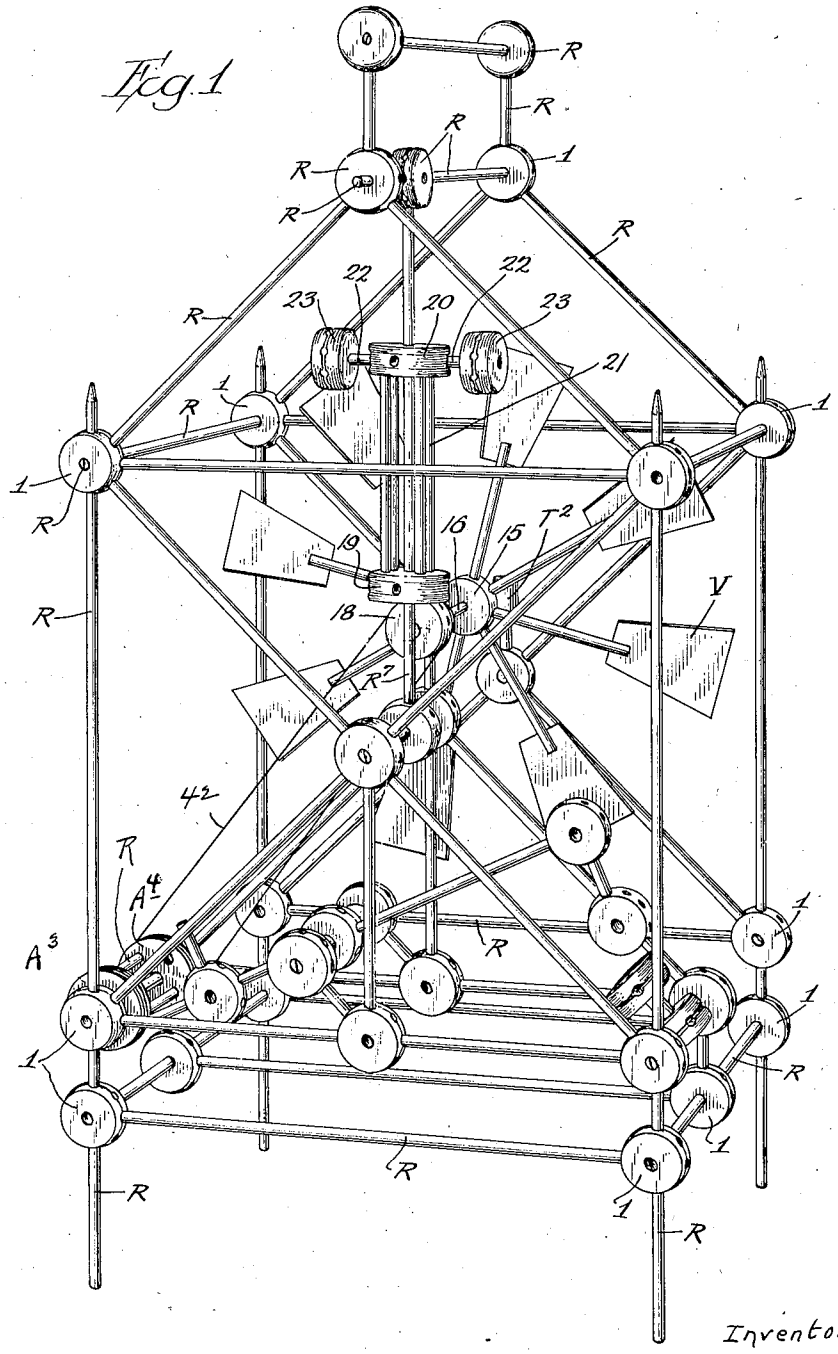
June 27, 1933. C. H. PAJEAU 1,915,835

TOY CONSTRUCTION BLOCK

Original Filed Jan. 16, 1932 3 Sheets-Sheet 1

Fig. 1



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TOY CONSTRUCTION BLOCK

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Fig. 4

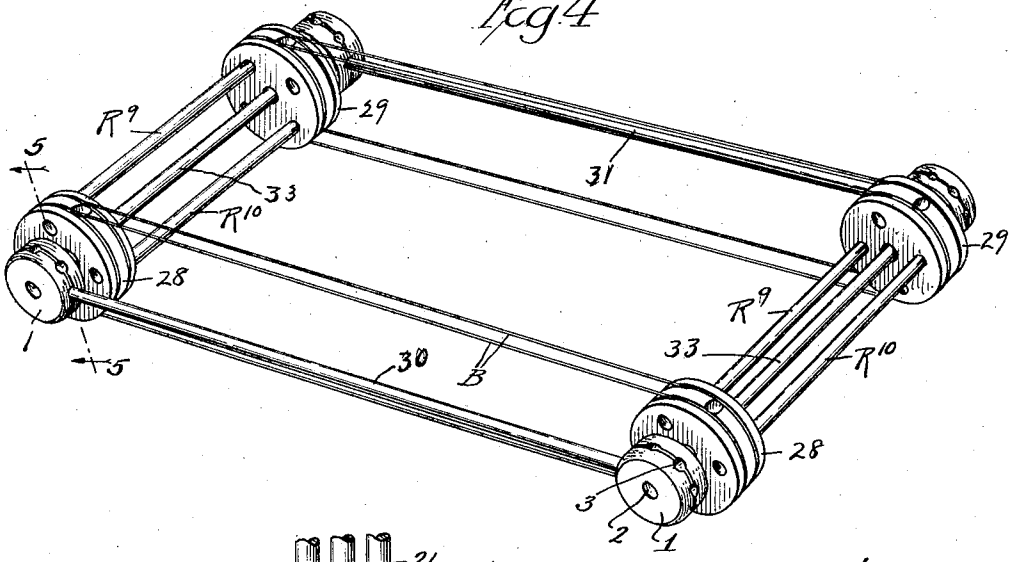


Fig. 2

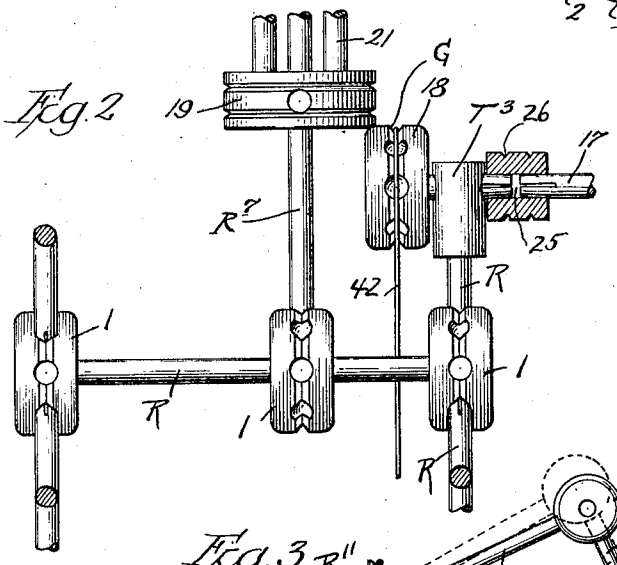


Fig. 5

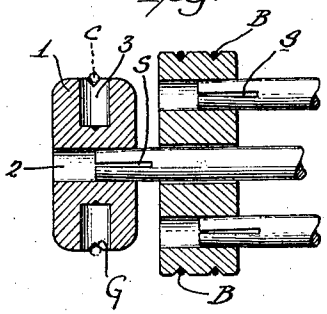
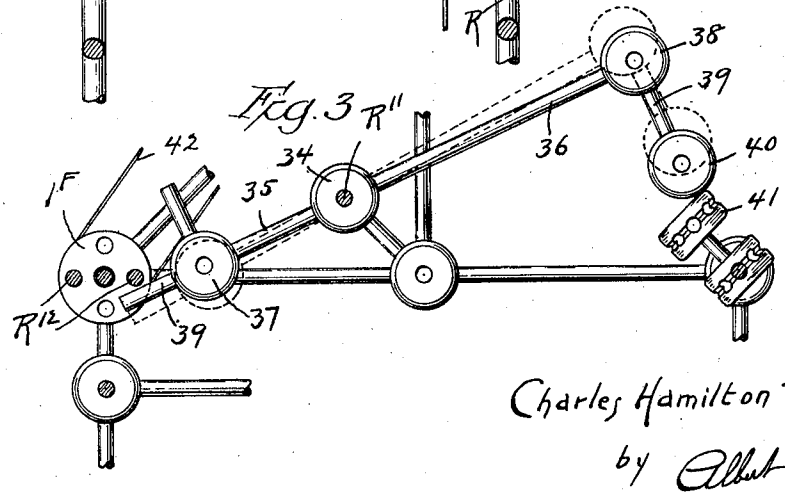


Fig. 3



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TOY CONSTRUCTION BLOCK

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Fig. 6

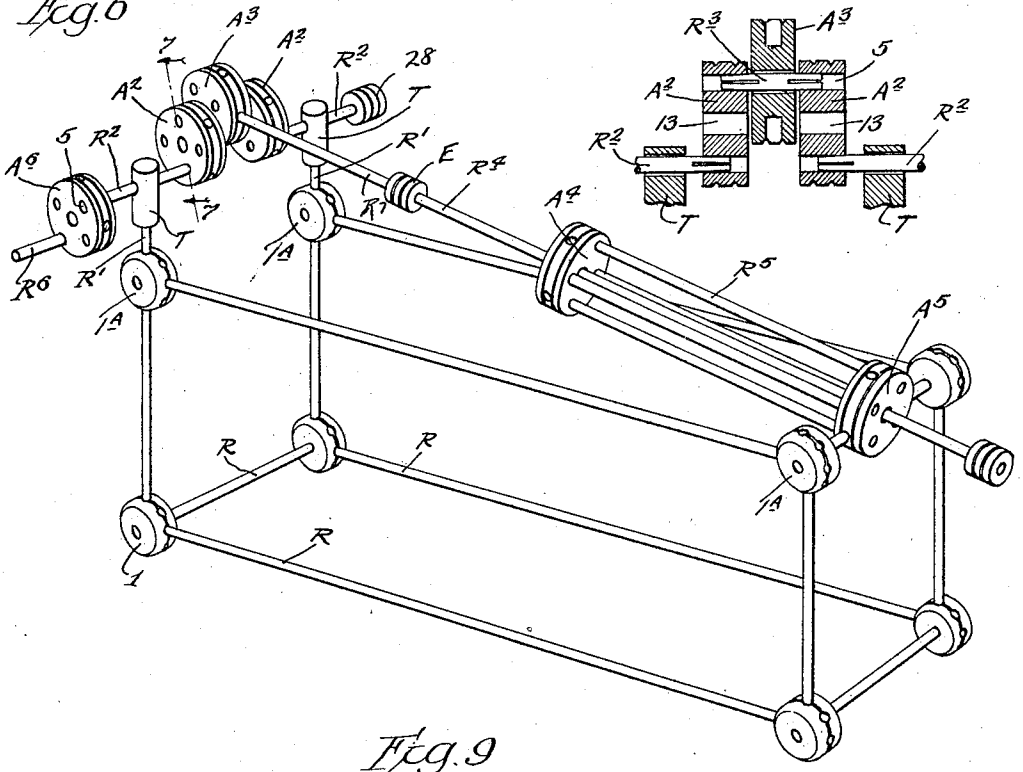


Fig. 7

Fig. 8

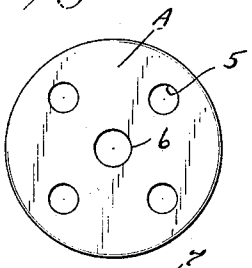


Fig. 9

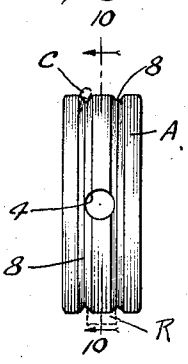


Fig. 10

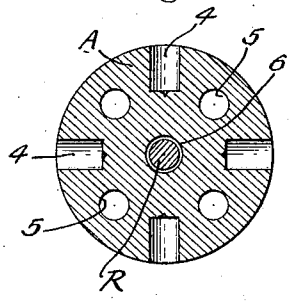


Fig. 13

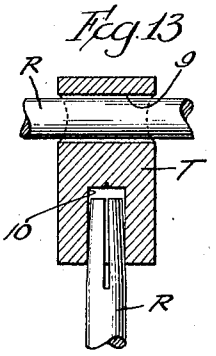


Fig. 11

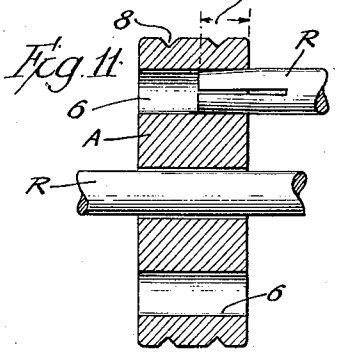
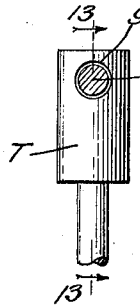


Fig. 12



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Patented June 27, 1933 1,915,835

UNITED STATES PATENT OFFICE

CHARLES HAMILTON PAJEAU, OF GLENCOE, ILLINOIS, ASSIGNOR TO THE TOY TINKERS, INC., OF EVANSTON, ILLINOIS, A CORPORATION OF ILLINOIS

TOY CONSTRUCTION BLOCK

Application filed January 16, 1932, Serial No. 587,013. Renewed March 29, 1933.

My invention relates to toy construction blocks of the class in which an assortment of relatively interfitting elements of varying types are adapted to be manually assembled (without the use of bolts or other fastening elements) into structures and mechanisms of widely varying sizes and types.

Since even relatively young children have an adequate imagination for visualizing a mere outline of a structure or mechanism if the outlining portions defined the borders of walls or other parts of corresponding area, children (and often adults also) find prolonged enjoyment in thus assembling construction blocks consisting of slender rods of varying lengths, together with connecting members adapted to connect the ends of such rods at varying angles to one another.

This has proven to be particularly true with the rods and disks of my United States Patent #1,113,371 of October 13, 1914, which patent disclosed rods of uniform diameter, the rods having both ends slitted so that it can be firmly (and yet readily detachably) socketed either in the axial bore or in any one of a plurality of radially extending bores in wooden disks. When such rods are provided in lengths suitably proportioned for use with disks in which the radial bores extend consecutively at angles of 45 degrees from each other, the variety of rigid structures into which the average child can combine such rods and disks is enormous.

However, the firm interfitting of such rods and connecting disks does not lend itself to a combining of such toy construction blocks into resemblance of mechanisms, vehicles or other assemblages in which a relative rotational or sliding movement of various parts is essential. My present invention aims to overcome this limitation by providing supplemental construction elements which can readily be used in connection with the rods and the connecting disks of my said patent for affording rotatable or slidable connections, and for serving as wheels for a movable structure.

Moreover, my present invention aims to provide disk-like connecting members for this purpose which can also be connected to the rods to form eccentrics or cranks, which can be used in pairs in connection with pluralities of rods to form cages or the like; which can be employed in connection with cords to function as driving or hoisting wheels, or without cords as friction pulleys; which can also be used as rigid connections between pluralities or rods, with the rods either radiating from the axis of the connecting member in the general plane of the disk, or partly in a direction at right angles to this plane; and which disk-like connecting members can also be used as rigid connections between rods all extending in a direction at right angles to the general plane of the disk.

In addition, my present invention aims to provide rod connectors of a firmly rod-fitting type disclosed in my said patent, which connectors can also be used for receiving motion from, or imparting motion to a cord; and also aims to provide more simple and compact cap-like construction blocks adapted for rigid connection to the end of one rod and for slidable connection to another rod extending in a plane at right angles to the aforesaid rod.

Illustrative of the manner in which I attain these objects and of some of the novel assemblages which can be made by combining my new toy construction blocks with those of my aforesaid patent.

Fig. 1 is a perspective view of a construction block assemblage including a wind-rotated shaft, an imitation centrifugal governor actuated through a friction wheel connection, a twin pulley and cord arrangement, and a trip-hammer actuated from the said shaft through the pulley and cord connections.

Fig. 2 is an enlargement of a portion of Fig. 1, showing the arrangement for rotating the simulation of a centrifugal governor.

Fig. 3 is an enlargement of another portion of Fig. 1, showing the trip-hammer in two extreme positions.

Fig. 4 is a perspective view of another assemblage, simulating a tractor.

Fig. 5 is an enlarged and fragmentary section taken along the line 5—5 of Fig. 4.

Fig. 6 is a perspective view of another assemblage showing a simulation of a steam engine of the oscillating cylinder type.

Fig. 7 is an enlarged and fragmentary section taken along the line 7—7 of Fig. 6.

Figs. 8 and 9 are respectively side and edge elevations of one of my novel multi-parallel-bored, axially bored and peripherally double-grooved disk-like connectors, drawn on an enlarged scale.

Fig. 10 is a section taken along the line 10—10 of Fig. 9.

Fig. 11 is an enlarged section taken radially of one of the disk-like connectors of Figs. 8 to 10, showing a part of one rod as extending rotatably (or slidably) through the axial bore of this disk and showing the end of another rod as firmly gripped by one of the bores which are parallel to this axial bore.

Fig. 12 is an elevation showing one of my new cap connectors firmly mounted on one end of a rod, and also showing another rod as extending slidably (or rotatably) through this connector.

Fig. 13 is an enlarged section taken along the line 13—13 of Fig. 12.

In accomplishing the objects of my invention after the here illustrated manner, I provide three additional types of construction blocks, in addition to peripherally grooving the disk connectors of my said patent, for these reasons:

To permit such assemblages to be made with a relatively small number of toy construction blocks (so as to reduce the manufacturing and shipping costs, thereby permitting the sale price to be correspondingly low), I provide an assortment of rods R (Fig. 5) of suitably proportioned lengths and also a plurality of rigid 1 connectors in the form of disks, both after the general manner disclosed in my aforesaid patent, these rods and disks all desirably being of wood. Each of the rigid connectors 1 has an axial bore 2 extending through it and a plurality of radial bores 3 also extending into it, the radial bores being preferably eight in number and having their axes consecutively at angles of 45 degrees from each other, and each of these radial bores being of the same diameter as the axial bore. In addition, each rigid connector 1 has a peripheral groove G (Fig. 5), the center line of which groove is preferably in the same plane with the axes of all of the radial bores.

Each of the rods R has a diametric slot S in each end thereof which slot divides each rod end into two prongs adapted to be flexed toward each other when the rod is inserted in one of the standard-sized bores 2 or 3 and the rod has its axis out of alinement with the axis of that bore. The diameter of all rods is also uniform and sufficiently close to the diameter of the said standard-sized bores that each rod end will be tightly gripped by a bore into which it is forcibly inserted, so that the resiliency of the split rod end will effect a firm connection of the rod to the disk (or rigid connector) 1 either axially or radially of that connector.

These rods are furnished in pluralities of assorted length, with at least part of the lengths proportioned substantially in ratios of one to the square root of two, thereby permitting two rods of each length to afford two sides of a triangular skeleton structure of which a rod of the next longer length forms the hypotenuse, the connecting of thus proportioned rods by such rigid connectors 1 being permitted by the resiliency of the slitted rod ends as explained in my said patent. Thus constructed, these rods and rigid connectors can readily be assembled to constitute quite stable and yet easily disassembled structures, such as the skeleton framework of Fig. 1.

To permit rotating or sliding movements between parts of such a rod and rigid connector assemblage, I provide auxiliary disks A (hereafter termed movable connectors), as shown in Figs. 8 to 11 inclusive. Each of these disks has four radial bores 4 extending into it, with the axes of the consecutive bores at right angles to each other, each radial bore 4 being of the same rod-fitting diameter as the bores 2 and 3 in the aforesaid rigid connectors. In addition each movable connector A has an axial bore 6 sufficiently larger than the uniform diameter of the rods R so that any such rod can be slid freely through this axial bore, the difference in the diameters of the rods R and the bore 6 being exaggerated in Figs. 5, 10 and 11 to clarify the drawings.

Extending respectively between each two consecutive radial bores 4 parallel to the axial bore 6 are auxiliary bores 5, each of which is of the same (firmly rod-gripping) diameter as the radial bores 4. Each of these auxiliary bores extends entirely through the disk and the thickness of each disk A desirably is fully twice the depth 7 (Fig. 11) to which the slitted end of each rod may need to be inserted in such a bore to have the rod end firmly gripped, while the depth of each radial bore 4 merely needs to correspond to the same depth 7.

Thus constructed, each movable connector A affords four similarly spaced and parallel bores each of which will firmly grip rods extending into it from opposite sides of the connector.

In addition to providing these auxiliary parallel bores and providing an enlarged axial bore, I also provide the periphery of each movable connector A with two grooves 8 (Fig. 5) which preferably are V sectioned grooves disposed so that the bottoms of the two grooves are spaced by a slightly greater distance than the diameter of one of the rods

R. Thus arranged, this movable connector affords two grooves disposed so that a cord C (Fig. 9) engaging either groove will not catch upon, or be torn by, the mouth end of the radial bores 4, and also disposed so that either one or two cords can be used in this manner even if a rod R is socketed in one of the radial bores 4 as shown in dotted lines in Fig. 10.

With my movable connectors A thus constructed, the axial bore 6 will readily permit sliding and rotating movements of a rod R extending through this axial bore, and each such connector A may have from one to four rods socketed in its radial bores.

However, in many assemblages a slidable or rotatable connection is only needed between two rods having their axes at right angles to each other. Hence I desirably also provide cap-connectors T as shown in Figs. 12 and 13, so as to enlarge the constructive range of my toy construction blocks at considerably less cost than that of an increased number of the disk-like movable connectors A. Each such cap connector T may be a simple cylinder having a transverse bore 9 of the same diameter (larger than a rod R) as the axial bore 6 of a movable connector, and having a longitudinal bore 10 extending into it for a depth at least equal to the rod-gripping depth 7 (of Fig. 11), the diameter of this longitudinal bore 10 being the same as that of the non-axial longitudinal bore 5 in the movable connectors.

As a further novel construction element, I also provide couplings E (Fig. 2) each of which has a bore 25 of the same rod-gripping size as the aforesaid bores 2, 4, and 5 and of sufficient length for grippingly receiving the ends of two of the rods when these rods are inserted from opposite ends of the coupling. Each such coupling also has at least one and preferably two peripheral grooves 26 each adapted to be entered by a cord, so that the coupling can be used either for connecting two rods in extension of each other (as in Fig. 6), or as a belt pulley with a driving cord entering either groove.

Illustrative of a novel assemblage afforded by the mere addition of movable connectors A, cap connectors T and couplings E to the rods R and rod-gripping connectors 1 when the latter are also peripherally grooved, Fig. 6 shows an engine simulation in which the frame-work consists mainly of such rods and of the rigid connectors 1. Extending upwardly from two spaced rigid rod-gripping connectors 1A in this figure are two rods R^1, each of which has its upper end socketed in the downwardly opening longitudinal bore 10 of a cap connector T.

Extending through the transverse bore 9 in each cap connector and freely rotatable in that bore is a rod R^2 which has its inner end gripped within one of the non-axial longitudinal bores 5 of one of two relatively spaced movable connectors A^2. Interposed between these movable connectors is third movable connector A^3, through the axial bore of which an axle-forming rod R^3 extends as shown in Fig. 7. This last-named rod, upon which the connector A^3 can freely rotate, has each end thereof firmly gripped in a non-axial longitudinal bore 5 of the said spaced movable connectors A^2, the assembly being such that the axial bores 6 of the last named aline, as also shown in Fig. 7.

Firmly gripped at its forward end in a radial bore of the central connector A^3 is a longer rod (consisting of two rods R^4 and R^7 connected by a coupling E, which rod extends slidably through the axial bores of two additional movable connectors. The rearward one of these connectors (A^5) is pivoted to the structure, while the forward one (A^4) is rigidly connected to the connector A^5 by four rods R^5, each firmly gripped at each end within one of the non-axial longitudinal bores 5 of the two additional movable connectors.

Thus assembled, the two movable connectors A^4 and A^5 together with the interposed rods R^5 form an oscillatable assemblage which simulates the cylinder of an engine, and for which cylinder the rod R^4 simulates the piston rod. At the same time, the said two spaced movable connectors A^2 together with the interposed connector A^3 and the rod R^3 afford a crank connecting the imitation piston rod R^4 with the rods R^2 which form the ends of a crank shaft. By also gripping the outward end of one crank-shaft rod R^2 in a non-axial longitudinal bore 5 of another connector A^6 and socketing an additional short rod R^6 in the diametrical opposite bore 5 of that connector, the erector can provide a hand crank for rotating the crank-shaft so as to oscillate the piston rod and the cylinder, operating this engine simulation.

Moreover, by attaching one of my couplings to the opposite end of the crank-shaft from the crank-handle R^6, I can afford a driving connection from this engine shaft to any other toy having one of my movable connectors or peripherally grooved rigid connectors on a shaft-forming rod.

In the "wind jammer" assembly of Fig. 1, the hub 15 of the wind vane is one of the smaller rod-gripping connectors 1, in axial bore of which two stub shafts 16 and 17 are gripped. One of these stub shafts is journaled in the cross-bore of a cap connector T^2 as shown in Fig. 1, while the other is similarly journaled in a companion cap connector T^3 which is concealed in Fig. 1 by the driving wheel 18 but is shown in Fig. 18, this driving wheel having its axial bore firmly gripping the end of the shaft 16 which is forward in Fig. 1.

Both of the cap connectors T^2 and T^3 (in Figs. 1 and 2) are rigidly supported by sta-

tionary parts of the structure, as also a riser rod R^7 which rod extends through the alined axial bores of two movable connectors 19 and 20, these two connectors being rigidly connected (after the manner of the piston-simulating portion of Fig. 6) by rods 21 each of which has each end firmly gripped within a non-axial longitudinal bore of one of the said connectors 19 and 20.

Socketed respectively in opposite radial bores 4 of the upper of these connectors (20) are the inner ends of two short rods 22, each of which has its outer end firmly gripped within the axial bore of a rod-gripping connector 23 which is a counterpart of the connectors 1. Thus assembled, and with a portion of the lower movable connector 19 seated on the periphery of the driving wheel 18 as shown in Figs. 1 and 2, a rotation of the wind vane will also rotate the just described assembly, in which the laterally disposed upper connectors 23 look sufficiently like weights so that this assembly simulates a centrifugal governor.

In Fig. 4, the illustrated imitation tractor, includes two rigid wheel assemblies each consisting of two of my movable connectors (28 and 29) connected by rods R^9 and R^{10} of equal length, which rods are firmly gripped in diametrically opposite non-axial bores of the connectors and are of equal length. Extending through the larger axial bore of the two connectors of each wheel assembly is a somewhat longer rod 33 which is gripped at each end (outward of the adjacent wheel 28 or 29) by one of my rigid connectors 1.

After the two twin wheel assemblies have thus been constructed, they are connected to each other by side rods 30 and 31, each rod being firmly gripped at each end within a radial bore of one of the rigid connectors, so that these side rods are connected to the two shaft-forming rods 33 to form a rigid frame. Two endless cords or bands B (which desirably are elastic rubber bands) are then snapped over the two movable connectors at each side of the assemblage, to simulate the crawler bands of a tractor.

In the "wind jammer" of Fig. 1, I employ two spaced rotatable connectors A^3 and A^4 connected by two rods R^{12} having their ends respectively socketed in diametrically opposite non-axial longitudinal bores of these connectors, after the manner of each of the two wheel assemblies of Fig. 4. Then use two other connectors for journaling a rod R^{11} on which another connector 34 is fastened. This member 34 has two alined rods 35 and 36 socketed in diametrically opposite radial bores of that member, and the outer end of each of these rods is gripped within a radial bore of another rigid connector (37 and 38 respectively). An extension rod 39 socketed in a radial bore of the connector 37 projects into the path of the rods R^{12} of the just described assembly, so as to be engaged by these rods at each half rotation of that assembly, thereby rocking the rod assembly (which includes the rods 35 and 36) about the axis of the journaled rod R^{11}.

The connector 38 at the other end of this rod assembly is connected by a rod 39 to another rigid connector 40 which functions as a hammer head or "clapper" for engaging an "anvil" connector 41 which is supported so that the connector 40 will seat on it whenever the rod 39 is not depressed by engagement with one of the parallel rods R^{12}. Consequently, a continuous rotation of the connector and rod assembly constituted by the rods R^{12} and the connectors 1E and 1F intermittently raises the "clapper" connector 40 and then allows gravity to slam that clapper back against the "anvil" 41.

To secure this rotation, the rigid connector 18 of Fig. 2 is connected to the rotating disk and rod assembly by an endless band 42 which extends partly around the connector 1F in Fig. 3, this band being guided by the walls of the groove in Fig. 2 and by one of the peripheral grooves on the connector 1F.

While highly numerous other illustrations of assemblages made from pluralities of the same elements might be presented, it should be obvious from the above that the here presented simple and cheaply manufactured additional blocks add enormously to the range of such structure. Moreover, since these novel additions to the previous rod and disk construction toy sets permit of the assembling of so many and varied structures in which parts are movable, and in which the completed structure can effectively simulate mechanisms and vehicles, my novel additions greatly increase the satisfaction afforded to children by toy construction blocks and also make them appeal to those who are too old to be content with the erecting of merely rigid structures.

However, while all of the above described novel features are desirably included in a single set of construction blocks, I do not wish to be limited in this respect. Nor do I wish to be limited to the illustrated details of the proportions, construction and arrangement of my novel features, as many changes might be made without departing either from the spirit of my invention or from the appended claims.

I claim as my invention:

1. A toy construction block for use with rods of uniform diameter, comprising a disk having an axial bore and having a plurality of pairs of bores extending radially into the disk, the radial bores all being of a size for tightly receiving an end of one of the said rods, the axial bore of the disk being sufficiently larger in diameter than such a rod for permitting a rod to be slid freely through it to afford a rotatable mounting for the disk.

2. A toy construction disk as per claim 1 in which the disk is provided also with rod-gripping bores extending parallel to the said axial bore and disposed radially outward of the said axial bore.

3. A toy construction disk as per claim 1 in which the disk is provided also with rod-gripping bores extending parallel to the said axial bore and disposed radially outward of the said axial bore, the said rod-gripping bores extending between the radial bores in the disk.

4. A toy construction disk constructed as per claim 1, in which the disk is provided also with two peripheral grooves, each groove having its medial plane spaced from the axes of the radial bores in the disk by a distance at least equal to the radius of these radial bores.

5. A construction block for use with rods of a counterpart diameter, comprising a disk having an axial bore sufficiently larger than the said diameter to permit a rod to be slid freely through the said bore; the disk also having a plurality of auxiliary bores spaced from and extending through the disk parallel to the axis of the disk, each auxiliary bore being of such a diameter as to cause the slitted end of a rod to wedge tightly therein when inserted into that bore for only about half the length of that bore.

Signed at Chicago, Illinois, January 13th, 1932.

CHARLES HAMILTON PAJEAU.