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CONSTRUCTION TOY

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2 Sheets-Sheet 1

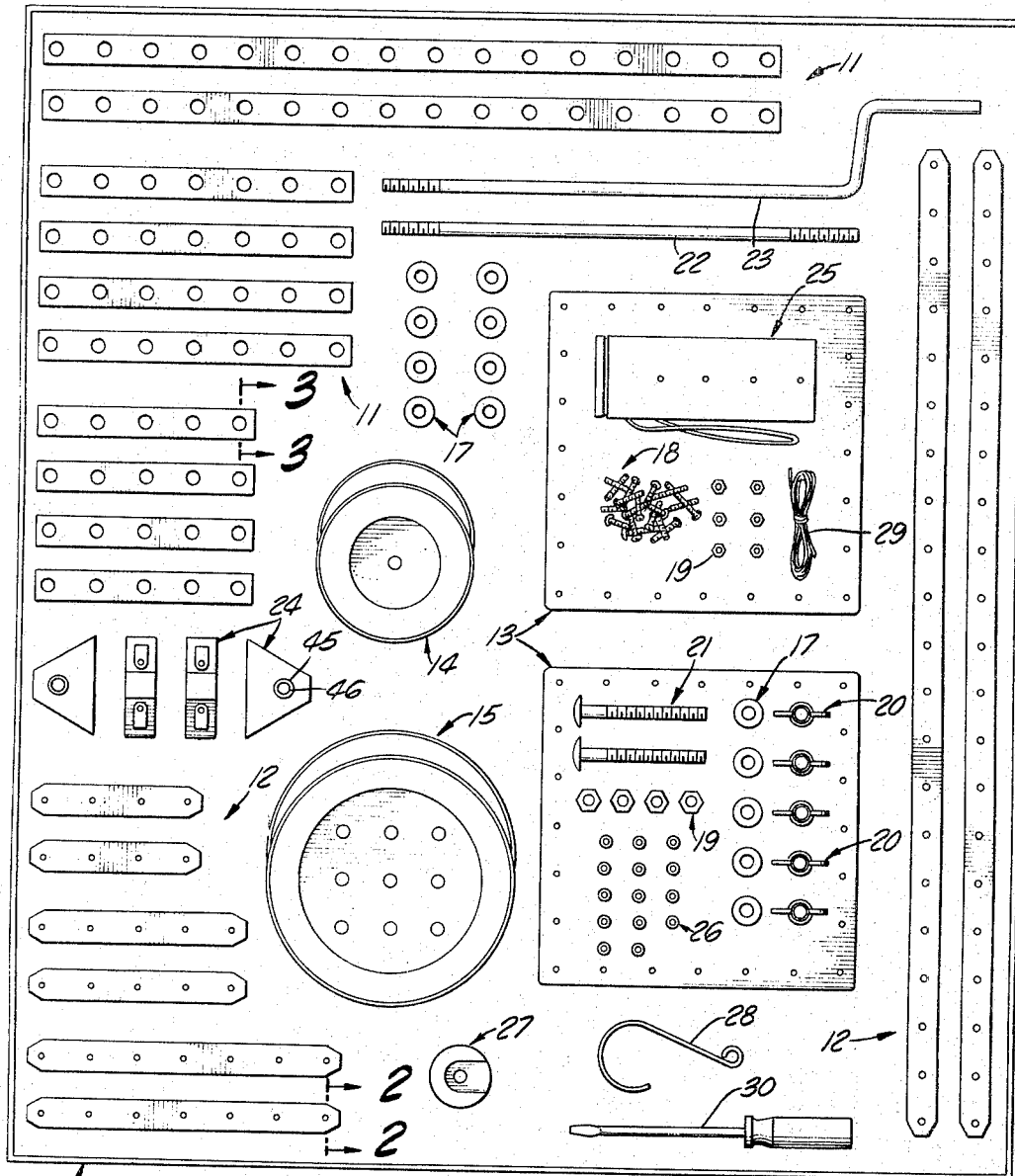


FIG. 1.

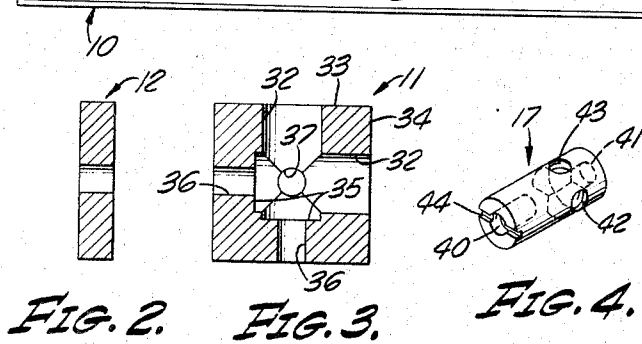


FIG. 2.

FIG. 3.

FIG. 4.

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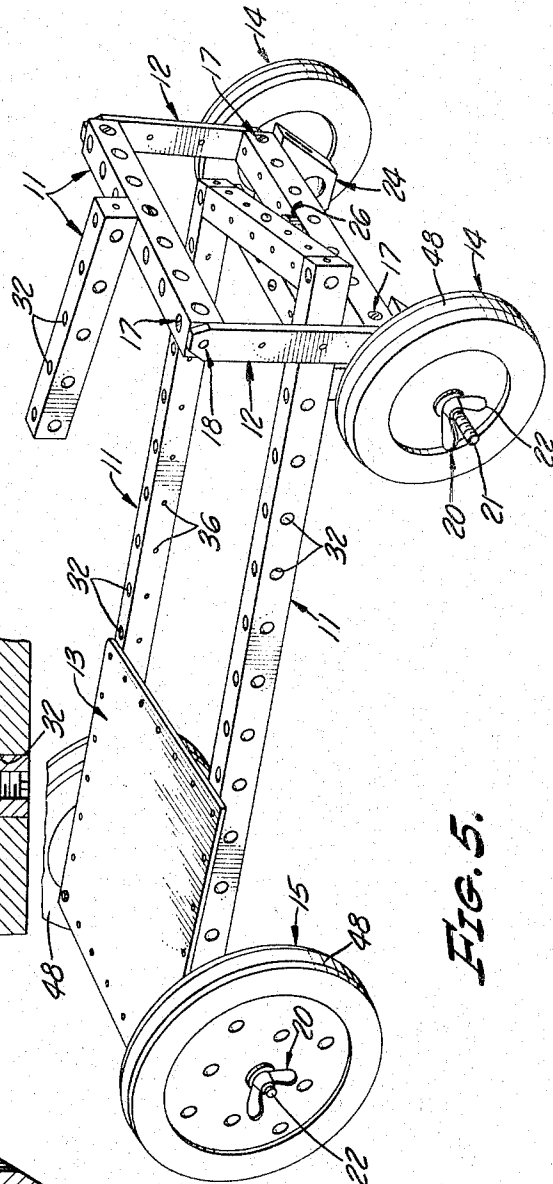
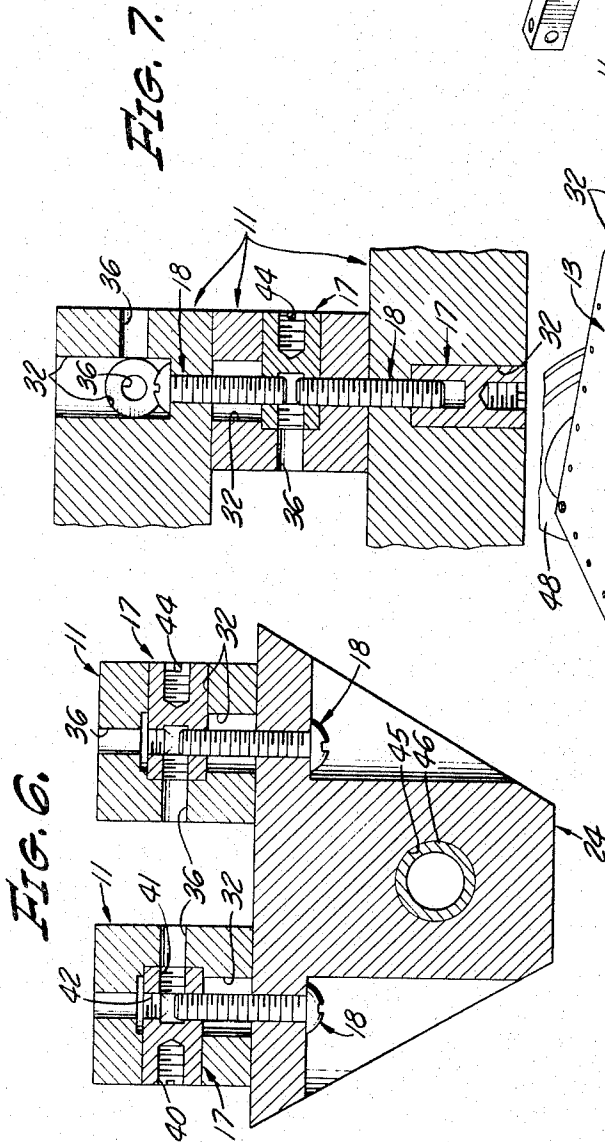
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CONSTRUCTION TOY

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This invention relates to toys and more particularly to a unique construction toy having a variety of simple structural components, fastener assemblies and accessories adapted to be assembled in a great variety of arrangements challenging to the manual dexterity and imagination of young people.

The invention toy construction kit comprises a plurality of structural components of varying length some of which are square and others rectangular in cross section, and each provided with rows of uniformly spaced openings. The square-section structural members have intersecting pairs of holes identical with one another and including a deep well and a shallow bottom provided with a small diameter axial bore adapted to receive a threaded shank of a fastener component, a shaft or an axial unit. Desirably, a pair of the well openings intersect one another. Other of the structural components are relatively thin and serve as connecting struts and braces and their openings correspond in size and spacing with the axial openings through bottoms of the aforementioned wells. Still other of the thin members comprise plates or plaques of assorted sizes each preferably provided with criss-crossing rows of small openings spaced apart similarly to the openings in the other structural openings and adapted to receive the shanks of the fastener members, and the like.

The fastener assemblies include a cylindrical or spool-like member fitting loosely in and exactly filling the wells. Each is provided with a threaded axial bore at either end and a pair of diametric threaded bores at right angles to one another. The latter are positioned to lie intersect along the longitudinal center of the square structural members when the cylinder is seated in any well. Thus a threaded bore is always accessible to a threaded shank member inserted through any opening from any face of the square members. The threaded shanks comprising the other main component of the fastener assemblies are of varying lengths and some are headless while others are provided with a head. The headless shanks are useful in connecting two cylindrical members together while seated in the wells of adjacent structural members. Other accessory components of the kit include disks, pulleys and wheels, shafts, spacers, thumb nuts, belting etc.

A feature of the invention is the fact that the fastener assemblies are, in general, located internally of the structural parts in their assembled positions. The relatively large cylindrical member may be viewed as a nut having a series of threaded openings any one of which is adapted to receive and mate with the end of a threaded shank. In certain assemblies of the parts, the end of this cylindrical nut is clamped against the bottom of the well in which it is located while in other arrangements the cylindrical member is held clamped against the well side.

Accordingly it is a primary object of the present invention to provide a unique and improved construction toy kit, components of which are adapted to be held in a great variety of assembly arrangements by simple threaded fastener assemblies of a unique character.

Another object of the invention is the provision of a toy construction kit having a plurality of similar structural elements of varying lengths and shapes each provided with rows of openings adapted to seat and support fastener assemblies which are substantially concealed when used to hold components together.

Another object of the invention is the provision of a

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construction kit having a plurality of elongated rigid members provided with rows of uniformly-spaced holes each including a deep cylindrical well having a relatively small diameter hole through its bottom.

Another object of the invention is the provision of a toy construction kit having structural components provided with a series of holes and adapted to be assembled face-to-face, end-to-end, or with the end of one held clamped against a face of the other.

Another object of the invention is the provision of a toy construction kit utilizing fastener assemblies, including both headed and headless threaded shanks, and a nut some of which comprise cylinders having both threaded axial and diametric bores intersecting with one another at right angles along the longitudinal axis of the cylinder.

These and other more specific objects will appear upon reading the following specification and claims and upon considering in connection therewith the attached drawings to which they relate.

Referring now to the drawings in which preferred embodiment of the invention is illustrated:

FIGURE 1 is a plan view of the invention construction kit showing the typical components and accessories disassembled;

FIGURES 2 and 3 are cross-sectional views on an enlarged scale taken respectively on lines 2-2, 3-3 of FIGURE 1;

FIGURE 4 is a perspective view of one of the cylindrical fastener nuts;

FIGURE 5 is a perspective view of a toy wagon assembled from kit components;

FIGURE 6 is a cross-sectional view on an enlarged scale showing a detail of the front axle assembly; and

FIGURE 7 is a cross-sectional view through one of a great variety of joints which can be assembled utilizing the versatile fastener assemblies.

Referring initially more particularly to FIGURE 1, there is shown typical components of the construction kit arranged in the bottom half of a shipping container 10 and made of any suitable rigid material as wood, molded rigid thermoplastic, or the like. Arranged parallel to one another in the upper left hand corner of this container are a plurality of structural members of square configuration and varying lengths. In the lower left hand corner and along the side are other structural components of varying lengths generally similar to the square components but rectangular in cross-section and suitable for use as struts and braces. Thin plaques or plates 13 are also provided in varying sizes and each having rows of holes spaced apart similarly to the spacing between the holes in the other structural components. Centrally of FIGURE 1 are both small disks 14 and larger disks 15 each desirably having a recessed or grooved periphery useable to support a belt, to guide the disks along a rail or track, or other purposes. All disks have a central opening to receive a shaft, axle or fastener, and disks 15 are also provided with additional holes spaced apart similarly to the holes in the other structural members.

The kit also includes the unique and important fastener assemblies including a plurality of threaded cylindrical nut members 17 and an assortment of threaded shanks of varying lengths, some being headless and others having heads. Also provided are thumb nuts 20 for use on the threaded shanks 21 and the threaded portions of rods 22 and cranks 23. In addition, the kit preferably includes an assortment of auxiliary members, such as the journal boxes 24, rectangular member 25, washers 26 and spacers 27, a crane hook 28, belting or line 29 and a suitable tool 30 for use with the threaded fasteners.

Referring now more particularly to FIGURES 3 and 5, it will be understood that each structural member 11 of

square cross-section is preferably provided with rows of penings extending centrally along each face and having the configuration best shown in FIGURE 3. As there shown, these openings include relatively large diameter wells 32 opening through two adjacent faces 33, 34. These wells are arranged in pairs with their axes intersecting and lying at right angles to one another and to the longitudinal axis of the structural member itself. To be noted in particular is the fact that the depth of wells 32 is substantially greater than one-half the face width of member 11 but substantially less than the face width. The result is that each well has a rather thick bottom 35 provided with an axial bore 36 loosely receiving the threaded shank of a fastener 18. A similar bore 37 is located axially of each end of members 11 for a purpose to be described presently.

Referring now to FIGURE 4 it is pointed out that the cylindrical fastener nuts 17 are made in one piece from suitable material such as metal and have a size exactly filling the identical wells 32 in the structural members. Thus the length of member 17 corresponds to the depth of wells 32 and their diameter corresponds to but is one or two mils smaller than the well diameter so as to slide easily into and out of assembled position therein. Each of nut members 17 is provided in its opposite ends with a threaded axial bore 40, 41. In addition there are a pair of threaded diametric bores 42, 43 which intersect one another along the longitudinal center line of the structural member and at right angles to one another when properly seated in wells 32. These important details are made clear by FIGURES 6 and 7.

Referring to FIGURES 6 and 7, it will be apparent that the described cylindrical nuts and threaded shanks 18 may be assembled to one another and between construction members in a great variety of arrangements. Only a few illustrative assemblies are shown in these two figures, other typical ones being shown in FIGURE 5. These representative modes of assembly are believed self-explanatory. It will be observed that some of the components are held assembled by a headed shank 18 whereas others are held together by a headless shank. See for example, the two lower structural elements 11 in FIGURE 7. These shanks can be assembled between aligned axial bores of nut member 17 or one end of the shank may be threaded into a diametric bore of one nut and the opposite end into the axial bore of a second nut member. In all cases, both cylindrical nuts 17 and either the headless or headed shank extending between the two nuts are concealed or lie within the confines of the structural members. Occasionally the head of a headed shank will be exposed, as for example, when used to secure one of the brace members 12 to another structural component, an example of which appears in the forward carriage unit in FIGURE 5. It will be understood that all of the threaded members desirably have a reasonably snug fit with one another so that the parts do not become unthreaded where it is desirable to avoid fully tightening the fastener parts. This has the advantage that when it is desirable to have relative rotary movement of one structural part relative to another the threaded shanks can be left sufficiently loose to permit this rotary movement without risk of the fasteners becoming disassembled during the use of the toy.

Normally a wrench or tool is not required in the disassembly or assembly of the parts but instead proper manipulation of the structural parts being assembled can be utilized to tighten and untighten the fasteners. However, in certain cases a wrench is useful such as the screw-driver 30, the bit of which can be inserted in the kerf 44 transversely of one end of members 17 (FIGURE 1). A thin coin may also be used as a wrench.

The presence of the axial bores 37 at the end of the square structural members 11 permits either of their ends to be clamped either against the face of a structural member or in axial alignment with another. When the latter mode of assembly is employed, it will be evident that square members of any desired length can be assembled

in end-to-end relation by selecting appropriate length subcomponents.

Journal boxes 24 are made in the configuration best shown in FIGURE 6 and include a transverse opening 45 seating a bearing sleeve 46. A shaft, crank, or axle may be assembled through these bearings.

Disks 14, 15 are preferably provided with broad rims having a centrally located shallow groove 48 seating a belt or mating with the top edge of a rail or trackway.

While the particular construction toy herein shown and disclosed in detail is fully capable of attaining the objects and providing the advantages hereinbefore stated, it is to be understood that it is merely illustrative of the presently preferred embodiment of the invention and that no limitations are intended to the details of construction or design herein shown other than as defined in the appended claims.

I claim:

1. A construction toy, comprising a plurality of elongated structural members having rows of openings intersecting one another at spaced points along the length thereof, each of said rows of openings including a first relatively-deep large-diameter portion and a second co-axial portion which is relatively short and small in diameter, a plurality of rigid connectors having a length and diameter to seat in and fill said first portions of said openings and be freely insertable therein, said connectors having threaded bores opening axially into the opposite ends thereof and a plurality of intersecting threaded bores extending diametrically thereof, said threaded bores being adapted to receive threaded tie shanks inserted through the second smaller diameter portions of said rows of openings to hold a pair of said structural members clamped together in any one of a plurality of positions with said rigid connectors substantially confined within the faces of the structural members.

2. A construction toy comprising a plurality of rigid structural members connectable in a variety of different positions and arrangements by internally threaded connectors and externally threaded tie members, said structural members having a plurality of transverse openings therethrough comprising a first relatively long large-diameter portion and a second relatively short small-diameter portion, a plurality of connector members and a plurality of threaded tie members, said connector members corresponding generally to the length and diameter of said first portions so as to be received loosely therein and having a threaded axial bore at each end and at least one threaded diametric bore extending transversely therethrough, said threaded tie members being insertable through aligned openings of two or more of said structural members and adapted to be threaded into the threaded bores of said connector members and effective when tightened to hold said last mentioned structural members in assembled relation.

3. A construction toy as defined in claim 2 wherein said connector members have a second diametric threaded bore therethrough and said diametric bores are located closer to one end of said connector members than to the other end thereof.

4. A construction toy as defined in claim 3 characterized in that said diametric threaded bores intersect one another in a common plane lying normal to the longitudinal axis of said connector members.

5. A construction toy as defined in claim 4 characterized in that the axes of all of said threaded bores lie substantially at right angles to one another.

6. A construction toy as defined in claim 2 characterized in that at least one end of said connector members is provided with a diametric kerf to seat the bit of a wrenching tool useful in tightening and loosening assemblies of said connector and tie members.

7. A construction toy as defined in claim 2 characterized in that some of said rigid structural members have four faces therealong lying at right angles to one another

and having rows of said openings extending therethrough with adjacent pairs of said openings intersecting one another and lying in a common plane normal to the longitudinal axis of said structural members.

8. A construction toy as defined in claim 7 characterized in that the smaller diameter portions of said openings are in rows along two faces of said structural members and in that the larger diameter portions are arranged in rows along two other faces thereof.

9. A construction toy as defined in claim 7 characterized in that the ends of said structural members lie normal to the longitudinal axis thereof include a bore extending therethrough axially of the structural member into the larger diameter first portion of the adjacent pair of said intersecting openings extending transversely of the structural member.

10. An elongated rigid structural member of square cross section for a construction toy, said member having rows of similar wells along two adjacent faces thereof, said wells having a depth substantially greater than half the thickness of said member and having a predetermined diameter, the axes of pairs of said wells intersecting one another along the longitudinal axis of said member, and each of said wells having a bore opening through the bottoms thereof and in axial alignment with the longitudinal axis of the well, the diameter of said opening being substantially less than said predetermined diameter.

11. A structural member as defined in claim 10 including in each of the end surfaces thereof a bore similar to said first mentioned bores and extending toward one another along the longitudinal axis of said structural member and opening into the pair of wells closest to the respective ends of said structural member.

12. A fastener assembly for use in holding assorted components of a toy construction kit assembled to one another, said fastener assembly comprising a cylindrical member sized to fill any selected one of similar wells of the construction components and having threaded axial bores in the opposite ends thereof, a pair of threaded diametric bores intersecting at right angles to one another nearer to one end of said member than the other and intersecting one of said axial bores, and a plurality of threaded shanks selectively mateable with any one of said threaded bores, at least one of said shanks having a head at one end and at least one being headless.

13. A fastener assembly as defined in claim 12 characterized in that one end of said cylindrical member has a kerf extending diametrically thereacross to seat a wrenching tool.

14. A fastener assembly as defined in claim 12 characterized in that said threaded shanks are of assorted lengths, and the headless shanks being adapted to have their opposite ends threaded into any threaded bore of a pair of said cylindrical members to hold said members connected to one another.

15. A kit of construction components adapted to be detachably assembled to one another in a variety of patterns to provide a variety of toy articles, said kit includ-

ing a plurality of components of different sizes and shapes and a plurality of fastener assemblies for holding said components together, said components including a plurality of elongated rigid members of square cross section having rows of wells of a predetermined diameter opening through adjacent faces thereof, said wells having relatively thin bottoms formed with axial openings therethrough having a diameter substantially less than said predetermined diameter, said wells being grouped in pairs intersecting one another and the longitudinal axis of said rigid members at a common point, said fastener assemblies including a cylindrical member adapted to fit loosely in any of said wells and having threaded axial bores in its ends and at least one diametric bore positioned to intersect the longitudinal axis of said rigid member when said cylindrical member is seated in a well thereof, and a plurality of threaded shanks adapted to pass through said axial openings of said wells and interconnect a pair of cylindrical members seated in wells of an adjacent pair of said rigid members to hold said rigid members assembled to one another.

16. A kit as defined in claim 15 characterized in the inclusion therein of elongated rigid members of rectangular shape in cross section and relatively thin compared to the thickness of said square members, said members of rectangular cross section having rows of small diameter openings therethrough spaced apart similarly to the spacings between said rows of well openings and sized to receive said threaded shanks.

17. A kit as defined in claim 16 characterized in that said components include a plurality of disks all of which include a transverse opening through the center thereof, and at least some of which include additional transverse openings uniformly spaced apart by the same spacings as existing between adjacent wells in said rigid members and sized to receive said threaded shanks.

18. A kit as defined in claim 15 characterized in that at least certain of said rigid members of square cross section are provided with axial openings therein extending into an adjacent pair of intersecting wells and adapted to seat a threaded shank to hold another component of said kit assembled against the end of said rigid member.

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