39. The lower end of the chord 38, the upper end of the brace 36, the upper end of radial member 33 and the upper end of the top chord 40, of panel 10, are connected together by a gusset plate 41. The adjacent ends of the bottom chords 35 of panel 9 and 350 of panel 10 and the lower ends of brace 351 of panel 10 and radial member 33 are united by a gusset plate 353. The upper ends of the top chords 31 of the middle panels 7 are united at the middle of the arch by a pair of plates 42 and 420 to which the upper end of the bottom chord 32 is also connected. The plate 42 is double with a spreader piece between its parts, and the plate 420 is engaged between these parts, a hinge pin 421 uniting the halves of the arch. The arch thus constructed has its halves held together by a tie-rod 50, the slack of which may be taken up by a turn buckle 51. This tie-rod is connected to the frames by ties 15 and 45 connected at their opposite ends to plates 20 and 46 respectively, the latter being secured to the frames 5. A brace 14 stiffens the connection between the panel 8, frame 5 and the tie rod. The roof frame is stiffened by vertical bracing formed of purlins 80 extending throughout the length of the roof and serving to stiffen the top chords of the arches to which they are connected, strut-bracing 81 between the bottom chords of the arches and diagonal bracing between the two arches at each end of the structure. Diagonal horizontal bracing 71 completes the stiffening of the structure. Each arch is so designed that the panel points which are located between the ends of the adjacent top chords 31, 38, 40 and 12 and at the center of the arch, all lie on the circumference of a circle, and the members 30, 33 and 115 lie on radii of that circle and are of the same length. It is for this reason that the intermediate panels are interchangeable with each

other or with shorter panels to obtain an exact adjustment of the span of the arch as may be required.

The purlins 80 project as at 84 about six feet, more or less according to requirement, beyond the front and rear arches for a purpose to be presently described. These purlins are preferably of a length to extend from arch to arch except the end ones which project beyond the end arches. The upper portion of the columns carrying the relatively braced arches are also relatively braced by diagonal bracing 85.

In order to adapt the panels to be separately handled and stored the chords and brace of each of them except the end ones are tied together in fixed relation by an iron strap 400 at one end of each of these panels, the other end including a fixed radial member. The panels may be of various lengths to suit requirements. In practice I prefer to provide my building inclosure in convenient length or sizes for handling, and to this end the panels of the arches are independent sections, and are so stored.

According to this embodiment of my invention the erection of the walls of the building takes place outside the columns. To accommodate and at the same time protect the work and workmen and to also present an efficient protection against the elements, whatever may be the relation of the inclosure to the building being erected, a canvas sheet 60 or a sheet of like material, of sufficient length to form a cover for the roof and curtains is attached to the purlins 80 and hangs over the opposite sides of the building. This canvas is preferably constructed in sections of suitable dimensions as illustrated in Figure 2, and the sections are fastened together as illustrated in Figures 4 and 5, the edge of one section being of pocket-form to receive the adjacent edge of the other section and the two being fastened together by what is commonly known as "Dutch lacing". In the case, as illustrated in the drawings, where the work goes on outside of the columns I provide the necessary accommodation there by a series of top brackets in the form of angle frames 90 fastened to the upper and lower ends of the sliding frames 5 and projecting out sufficiently to clear the work, workmen and any structures to implement the work, such as scaffolding for instance. These top brackets are supplemented by auxiliary brackets 91 bolted to the wall of the building. Each of these auxiliary brackets consists of a length of angle-iron bent to V-form with out-turned ends 92 having bolt-holes 93, while the apex is flattened and provided with a ring-bolt 94. Ropes 921 are strung through these eye-bolts and extend around the structure. The curtains are connected to these ropes by cords 95 attached to the curtains. In the case of a building erect-

ed with the columns outside the walls of the building the auxiliary brackets which are mounted on the wall of the building being erected, are connected at their outer ends to the columns, as shown in dotted lines in Figure 9.

In order to complete the inclosure of the building being erected front and rear curtains 100 and 101 are suspended from angle irons carried by the projecting ends 84 of the purlins and each consisting of a length of angle iron 102. These end curtains are laced to the ends of the roof cover, and these curtains are secured against displacement by the wind by being connected to the front and rear faces of the wall being erected by the ropes 921. The bottom edges of the curtains are secured to the ground by tent pegs 106 or other suitable means of anchorage.

As the walls of the building rise the frames 5 and the roof structure with the side and rear curtains are raised to accommodate the work. The means I prefer to use to perform this function comprises a mechanism secured to each column beneath its sliding frames 5 and adjustable vertically on the column. Each of these mechanisms consists of a box-like member 150 having an integral flange 151 along one edge to engage one of the flanges of the column and an angle bar 152 secured to the other side edge for engaging the other flange of the column as shown particularly in Figure 6, a jack screw 153 extending vertically through the box and held against rotation by a set-screw 154 projecting into a groove in the jack screw, a geared nut 155 encircling the jack screw and adapted to feed the latter axially when rotated, a gear 156 intermeshing with the nut, a shaft 157 carrying the last mentioned nut and means for manually rotating the shaft consisting of a ratchet 158 and a handle 159, both mounted upon the shaft outside of the box and one being fixed thereon and the other free to rotate relatively to the shaft, and a pawl 160 pivotally carried by the handle and reversible. The box-like member is secured to the column by bolts 161 engaging lugs 162 on the box and through them the flanges of the column. The sliding frames and their load are supported in any position to which they may be adjusted by the lifting jack, by a supporting bolt 163.

As the roof and curtains are moved up the columns, lengthening pieces are added to the curtains either at the lower ends or inserted at any level.

To accommodate different widths of buildings different lengths of arches are used. Assuming that an inclosure is required in connection with a building of less width than suggested in Figure 2, and where no intermediate panels would be needed, the triangular end panel 8 may have for instance, the free ends of the panel 7 connected thereto as

indicated in Figure 7; or the free ends of the panel 9. The arch may thus be assembled to accommodate any required width of building by adding as many intermediate panels to the end panels, as necessary. When the arch is being assembled a brace 14 must be selected of a length to fit in place with the contingent change in angular position. A shorter brace may be used for instance. My building-inclosure may be heated by a portable heat generator equipped to supply hot air under pressure, to ensure circulation. It consists of a truck 500, carrying an oil tank 501, an oil spray machine 502, an air heater containing a combustion chamber 503, and a system of tubes 504 and baffle-plates 505, together with a pipe connection 506 to project the hot air into the inclosure, or any subdivision thereof. A smoke pipe 507 is also provided. The air is forced through the heater and into the inclosure by a fan 508 driven by a motor 509.

In the use of my invention, the site being chosen, the entire structure, the members of which may be fabricated at the contractor's shop, is delivered at the site, concrete bases 3 are then laid and the required number of columns 2 with the roof are assembled in place and the curtains hung; after which the interior of the structure may be heated during the time that the weather is too cold for concrete or other building work generally to proceed, the protection afforded by the curtains and roof preventing rain, snow or other inclement weather from interfering with the work of erecting the building. The columns are removed with the balance of the inclosure when the building is completed. To enable the columns to be removed pre-cast blocks are provided. These blocks are cast from a gypsum mixture or other inexpensive material which may be readily broken up to release the columns when they are to be removed. These blocks prevent the concrete of a floor cementing to the column. In this manner, with my improved building inclosure, the men, material and implements, etc. employed in the erection of buildings are protected against damage from the weather, and my improved structure being of knock-down form readily lends itself to transportation from place to place to be assembled in accordance with the requirements as to area and height of any projected building.

What I claim is as follows:

1. A knock-down inclosure to protect a building in the course of erection having side and end walls and roof and comprising vertically extensible columns; frames slidable vertically upon the columns; transverse arches variable in length to accommodate buildings of different widths; means hingedly fastening the ends of the arches to the frames; means uniting the arches; and a cloth covering extending completely over the roof frame and hanging down the sides of the structure, and means for securing the said cloth covering in place, said means consisting of cords and ropes tying the covering to the frame.

2. A knock-down inclosure for a structure under erection having side and end walls and roof and comprising vertically extensible columns; frames slidable vertically upon the columns; transverse arches variable in length to accommodate structures of different width; means hingedly fastening the ends of the arches to the frames; means uniting the arches; and a cloth covering extending completely over the roof frame and hanging down the sides of the structure and means for securing the said cloth covering in place; and purlins extending beyond the ends of the structure and means carried by the projecting ends of the purlins and supporting the end portions of the hanging covering.

3. A knock-down inclosure having side and end walls and roof and comprising vertically extensible columns; frames slidable vertically upon the columns; transverse arches variable in length to accommodate buildings of different widths, means hingedly fastening the ends of the arches to the frames; means uniting the arches; means mounted upon said frames and projecting outwardly beyond the columns and forming extensions of the roof; a cloth covering extending completely over the roof frame and hanging down the sides of the structure; and means for securing the said cloth covering in place.

4. In a knock-down inclosure for a structure in the course of erection and having columns, an arch variable in length with means for connecting the arch to the columns, and end arch panels each composed of top and bottom chords and a radial member, the chords having means connecting them together at one end, means pivotally connecting the connecting means to a column, and means whereby the panel thus constructed is incorporated in the arch.

5. In a knock-down inclosure for a structure under erection such as claimed in claim 1 means for adjusting each frame vertically on its column; said means consisting of a jack screw adapted to engage said frame, and means for actuating said jack screw.

6. In a knock-down inclosure having side and end walls and roof and comprising vertically extensible columns; frames slidable vertically on the columns; transverse arches variable in length to accommodate buildings of different widths; means hingedly fastening the ends of the arches to the frames; means uniting the arches; a flexible covering extending over the roof frame and hanging down over the sides in the form of curtains

tains; means for spacing the side curtains from the sides of the structure consisting of laterally projecting angle frames carried by the said vertically slidable frames; and purlins forming component parts of the roof structure and extending beyond the ends thereof for spacing the end curtains from the ends of the structure, and means for fastening the curtains in place.

7. In a knock-down inclosure for a structure under erection such as claimed in claim 1; brackets adapted to be secured in fixed position throughout the height of the sides of the structure, and means for anchoring the curtains to said auxiliary brackets.

8. A knock-down inclosure for a structure under erection having side and end walls and roof and comprising vertically extensible columns; frames slidable vertically upon the columns; transverse arches variable in length to accommodate buildings of different widths, certain members of the arches being connected to said frames at the upper ends of the latter; tie rods; and means connecting the tie rods to the upper and lower ends of the frame and to the arches, substantially as described.

9. A knock-down inclosure for a structure under erection such as claimed in claim 8 characterized by the engagement of the members to the upper end of the frame being a pivotal connection for the purpose of permitting angular relations within the arch to be changed as the arch is varied in length.

10. A knock-down inclosure for a structure under erection comprising concrete bases 3, supporting vertically extensible oppositely arranged pairs of columns 2; supporting frames 5 carried by the several columns; a series of transverse arches supported by the frames and each composed of end, middle and intermediate panels, the intermediate panels being removable; each end panel comprising top and bottom chords 12 and 13 respectively, and radial member 15; means pivotally connecting the chords 12 and 13 to the supporting frames; vertical and longitudinal bracing means uniting the arches and comprising purlins 80, diagonal bracing rods 71, and strut bracing 81, the purlins projecting beyond the end arches; a flexible cover 60 connected to the purlins and extending over the roof and hanging as curtains over the sides and ends of the structure; means fastening the lower ends of the curtains to the ground and means anchoring the body of the curtains to the sides of the building being erected; transverse curtain rods carried by the ends of the purlins and having the curtain material connected thereto.

11. A knock-down inclosure to protect a structure in the course of erection and including an inclosure-frame; a covering serving as a roof with curtains hanging down

over the sides and ends of the inclosure-frame, and bracket and auxiliary brackets spacing the side and end curtains outwardly from the walls being erected.

12. A knock-down inclosure to protect a structure in the course of erection, consisting of columns and roof arches each roof arch being composed of panels, the panel points in each, located between the ends of adjacent cords, and at the center of the arch, lie on the circumference of a circle and the radial members of which lie on radii of that circle and being of the same length for the purpose of interchanging intermediate panels with other intermediate panels of different lengths, and means including said panels for increasing the size of the inclosure to accommodate the increase in size of the structure as it progresses.

13. A knockdown inclosure to protect a structure in the course of erection, and means for increasing the size of the inclosure to accommodate the increase in size of the structure as it progresses, such inclosure including a knockdown metallic frame with a covering for such frame.

14. A knockdown inclosure to protect a structure in the course of erection and means for increasing the size of the inclosure to accommodate the increase in size of the structure as it progresses, such inclosure including spaced vertical columns, roof arches slidably mounted on the columns; means bracing the arches together, and a roofing material completely covering the frame.

15. An inclosure for a structure under erection consisting of a vertically extensible steel frame and means for bracing the frame from the structure being erected.

16. A knock-down vertically extensible inclosure to protect a structure in the course of erection comprising the combination with columns, of roof arches extending transversely between certain of the columns; means carrying the arches and fastening the ends thereof to the columns; means supported from below for vertically adjusting the said arch-carrying means on the columns; means bracing the arches together; and flexible means completely covering the roof, sides and ends of the structure thus formed and means for bracing the inclosure from the structure inclosed.

17. A knock-down inclosure to protect a structure in the course of erection such as claimed in claim 16 and having its arches variable in length to accommodate different widths of buildings to be erected by interchanging some of the panels thereof with other radial panels of different width.

18. A knock-down inclosure to protect a structure in the course of erection and including an inclosure-frame, such frame having side and end-wall supporting members, the inclosure-frame comprising vertically

extensible columns; frames slidable vertically upon the columns, means for supporting the frames on the columns; transverse arches for supporting a roof and being variable in length to accommodate structures of different widths; means hingedly fastening the ends of the arches to the frames; means uniting the arches; means bracing the inclosure from the structure being erected; and a covering serving as a roof and supported by the inclosure frame; means bracing the arches together.

19. A knock-down inclosure to protect a structure in the course of erection and including an inclosure-frame, such frame having side and end-wall supporting members, the inclosure-frame comprising vertically extensible columns; frames slidable vertically upon the columns; means for supporting the frames on the columns; transverse arches for supporting a roof and being variable in length to accommodate structures of different widths; means hingedly fastening the ends of the arches to the frames; means for stiffening the hinged connections; means uniting the arches; means bracing the inclosure from the structure being erected; and a covering serving as a roof and supported by the inclosure-frame; means bracing the arches together.

20. A knock-down inclosure to protect a

structure in the course of erection and including an inclosure-frame, such frame having side and end wall supporting members, the inclosure-frame comprising vertically extensible columns; frames slidable vertically upon the columns; transverse arches for supporting a roof and being variable in length to accommodate structures of different widths; means hingedly fastening the ends of the arches to the frames; means for stiffening the hinged connections; means uniting the arches; means bracing the inclosure from the structure being erected; and a covering serving as a roof and supported by the inclosure-frame; means bracing the arches together and means for adjustably supporting the frames on the columns.

21. In a knock-down inclosure to protect a structure in the course of erection, the combination with the structure of an inclosure frame completely inclosing the same and independent thereof, a covering serving as a roof with curtains hanging down over the sides and ends, and means whereby the inclosure is increased in height to accommodate the structure protected thereby as it is erected.

In testimony whereof I have signed my name to this specification.

FREDERICK W. DAKIN.