

[54] MINING SHIELD-SUPPORTING CARRIER

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299/33

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[58] Field of Search ..... 214/518, 1 D, 1 H, 75 H,  
214/620; 61/85, 84, 45 R, 63; 299/11, 33

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[57] ABSTRACT

A mining shield supporter carrier which spans over a cutting machine in a mining road to permit a cutting machine to advance independently, without interruption. The shield supporter carrier has an arch-shaped frame, sliding base jacks mounted on the top portion of the arch-shaped frame and a lifting mechanism, so as to permit the assembling and installation of a shield supporter and the setting of beams for a main frame and foot frames as well.

1 Claim, 6 Drawing Figures

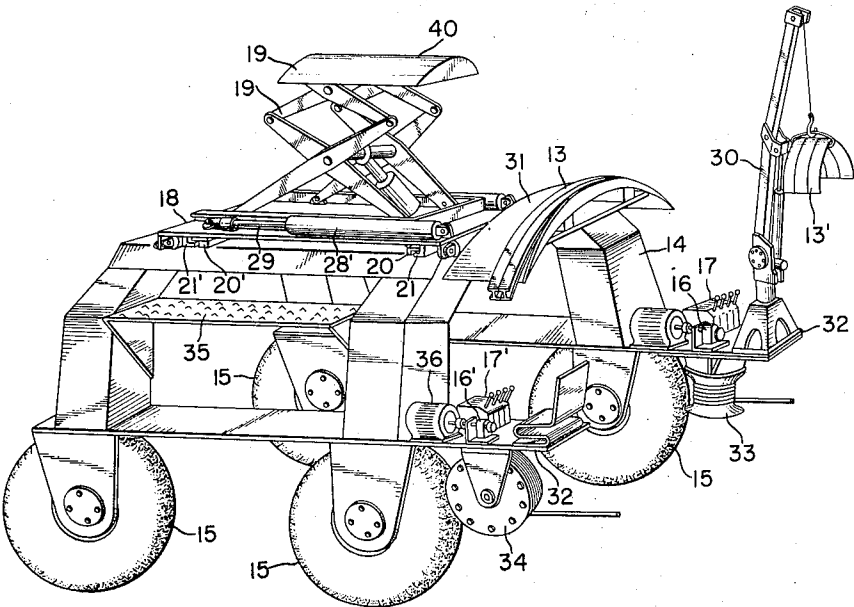


FIG. 1

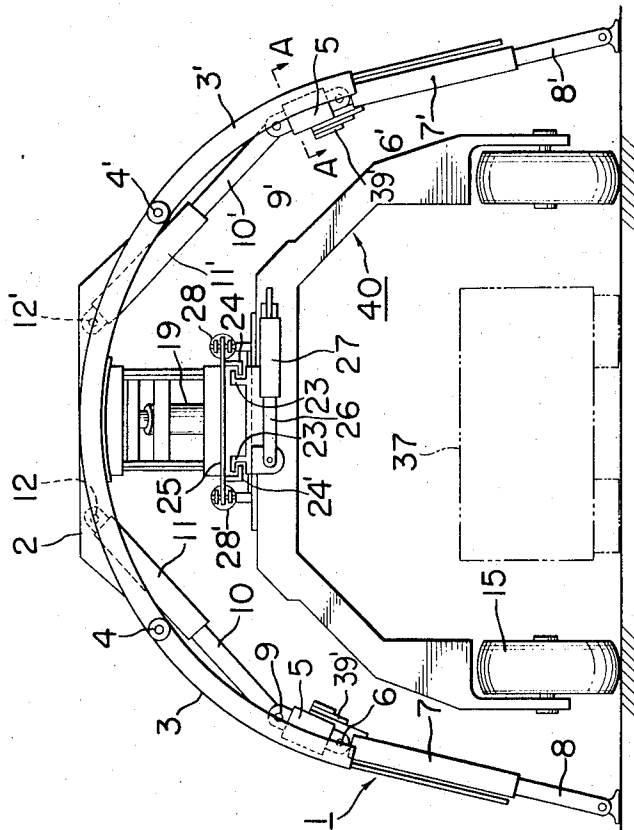
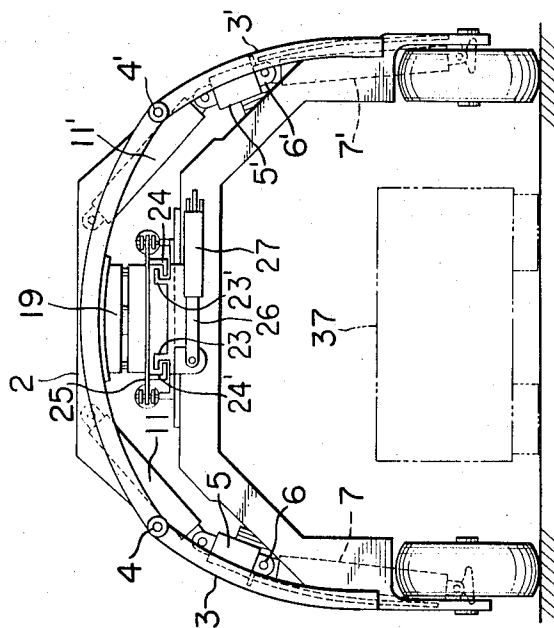


FIG. 2



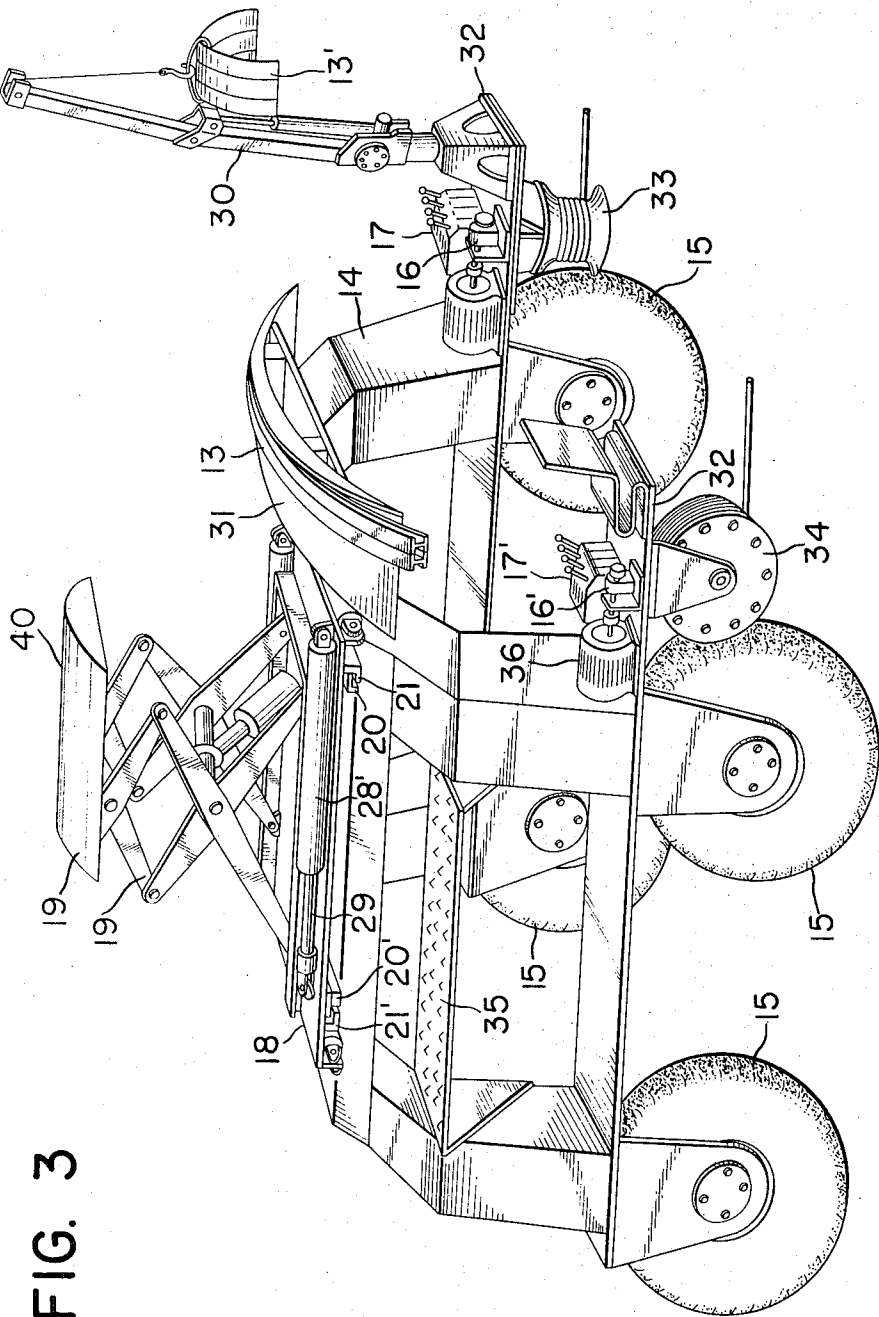


FIG. 3

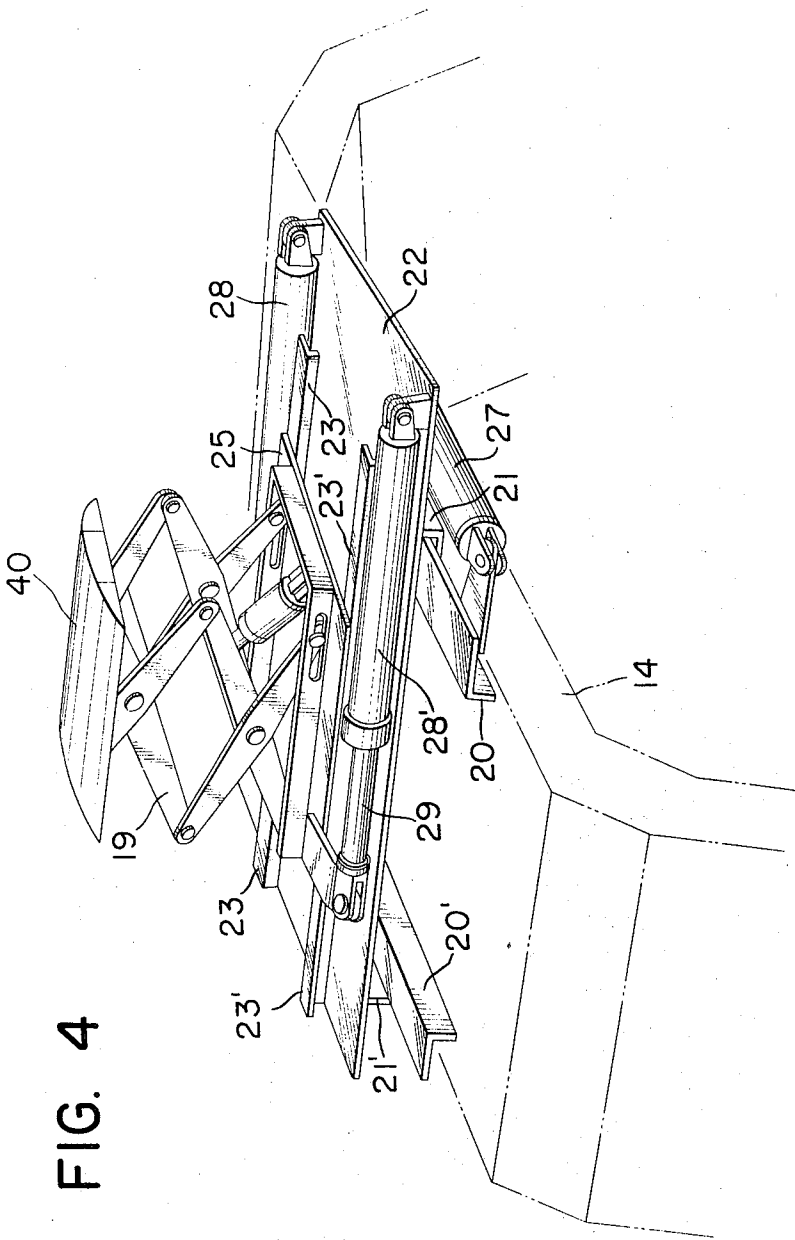


FIG. 5

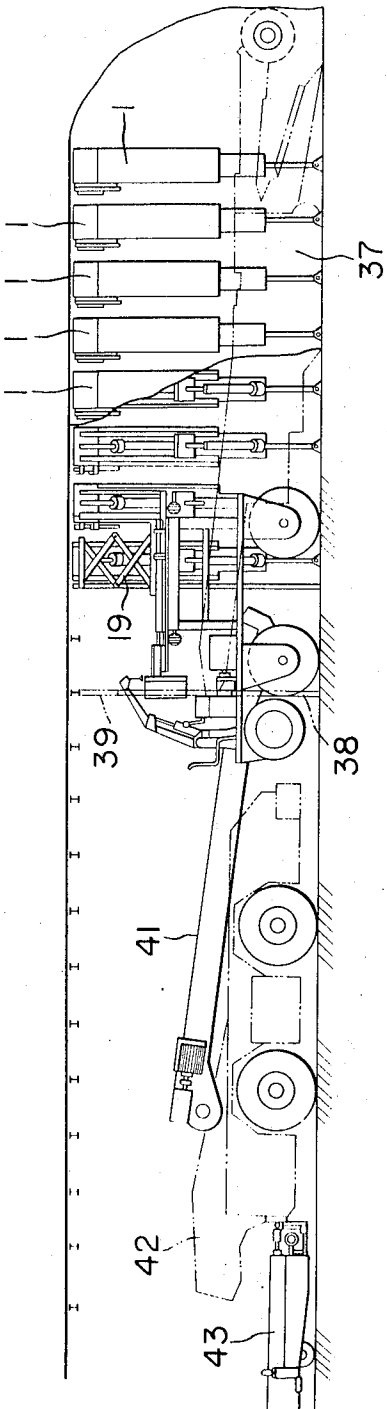
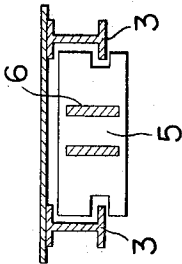


FIG. 6



## MINING SHIELD-SUPPORTING CARRIER

## BACKGROUND OF THE INVENTION

This invention relates to a mining shield supporter carrier.

Hitherto, in mining work or tunnel construction work, the backward transportation and the assembling of a shield support as well as the setting of a main frame require a considerable time, resulting in the lowering of cutting efficiency of a cutting machine which is used for such works.

To solve the above-described problem, it is an object of the present invention to provide a mining shield supporter carrier, which facilitates the assembling and installation of a shield supporter as well as the setting of beams for a main frame and foot frames.

## BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a front view showing the installing of a shield supporter for use in cutting, according to the present invention;

FIG. 2 is a front view of the shield supporter of FIG. 1 but shown in a contracted status;

FIG. 3 is a perspective view of a mining shield supporter carrier, according to the present invention;

FIG. 4 is a perspective view of an essential part of the mining shield supporter carrier, according to the present invention;

FIG. 5 is a side elevation illustrating the arrangement of the shield supporter, a main frame and face cutting equipment in a tunnel; and,

FIG. 6 is a cross-sectional view taken along the line A—A of FIG. 1.

## DETAILED DESCRIPTION OF THE INVENTION

Referring to FIGS. 1 and 2, a shield supporter 1 is composed of a central semi-ellipse member 2, and side semi-ellipse members 3,3' connected with coupling members 4,4' which are in turn journaled in opposite sides of the central semi-ellipse member 2, respectively. Sliding blocks 5,5' are incorporated in the left and right side of semi-ellipse members 3,3', respectively, and each adapted to be slidable relative to an arcuate inner wall of each semi-ellipse member 3 or 3'. The sliding blocks 5,5' have lower ends, on which the upper ends of cylinders 7,7' are journaled by pins 6,6', respectively. Each cylinder 7 or 7' receives therein an iron prop 8 or 8' in a manner of permitting an upward and downward sliding motion thereof within each cylinder. The afore-mentioned sliding blocks 5,5' have upper ends, on which piston rods 10,10' of shifters are journaled by pins 9,9', respectively. Cylinders 11,11', each of which receives therein the afore-mentioned piston rod 10 or 10', are connected with pins 12,12' which are in turn journaled in the inner walls of left- and right-hands of the afore-said central crown member 2.

A mining shield supporter carrier, 40, as shown in FIG. 3 is used for assembling and installing the shield supporter 1 and at the same time used for loading thereon beams 13 for a main frame and the foot frames 38 as well as beam stocks therefor which are to be assembled and fixed after the removal of the shield supporter. The carrier is equipped with tire units consisting of four wheels 15 each installed on a lower portion of each member pendent from an arch-shaped member 14. The drive of said tire unit causes the rotation of hydraulic motors (not shown) by means of control valves

17,17' which are positioned leftwards and rightwards of the arch-shaped member 14 and which are attached to hydraulic pumps 16,16'.

The aforesaid carrier 40 is equipped with a sliding base mechanism 18 on its top portion and a hydraulic lift 19 which rests on a sliding base member 25 slidable frontwards and rearwards.

The sliding base mechanism 18 is composed of a first sliding mechanism and a second sliding mechanism. The first sliding mechanism consists of a pair of first stationary guide members 20,20' each having an inverted L shape in cross section and rigid with the top portion of the carrier 40 and a pair of first movable guide members 21,21' each having an inverted L shape in cross section and rigid with a sliding base plate 22 in such a manner as to fit in the stationary guide members, said sliding base plate being adapted to be slid to the left and to the right with respect to the carrier. The second sliding mechanism consists of a pair of second stationary guide members 23,23' each having an inverted L shape in cross section and rigidly mounted on the upper surface of the sliding base plate 22 in the direction of crossing the first guide members, and a pair of movable guide member 24,24' each having an inverted L shape in cross section and rigid with the frontward and rearward sliding base member 25, in such a manner as to fit in the second stationary guide members. Piston rods 26 of a first slide jack are connected with pins, each of which is in turn journaled on one end of the aforesaid leftward and rightward sliding base member 22, with cylinders 27 opposite said piston-rods being connected with pins, each of which is journaled in each side wall of the top portion of the carrier 40. Cylinders 28,28' of a second slide jack are connected with pins which are in turn journaled on end portions of the aforesaid leftward and rightward sliding base plate 22, with piston rods 29 thereof being connected with pins which are in turn journaled on end portions of frontward and rearward sliding base member 25.

Mounted on a base plate 32 of the carrier 40, is a crane unit 30, the crane unit 30 serving to lift beams for the main frame and the foot frames in binding status and to load the same on a beam storing unit 31 disposed rearwards of said crane unit and on the upper portion of the aforesaid carrier, thereby facilitating the transportation of beams or foot frame beams.

The crane unit 30 is equipped with a mechanism such as a jack used for moving a winch arm vertically.

These are driven by operating control valves 17.

There is a capstan 33 attached on the reverse side of base plate 32 of the carrier 40 and a reel drum 34 for a cable used as motive power for the carrier, at 35 a scaffolding board provided on the carrier, at 36,36' motors for driving hydraulic pumps 16,16'.

As shown in FIG. 5, one of face cutting machines, for example, a continuous miner 37 is in advance of the carrier 40 while a bridge conveyor 41 extends backwards from the carrier 40 to a rear conveyor of the face cutting machine or to a transport machine located in the rear, such as a shuttle car 42. The shuttle car 42 is normally maintained stationary in a rear position at a distance of about 7 to 10 m from the face cutting machine, without traveling between the cutting machine and the rear conveyor (the shuttle car in the present invention is so arranged as not to travel). The chain conveyor of the shuttle car, in this case, is used as an intermediate conveyor.

To the rear of the shuttle car 42 is a belt conveyor 43.

An extensible belt conveyor embraces therein a belt of 100m in its entire length and is mounted on the rear portion of a driving section and a tail unit is attached to the shuttle car 42, such that the belt may be extended, when the shuttle car 42 is shifted.

Brackets having an upper and lower swingeable mechanisms are provided in a tip portion of rear conveyor of the cutting machine. The aforesaid bridge conveyor 41 having a length of 7 to 10m is connected to the rear conveyor of the cutting machine, in a manner to cause no interference with the shifting of the cutting machine, and is guided by guide-rails mounted in the shuttle car 42.

In addition, the shuttle car and the bridge conveyor are arranged, with the whole length of the bridge conveyor being lapped by the shuttle car passing under the bridge conveyor thereby allowing the shifting of the cutting machine by such a distance, independently of the belt conveyor.

Prior to the bridge conveyor being unlapped from over the shuttle car by the shift of the cutting machine, the tail unit is moved by shuttle car, to extend the extensible conveyor.

The installation of the mining shield supporter, according to the present invention is done in a leap-frog operation. Upon the termination of attaching foot frames to the beams 13 for the main frame of the rear-most shield supporter 1 among a series of shield supporters 1,1 . . . which have been already set, the carrier 40 equipped with the arch-shaped frame is advanced beneath the frame of the rearmost shield supporter, so as to shift the shield supporter 1 to the inner portion of the workface. Then, the cylinders 27 and 28 of the sliding base jacks are actuated to move respective sliding base plates frontward and rearward of left and right, thereby aligning a center of hydraulic lift 19 of the carrier 40 with that of the shield supporter 1.

After the carrier 40 has been positioned in place, the hydraulic lift 19 is moved upwardly to receive thereon the shield support 1.

Then, fluid is fed under pressure into cylinders 7,7' of the shield supporter 1, followed by shifting upwardly the iron rods 8,8', to be contracted.

Subsequently, fluid is fed under pressure into cylinders 11,11' of the upper shifter, to thereby shift the piston rods 10,10' upwardly in the direction of contraction, together with the sliding blocks 5,5'. Thus, simultaneously with the upward motion of the aforesaid iron rods 8,8', the side semi-ellipse members 3,3' of the shield supporter 1 are slightly collapsed by way of coupling members 4,4' into the contracted status, as shown in FIG. 2.

After the side semi-ellipse members 3,3' have been fully folded, the hydraulic lift 19 on the carrier 40 is lowered.

The carrier 40 is advanced through the inside of a row of shield supporters 1,1 . . . up to the space of the inner portion of the workface with the rearmost shield supporter 1 resting on the hydraulic lift 19.

Then, the cylinders 27 and 28 of sliding base jacks are actuated to move the sliding base plates to the front

and rear or left and right, so as to align the center of the shield supporter 1 with that of the gate road, after which cylinders 11,11' are actuated to move the sliding blocks 5,5' downwardly, and at the same time, to stretch the side semi-ellipse members 3,3' outwardly.

Thereafter, the cylinders 7,7' are actuated to move the iron-rods 8,8' downwardly, and thus the shield supporter 1 is set in the cutting spot in the workface.

With the shield supporter being thus installed, foot frames 38 of the main frame are installed, and then beams 13 for the main frame are fixed on the ends of foot frames 38, thus preventing the demolishing of the wall of the face.

For the purpose of preventing the falling-down of the cylinders 7,7' in the inward direction when the aforesaid iron-rods 8,8' are slid upwardly, leaf springs 39,39' are connected at their ends to the sliding blocks 5,5'.

The procedures as described are repeated in leap-frog sequence, and thus contraction, advance and installation of a shield supporter are continuously achieved.

The setting of beams for the main frame and the setting of foot frames are conducted simultaneously and in association with the procedures for contracting, advancing and installing the shield supporter, which is one of the features of the present invention.

I claim:

1. A mining shield supporter (1) carrier for expanding and collapsing mining shields used at a mine workface so as to leap-frog a rear shield under a forward shield to continuously place shields at the workface as cutting work progresses, comprising in combination:

- a. an arch-shaped frame (14) to allow passage thereunder of a cutting machine;
- b. wheels (15) mounted at the lower portion of a frame depending from said arch-shaped frame;
- c. first and second sliding mechanisms mounted on a top portion of said arch-shaped frame, including a pair of parallel spaced apart first guide members (20,20'), a sliding plate (22) held by and disposed to move longitudinally along said first guide members, a pair of parallel spaced apart second guide members mounted on the upper surface of said sliding plate (22) normal to said first guide members, a sliding base member (25) held by and disposed to move longitudinally along said second guide members, first and second sets of cylinders and pistons (27,28) disposed to move said sliding plate and sliding base member along the respective first and second guide members;
- d. a lift mechanism mounted on said sliding base member including a zig-zag upwardly telescoping section and a top section, cylindrically curved in the longitudinal direction;
- e. a curved beam storing unit disposed adjacent said lift mechanism on which to store beams used for making a mining shield; and,
- f. a crane mounted rearwardly of said arch-shaped frame to lift said beams for storage and assembly purposes.

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