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[54] **TOY CONSTRUCTION KIT**
10 Claims, 1 Drawing Fig.

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[56] **References Cited**
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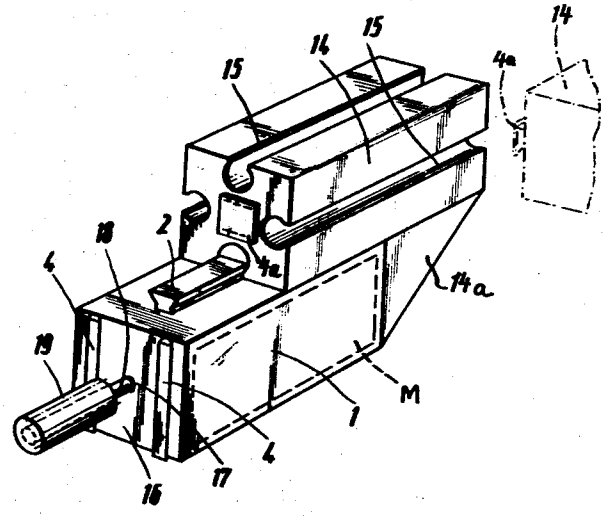
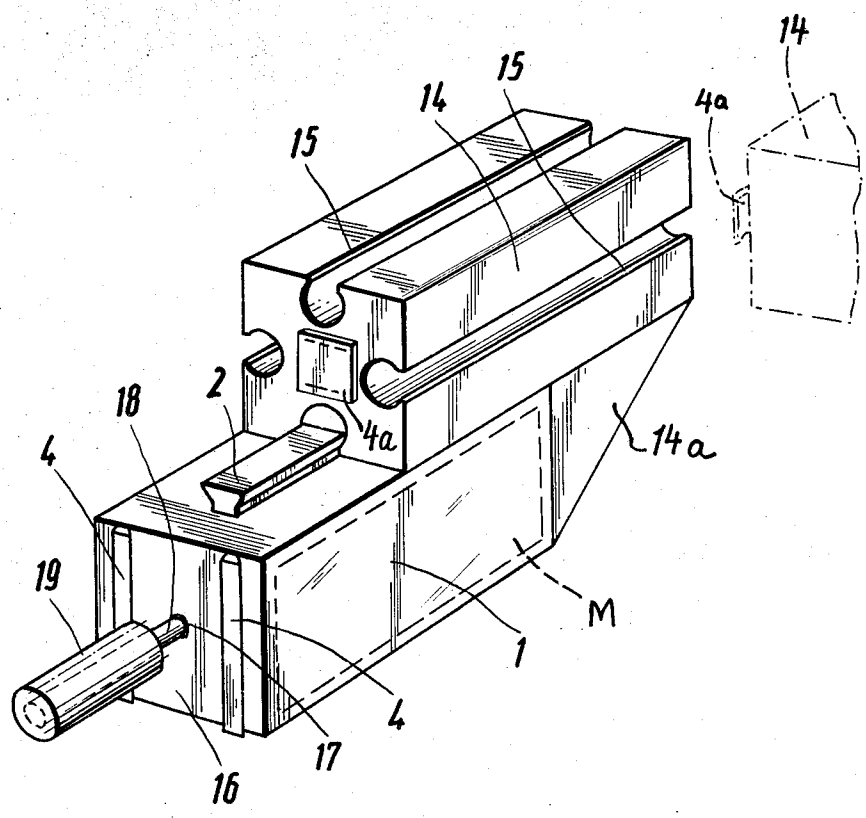
ABSTRACT: A toy construction kit includes, among other connectable structural elements, a plurality of building blocks of identical predetermined dimensions and outline. A drive unit comprises a housing whose outline and dimensions are identicals with those of the building blocks, and a prime mover which is accommodated in the housing and has an output shaft. Undercut male coupling heads and undercut female coupling grooves are provided on the housing and building blocks and the housing may thereby be connected to the building blocks in place of and in the same manner as another building block, so that the drive unit may be used as an integral component of the structure which is erected with the construction kit.





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TOY CONSTRUCTION KIT

BACKGROUND OF THE INVENTION

The present invention relates generally to a toy construction kit, and more specifically to a toy construction kit of the type comprising a plurality of connectable structural elements provided with coupling means.

Still more specifically, the invention relates to a toy construction kit of the above type which comprises a prime mover whose housing is connectable to the other elements of the kit and is identical in outline and dimension with at least certain ones of these other elements.

Construction kits are known which include a variety of structural elements which can all be secured to one another, whereby models of buildings, vehicles, and the like may be erected. Such kits may be provided with a prime mover, usually in form of a battery-operated motor, so as to make it possible—in conjunction with certain requisite elements such as gears and the like—for the child using the construction kit to erect working models of vehicles, of cranes, and other structures.

Advantageous as such construction kits are, in that they permit functional accuracy of working models which can be erected with them, they do suffer from the disadvantage that the prime movers utilized are considerably larger than the basic building blocks of the kit, often by a multiple of the dimensions of these building blocks, and thus make it impossible to provide a working model which is not only functionally but also proportionately accurate. This is particularly true in the many instances where it is necessary to employ two or more of the prime movers in order to obtain the desired functional accuracy.

Accordingly, these known construction kits force the playing child to abandon proportionate accuracy of his working model. It need hardly be emphasized that this is undesirable because construction kits of this type should enable the erection of working models which are as close as possible to the original both in their function and in their proportions, in order for the kit to fulfill its desired teaching function and to hold the interest of the playing child as much as possible.

SUMMARY OF THE INVENTION

It is, accordingly, an object of the present invention to provide a toy construction kit which is not possessed of the aforementioned disadvantages.

More particularly it is an object of the present invention to provide a toy construction kit including a drive unit having a prime mover, which drive unit can be integrated into structures erected with the construction kit as if it were one of the basic building blocks of the kit, so as not to force deviation from proportional accuracy of the erected model.

In pursuance of the above objects, and of additional objects which will become apparent hereafter, one feature of my invention resides, briefly stated, in a toy construction kit which comprises a plurality of building blocks of identical predetermined dimensions and outline, and a drive unit having a housing whose outline and dimensions are identical with those of the building blocks and a prime mover accommodated in the housing and including an output shaft. Further, mating male and female coupling portions are provided on the building blocks and the housing and the identity of outline and dimensions of the building blocks and the housing enables use of the latter by connecting it via the coupling portions with the building blocks, the drive unit thus being capable of being used in place of and in the same manner as one of the building blocks so that it may constitute an integral component of the structure which is erected with the construction kit.

This means that the drive unit can be located at almost any desired locus of a structure erected with the construction kit, simply by using it in place of one of the building blocks whose outline and dimensions are identical with those of the housing of the drive unit. Moreover, if there is no need for employment of the prime mover per se, that is if a structure is erected which does not include any components which must be powered by the prime mover, the drive unit can simply be used as a building block, or more particularly in place of one of the building blocks with which it shares identity of dimensions and outline.

I have found it to be particularly advantageous if the building blocks in question and the housing of the drive unit are elongated and of quadratic cross section, having a length of approximately 30 mm. and a height and a width of approximately 15 mm. each. Of course, the dimensions may be different but whatever dimensions are chosen, those of the housing will always be identical with those of the building blocks in question as per the present invention. If the dimensions are as small as those mentioned above, it is advantageous to have the output shaft of the prime mover extend outwardly beyond one end face of the housing, that is longitudinally thereof.

The coupling portions are preferably in form of projecting undercut male coupling heads and undercut female coupling grooves with the latter having at least one open end into which the coupling heads can be inserted endwise. In this manner the coupling heads cannot be withdrawn in direction transversely to the elongation of the grooves, once they have been introduced into the grooves. This provides for a more reliable connection.

It is also advantageous, if the drive shaft projects beyond one face of the housing, to provide the housing with two elongated undercut coupling heads provided on this one end face and extending in parallelism with one another, the coupling heads being located at opposite sides of the drive shaft. In addition, one of the side faces of the housing may be provided with a similar elongated coupling head which extends centrally of the side face in longitudinal direction of the latter, and thereby of the housing. In this case, the single coupling head may then be used to connect the housing with one or more of the building blocks, or indeed any other structural elements of the toy construction kit, whereas a transmission—which may form a part of the construction kit and be provided with one or more undercut coupling grooves—may be connected with the housing via the coupling heads provided on the one end face so that it meshes with a gear, for instance a worm, provided on the output shaft.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims.

The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawing.

BRIEF DESCRIPTION OF THE DRAWING

The single FIGURE is a perspective view illustrating a drive unit in conjunction with several building blocks, as encompassed in a toy construction kit according to the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Discussing the drawing in detail it will be seen that reference numeral **1** identifies the housing of the drive unit, with the prime mover M being accommodated in the interior of the housing **1** and being shown only in phantom lines. Evidently, the prime mover M may be included in a chamber provided in the housing **1**, or it may even be encapsulated in the housing **1**, as by being cast about with the material of the housing **1** which may be synthetic plastic. In any case, it will be seen that the housing **1** has longitudinal and transverse dimensions which are identical with those of a building block **14**, of which a plurality are provided in a construction kit according to the present invention. Only one building block **14** is shown in full lines, and one other is shown in phantom lines and broken away. Not only the dimensions but also the overall

configuration of the housing **1** is identical with that of the building blocks **14**.

The building blocks **14** are provided in their side faces with longitudinally extending undercut female coupling grooves **15** whose cross-sectional configuration is clearly shown. The visible end face of the building block **14** is provided with a projecting undercut coupling head **4***a* which is so configurated as to be matingly receivable in grooves whose cross section corresponds to that of grooves **15**. The opposite end face may or may not be provided with a similar coupling head **4***a*. The cross-sectional configuration of the coupling head **4***a* may be the same as that of the coupling head **2** which is provided on a side face of the housing **1** extending longitudinally of the latter.

One end face **16** of the housing **1** is provided with an opening **17** through which the output shaft **18** of the prime mover M projects outwardly beyond the end face **16**. The output shaft **18** may carry, as illustrated, a worm gear **19**.

In accordance with the invention the end face **16** may be provided with two elongated coupling heads **4** whose cross-sectional configuration may be the same as that of the coupling head **2** and which extend transversely spaced in parallelism with one another, being located on opposite sides of the output shaft **18** as illustrated. As mentioned before, a gear unit may be connected with these coupling heads **4** so as to mesh with the worm **19**.

It will be appreciated that the opposite end face of the housing **1** may be provided with one or more coupling heads identical with or similar to those identified with reference numerals **2** and **4**, and that still others may be provided on the other side faces of the housing **1**. However, in place of the coupling heads it is also possible to provide undercut coupling grooves corresponding in cross-sectional configuration to those identified with reference numeral **15** on the building block **14**.

The building block **14** which is shown in phantom lines is identical in all respects with the one shown in full lines.

Of course, construction kits of this type use other structural elements beside the basic building blocks **14**. One such other structural element is identified with reference numeral **14***a* and will be seen to be a building block of substantially triangular cross section which may be provided with projecting undercut coupling heads and/or undercut coupling grooves corresponding to those shown in conjunction with the housing **1** and the building blocks **14**.

The box **14**, the element **14***a*, the housing **1** may all be made from synthetic plastic material, although other materials are of course suitable.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of constructions differing from the types described above.

While the invention has been illustrated and described as embodied in a toy construction kit, it is not intended to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of the present invention.

I claim:

1. In a toy construction kit, in combination, a plurality of building blocks of identical predetermined dimensions and outline; a drive unit, comprising a housing having an outline and dimensions identical with those of said building blocks, and a prime mover accommodated in said housing and including an output shaft; and mating male and female coupling portions provided on said building blocks and said housing, the identity of outline and dimensions of said building blocks and said housing enabling use of the latter in place of and in the same manner as one of said building blocks whereby said drive unit may be used as an integral component of a structure erected with said construction kit.

2. In a toy construction kit as defined in claim **1**, wherein said building blocks and said housing each comprise a plurality of external surfaces, and wherein the respective coupling portions are provided on at least some of said surfaces of each of said blocks and on at least one of said surfaces of said housing.

3. In a toy construction kit as defined in claim **2**, wherein said male and female coupling portions are of undercut configuration.

4. In a toy construction kit as defined in claim **3**, wherein said male coupling portions are undercut projecting coupling heads, and wherein said female coupling portions are undercut coupling grooves each having at least one open end for endwise introduction of a coupling head.

5. In a toy construction kit as defined in claim **4**, wherein said one surface of said housing is provided with at least one of said undercut coupling heads.

6. In a toy construction kit as defined in claim **5**, wherein said one undercut coupling head is elongated in parallelism with said one surface.

7. In a toy construction kit as defined in claim **1**, said building blocks and said housing being elongated and of quadratic cross section, and wherein the dimensions of said blocks and said housing in three mutually normal directions are identical and on the order of 15×30 mm.

8. In a toy construction kit as defined in claim **1**, said building blocks and said housing being elongated and each having spaced end faces, and wherein said output shaft projects outwardly beyond one of said end faces of said housing.

9. In a toy construction kit as defined in claim **8**, said coupling portions comprising undercut male coupling heads and undercut female coupling grooves, and wherein said one end face of said housing is provided with a pair of said undercut male coupling heads both elongated in parallelism with said one end face and with one another and respectively located at opposite sides of said output shaft.

10. In a toy construction kit as defined in claim **9**, said housing further comprising a plurality of elongated side faces extending at least substantially normal to said end faces; and wherein said coupling portions on said housing further comprise an elongated undercut coupling head provided on one of said side faces extending centrally thereof in direction of elongation of said one side face in parallelism with the latter.