Jan. 19, 1960 W. H. MACKEY 2,921,592

SUPPORT FOR AIR-INFLATED BUILDING STRUCTURE

Filed July 10, 1957 3 Sheets-Sheet 1

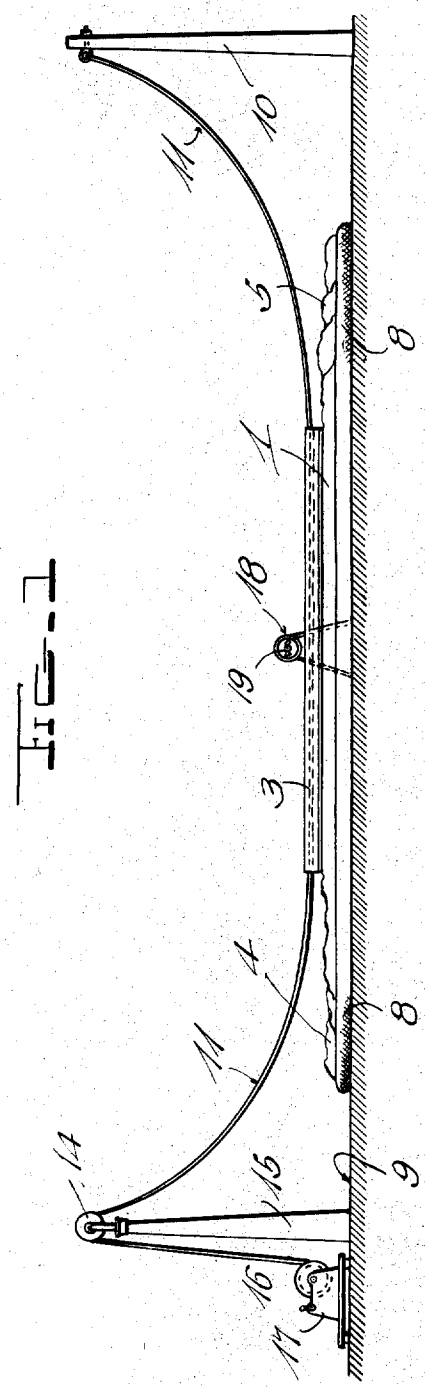


FIG. 1

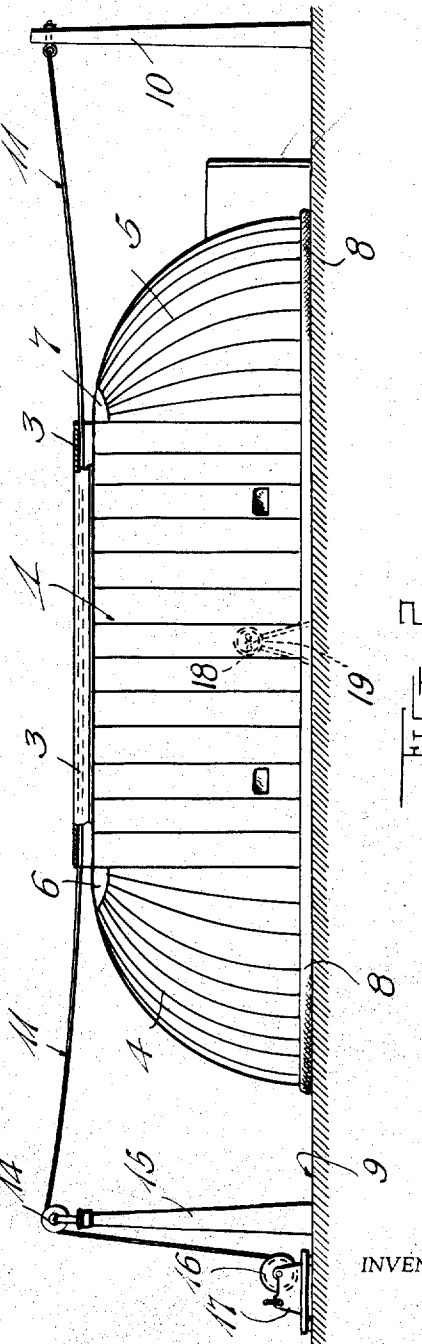


FIG. 2

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SUPPORT FOR AIR-INFLATED BUILDING STRUCTURE

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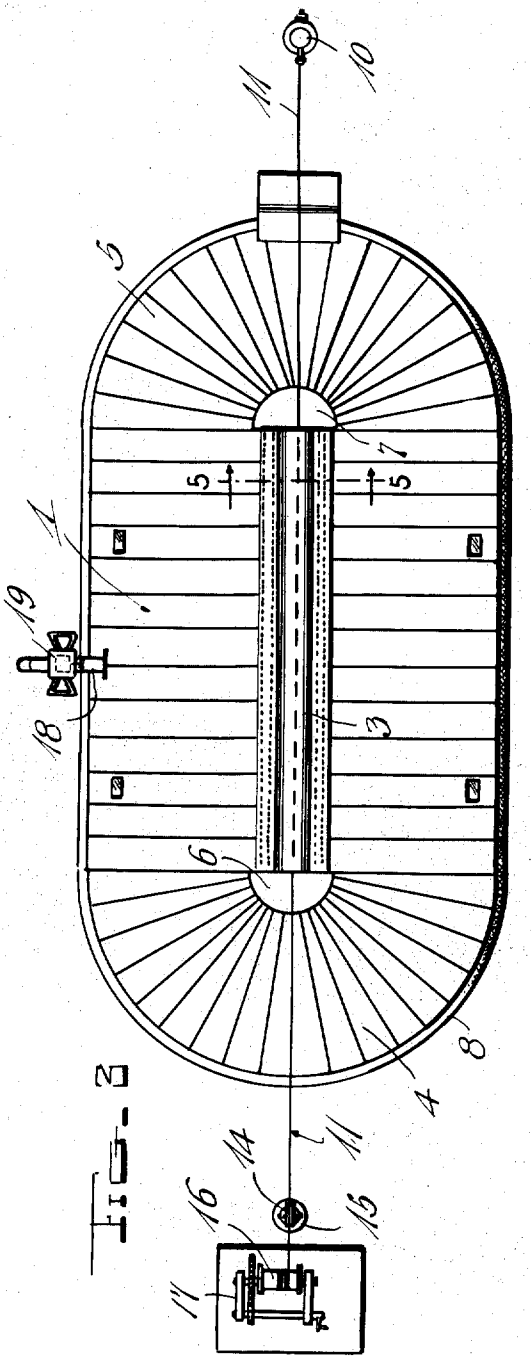


FIG. 2

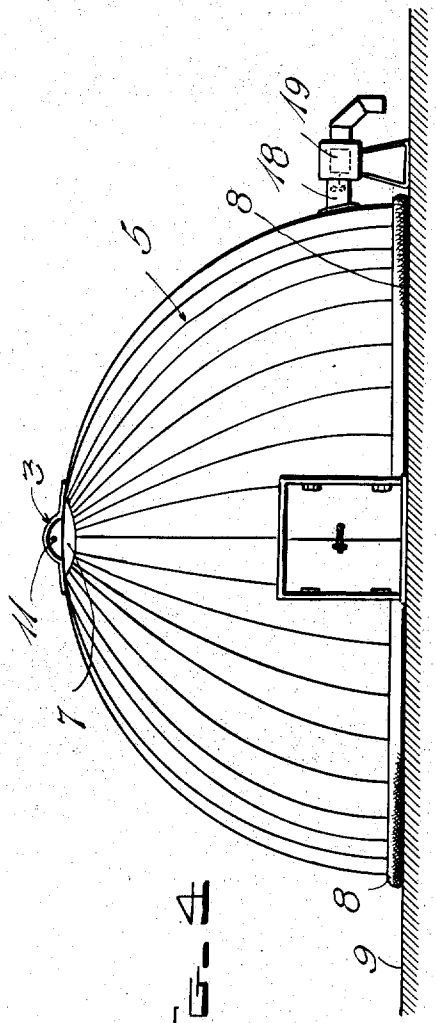


FIG. 4

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SUPPORT FOR AIR-INFLATED BUILDING STRUCTURE

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FIG. 5

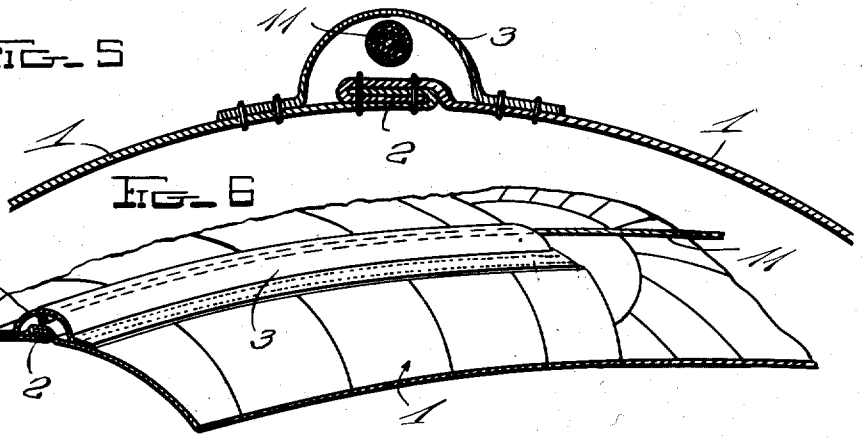


FIG. 6

FIG. 7

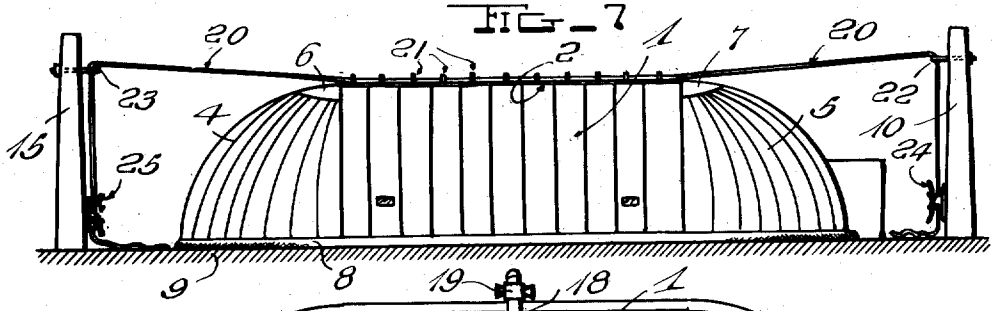


FIG. 8

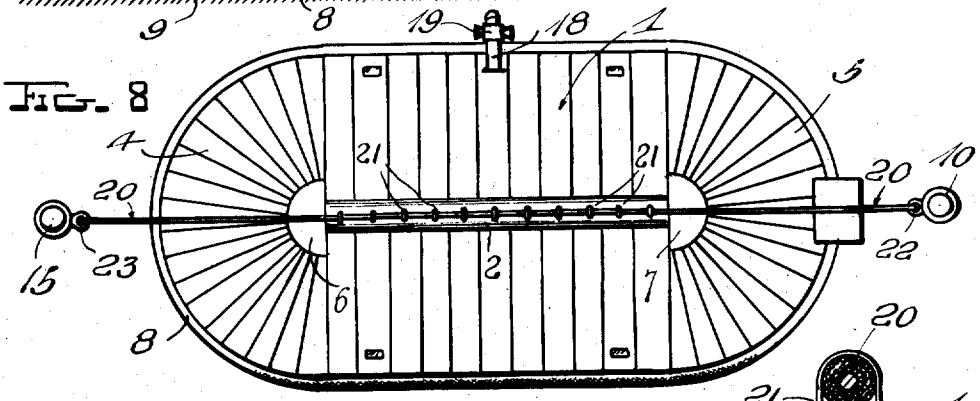


FIG. 10

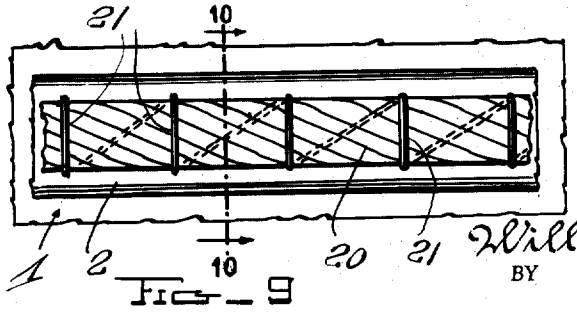


FIG. 9

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United States Patent Office 2,921,592 Patented Jan. 19, 1960

2,921,592

SUPPORT FOR AIR-INFLATED BUILDING STRUCTURE

William H. Mackey, Libertyville, Ill., assignor to Cid Air Structures Company, Chicago, Ill., a corporation of Illinois

Application July 10, 1957, Serial No. 670,997

1 Claim. (Cl. 135—1)

My invention relates broadly to inflatable building structures and more particularly to an improved construction of and method of erecting an inflatable building structure.

One of the objects of my invention is to provide an improved inflatable building structure which is capable of erection with a minimum amount of labor and in minimum time, the building structure including means for facilitating its erection, such means being built into the structure.

Another object of my invention is to provide a construction of inflatable building structure which includes substantially semi-spherical end sections interconnected by a substantially semi-cylindrical intermediate section where said last mentioned section is provided with a longitudinally extending cable run attached to the ridge of the semi-cylindrical section and through which an erecting cable may be passed for facilitating the raising of the air structure independently of the pumping of air beneath the air structure during the erecting process.

Still another object of my invention is to provide means for connecting a cable run to the top ridge of the substantially semi-cylindrical portion of an inflatable building structure in accordance with my invention.

Another object of my invention is to provide a method of erecting an inflatable building structure by which, in cases of necessity, the building structure may be erected by one individual, or at least the number of personnel required for erecting the building structure considerably reduced over that heretofore required for the erection of comparable air structures.

Other and further objects of my invention reside in an arrangement for facilitating the maintenance of an inflatable air structure in an elevated position in the event of failure of the air pump with subsequent deflation, as set forth more fully in the specifications hereinafter following by reference to the accompanying drawings in which:

Figure 1 illustrates the arrangement of the air structure of my invention in collapsed or deflated position preparatory to erection in accordance with the method of my invention;

Fig. 2 illustrates the inflated erect position of the improved building structure of my invention;

Fig. 3 is a top plan view of the erected air structure of my invention;

Fig. 4 is an end view of the erected air structure of my invention showing particularly the cable run at the ridge of the inflated air structure;

Fig. 5 is a transverse sectional view on line 5—5 of Fig. 3 showing the double stitched seam which I provide at the ridge of the air structure for securing the cable run in position and a sectional view of the cable run with the cable shown in position thereon;

Fig. 6 is a fragmentary perspective view of the cable run in position along the longitudinal ridge of the air structure;

Fig. 7 is a side elevational view of an inflated building structure of my invention but illustrating a modified arrangement of the cable suspension for the air inflated building;

Fig. 8 is a top plan view of the form of my invention shown in Fig. 7;

Fig. 9 is a fragmentary plan view of the cable attached to the ridge of the building structure of Figs. 7 and 8; and

Fig. 10 is a transverse sectional view taken on line 10—10 of Fig. 9.

My invention is directed to an improved inflatable building structure and method of erecting the same, the structure being of the class set forth in my co-pending application Serial No. 670,996, filed July 10, 1957, for Air-Inflated Building Structure. In the erection of air-inflated building structures of the type set forth in my aforesaid application the personnel neccesary to make an erection and installation of the building includes the services of at least four laborers for approximately two hours; the services of an electrician for approximately ¼ hour; and the services of a supervisor engineer. There are occasions under conditions of emergency where this complement of personnel may not be available and to provide for installation and erection of the building structure of my invention I have made the improvements set forth herein which greatly reduces the personnel required. In fact the improvements herein under certain conditions permit the installation and erection of the building by one individual. I accomplish this by providing the substantially semi-cylindrical portion of the building structure with a double stitched seam along the top longitudinal ridge to which is connected in one form of my invention a cable run or tunnel made of the same fabric as that which constitutes the walls of the air structure. This cable run extends along the top of the semi-cylindrical portion of the air structure terminating at the semi-circular gores in the substantially semi-spherical quadrantal end sections of the building. In another form of my invention the cable is directly fastened to the material of the air structure with extensions on either end thereof adapted to be connected with supports adjacent opposite ends of the air structure.

The building in its deflated or collapsed position has its base peripheral seal arranged around the supporting surface adjacent suitable vertically extending cable supports. Such supports may be vertically erected poles or some other stationary support to which is attached at the approximate height of the building structure one end of a cable which, in one form of my invention, extends freely through the cable run at the ridge of the semi-cylindrical portion of the building. The other end of the cable extends over a pulley suspended from the top of the other pole, support, or other stationary structure at a height approximately equivalent to the height of the air structure of my invention. The free end of the last mentioned cable is anchored to the drum of a suitable winch. Such winch may be a gasoline engine driven or an electrically driven device or the winch may be manually operated for purposes of raising the building structure. As explained more fully in my aforesaid copending application the building structure is formed from air-tight material which is thin flexible cloth or fabric impervious to air and moisture. The base of the building structure is provided with an anchoring seal so that a substantially air tight connection between the building structure and the supporting surface is assured. A continuously operating electrically driven air blower is connected to the sidewall of the air structure for delivering a constant stream of air beneath the air structure to effect inflation thereof. The fact that the air structure of my invention is raised by the cable system hereinbefore explained removes the load from the air blower so that the air blower functions simply to deliver an inflating atmosphere within the building structure and is not required to pump the principal mass

f the building to the elevated position. Thus the time eriod for erecting the building is considerably reduced nd maintenance of the inflated structure is considerably mplified in that the load on the blower is reduced through ie cable suspension of the building. In the case of ailure of the blower the building remains erect even ough the side walls may be subject to sagging. Neverieless, upon re-starting of the blower normal inflation of ie building may be quickly re-established.

In another form of my invention a suspension cable directly fastened to the seam at the ridge of the air ructure and extends at each end beyond the semi-spheri-l end sections for attachment to supporting poles or e like erected adjacent opposite ends of the air structure.

Referring to the drawings in more detail, reference naracter **1** designates the central substantially semi-lindrical portion of the building structure of my inven-on formed by interconnected sections of airtight fabric rminating in a longitudinally extending locked seam **2** the ridge thereof over which there is stitched a cable n or tunnel **3** formed of a similar fabric. Various nds of airtight materials may be employed for the wall ructure of the building of my invention such as vinyl-ated nylon fabric of great strength that withstands both treme warm and cold temperatures, or a laminated bric in lieu of the coated fabric may be used. The mate-al is water-proof and airtight and has a life expectancy ell beyond the requirements of a temporary structure nich is the field of application to which my invention is rected.

The semi-cylindrical section **1** of the building forms intermediate portion of the building structure between posite end portions shown at **4** and **5** that have contours nich are substantially semi-spherical quadrants and are nnected through airtight seams with opposite ends of e semi-cylindrical portions of the building are formed om strips of the airtight fabric stitched together and rminating in the semi-circular gores **6** and **7** located at posite ends of the double stitched seam at the longi-linally extending ridge of the semi-cylindrical portion of the building. The building sections **1**, **4**, and **5** minate in the ballast tube **8** which forms the weighted chor for the building structure and the seal with respect the supporting surface **9** as more fully explained in my oresaid co-pending application.

In erecting the improved structure of my invention I ect a location which is adjacent a stationary support in locations which are clear of available stationary pports I erect a pole such as **10** shown in Figs. 1 and 2 the supporting surface **9**. This pole **10** or other sta-nary supporting structure has a cable **11** connected reto at a height which is comparable to the height of completed inflated building structure. This height y be, for example, thirty feet. The cable **11** is eaded through the cable run or tunnel **3** constituted by itrip having a width slightly less than the diametrical tion of the gores **6** and **7** and stitched to the material f the semi-cylindrical quadrantal portion of the build-structure and is extended over a pulley **14** located on upport **15** erected in spaced relation to the support **10** pending upon the longitudinally disposed axis of the lding and the effective length thereof. For example, air inflated building structure of my invention may e a length of the order of 80 feet to 120 feet in which nt the support **15** is located in spaced relation to sup-t **10** along surface **9** to permit ample room for the tallation of the building and accessories incident there-such as an air lock or access door all explained in my resaid co-pending application and yet provide quate space for entry into and out of the building hout obstruction by the location of either support **10** **15** in relation to the end wall of the building. The e end of the cable **11** after passing over pulley **14** is nected to the drum **16** of the winch **17**. Winch **17** y be manually operated to draw the cable **11** taut or

the winch may be driven by a gasoline engine or by an electric motor.

The side wall of the building in section **1** connects through a blower tube **18** with a fan blower unit **19** which is electrically driven as explained more fully in my aforesaid copending application for delivering a constant stream of air beneath the air structure for initially inflating the building and subsequently maintaining the building in erected inflated position. The fact that the flexible cable **11** in raising the mass of the building structure supports the weight of the building structure, greatly reduces the load on the blower **19** so that blower **19** is effective to inflate the interior of the building structure more rapidly than it is under conditions where the blower must also function to develop the necessary pressure head for raising the building structure.

I have heretofore alluded to the fact that under conditions of emergency one individual is capable of erecting and maintaining the building structure without assistance. This presupposes that supports **10** and **15** have been located in the required spaced positions and that the ballast tube **8** is arranged in proper position on the surface **9** between the supports **10** and **15**. The ballast tube **8** must be laid out in such a position that there is ample space between the supports **10** and **15** for the installation of the access door or air lock in the building. The flexible cable **11** is then drawn taut by winding the cable on drum **16** so that the building is raised from the position shown in Fig. 1 to the position illustrated in Fig. 2. Concurrently with the mechanical raising operation depicted in Figs. 1 and 2 a pneumatic raising operation is effected by driving the electrically motor driven fan blower **19** which simultaneously inflates the interior of the air structure through blower tube **18** as it is physically raised. The inflated building structure suspended on cable **11** is shown in erect position in Fig. 2. In this condition the inflated building structure is maintained in inflated erect position by the continuous operation of the fan blower **19**. Inasmuch as the mass of the building structure remains suspended from the cable **11** the work load on the blower **19** is considerably reduced enabling the inflation of the building to be maintained more effectively.

In Figs. 7–10 I have shown a modified form of my invention in which a flexible wire cable **20** is fastened to the locked seam **2** at the ridge of the cylindrical portion of the air structure by sewing the cable to the ridge by stitches **21**. An extension is provided at each end of the cable, one end of which passes through pulley of eyelet **22** on support **10** and the other end of which passes through pulley on eyelet **23** secured to support **15** at heights comparable to the height to which the air structure is to be ultimately raised. Thus the air structure may be stretched into an elevated position by pulling on the extended ends of cable **20** and fastening the ends of cable **20** in the cleats **24** and **25** as shown in Fig. 7 at the same time that blower fan **19** is driven to force air beneath the building structure for inflating the structure while the major load thereof is supported by cable **20** stretched taut between supports **10** and **15**. Dismantling of the building is very simply accomplished by stopping the blower **19**, disconnecting the blower tube **18** and disconnecting the ends of cable **20** from supports **10** and **15** whereupon the building structure may be readily packed and transported to another location for subsequent erection.

While I have described my invention in certain of its preferred embodiments I realize that modifications may be made and I desire that it be understood that no limitations upon my invention are intended other than may be imposed by the scope of the appended claim.

What I claim as new and desire to secure by Letters Patent of the United States is as follows:

A building structure of the inflatable type comprising a semi-cylindrical substantially air-tight envelope con-

stituted by quadrantally disposed transversely arranged flexible strips lock-stitched end-to-end in a seam located at the longitudinally extending central ridge of the envelope, a pair of semi-circular gores each having a diametrical portion and a semi-circular peripheral portion, said envelope being connected at the opposite ends of the top portion thereof with the diametrical portions of said semi-circular gores longitudinally aligned with the central ridge of the envelope, a semi-spherical circular end portion at each end of the building structure connected with the semi-circular peripheral portions of said gores and on opposite sides of the diametrical portions of said gores with the ends of said semi-cylindrical envelope, a longitudinally extending supporting cable disposed above the lock-seam of the strips constituting said semi-cylindrical envelope and extending above and beyond said gores,

and a longitudinally extending strip having a width slightly less than the diametrical portions of said gores, said strip being stitched along opposite longitudinal edges thereof to opposite sides of the top portion of said semi-cylindrical envelope and extending over said longitudinally extending central ridge above said central supporting cable for connecting the longitudinally extending central ridge of the semi-cylindrical envelope to said supporting cable.

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