

[54] TOY BUILDING ELEMENT  
CONSTRUCTIONS

[76] Inventor: Josef Bucheli, Busenhardstrasse  
1066, Herrliberg, Switzerland

[22] Filed: May 13, 1971

[21] Appl. No.: 143,152

[30] Foreign Application Priority Data

May 15, 1970 Switzerland..... 7359/70  
Apr. 1, 1971 Switzerland..... 4769/71

[52] U.S. Cl..... 24/252 CP, 46/16, 46/29

[51] Int. Cl..... A44b 21/00

[58] Field of Search..... 46/16, 23, 29;  
24/252 GC, 252 CP, 255 SL, 248 SL, 137 A,  
252

[56] References Cited

UNITED STATES PATENTS

1,400,066	12/1921	Huck .....	46/29
2,022,261	11/1935	Wade .....	46/23
2,303,961	12/1942	Sprague .....	24/137 A
2,330,120	9/1943	Hagelstein.....	24/137 A UX
2,922,209	1/1960	Longhi.....	24/137 A
3,021,159	2/1962	Back .....	46/29 X
3,486,268	12/1969	Fischer .....	46/16

FOREIGN PATENTS OR APPLICATIONS

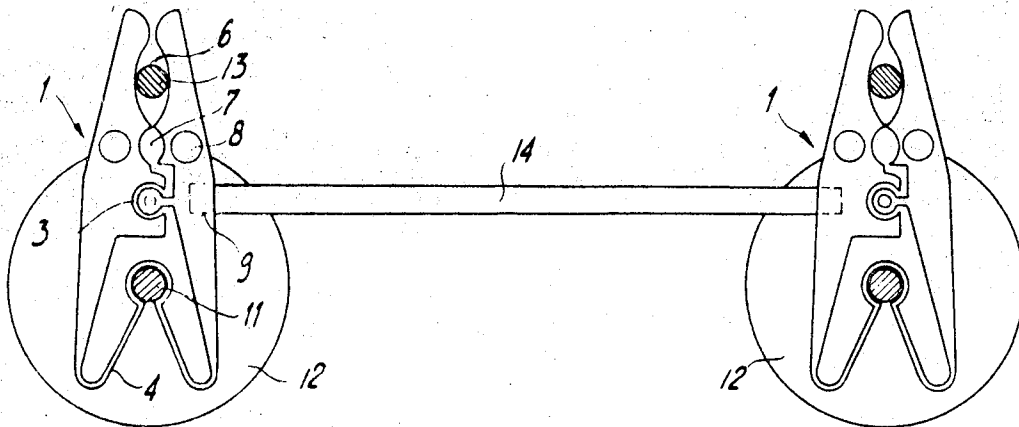
448,953 4/1968 Switzerland..... 24/137 A

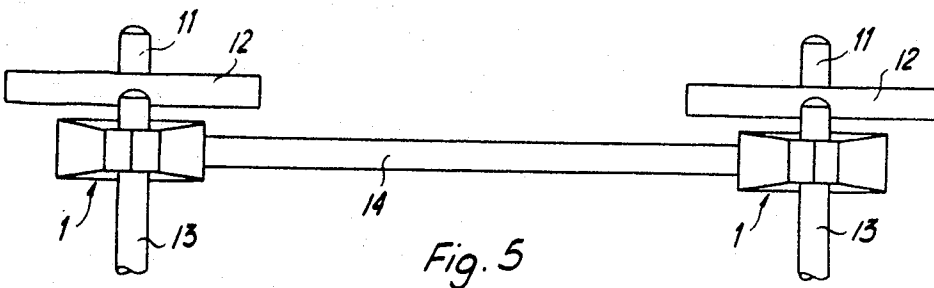
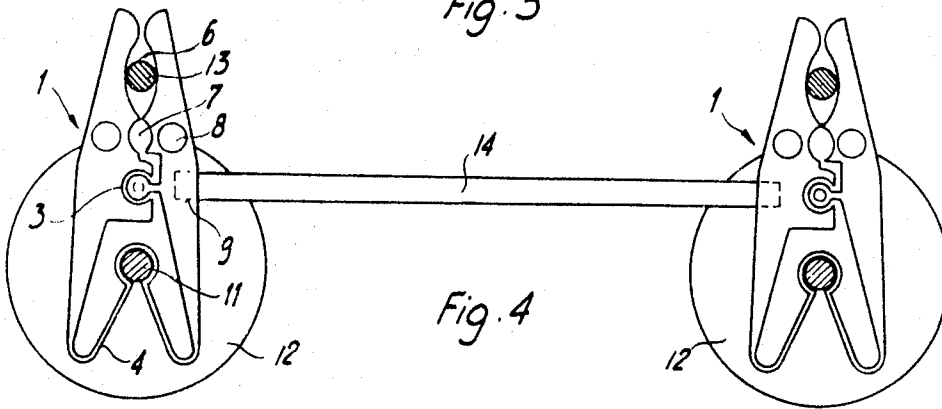
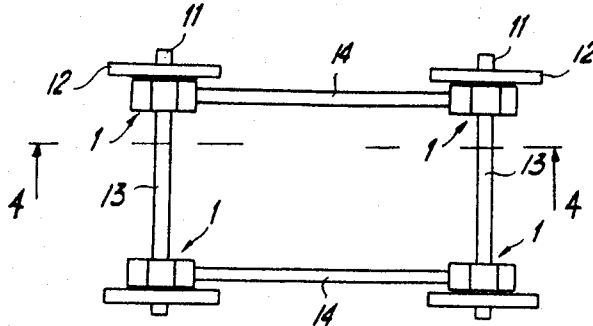
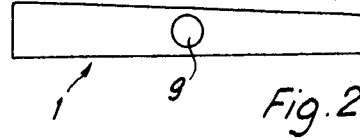
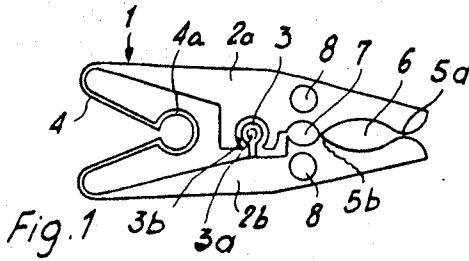
Primary Examiner—Donald A. Griffin  
Attorney—John J. McGlew and Alfred E. Page

[57] ABSTRACT

A set of elements for constructing toy devices includes a basic clothes-pin type part or clamping element which comprises first and second arms which are pivoted together by a ball-shaped formation on one which extends into a socket formation on the other end which are held together in a pivoted formation. A V-shaped spring is formed inwardly between one of the common ends of the adjacent arms and the opposite ends form clamping jaws. The clamping element includes at least one opening at each arm to permit passage of a rod-shaped structural element therethrough, and in addition, the V-shaped spring part is formed with a round apex to facilitate engagement over a similar rod-shaped element at this location. The clamping jaws may be sprung open to engage over a rod-shaped member or similar structural element. Advantageously the arms each includes an opening in a side or an end or top face or both so that they may be connected to a rod-shaped member on the side, ends or top. If desired, the ball-shaped projection on one of the arms can be lifted out of the socket-shaped part of the arm so that the arms are held spread apart by the V-shaped spring connecting their one ends. A very large number of interengagement possibilities may be obtained with the basic structures combined with one or more additional type toy building structures.

4 Claims, 17 Drawing Figures





INVENTOR.  
JOSEF BUCHELI  
BY John J. McEwen

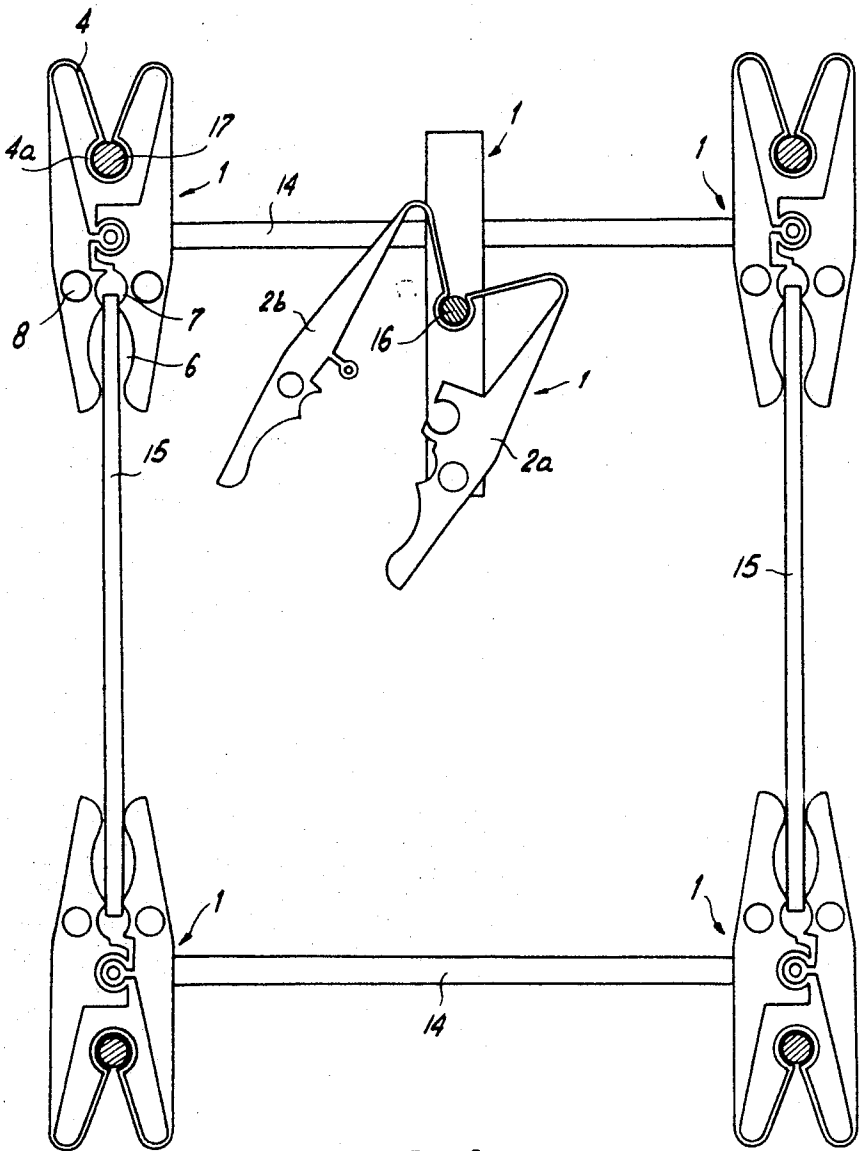
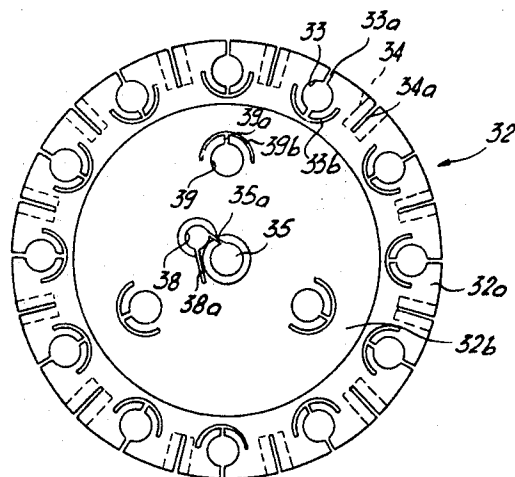
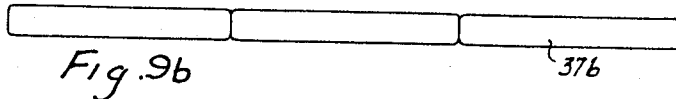
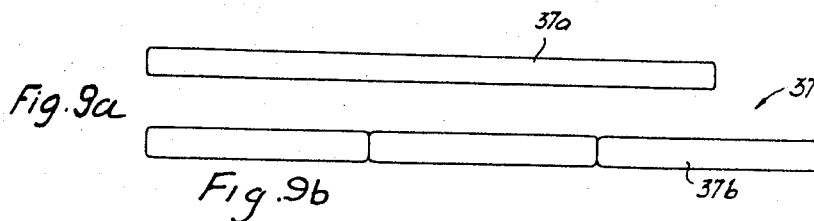
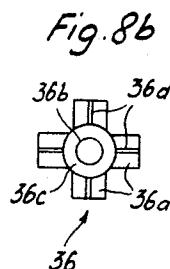
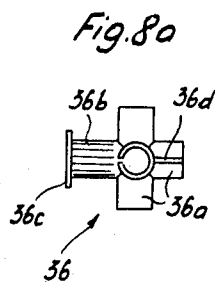
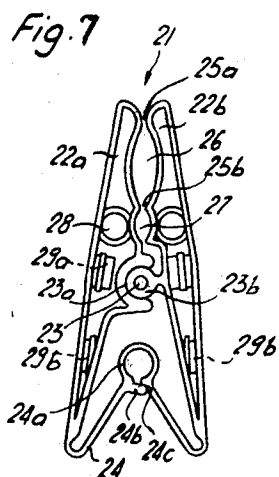


Fig. 6

INVENTOR.  
JOSEF BUCHELI  
BY *John J. McEwen*



INVENTOR.  
JOSEF BUCHELI  
BY *John J. McEwen*

Fig. 11

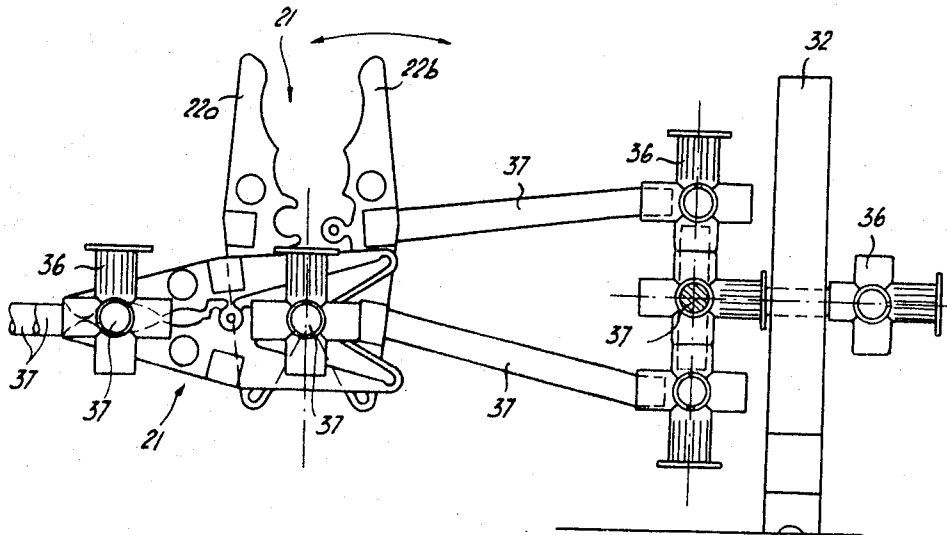
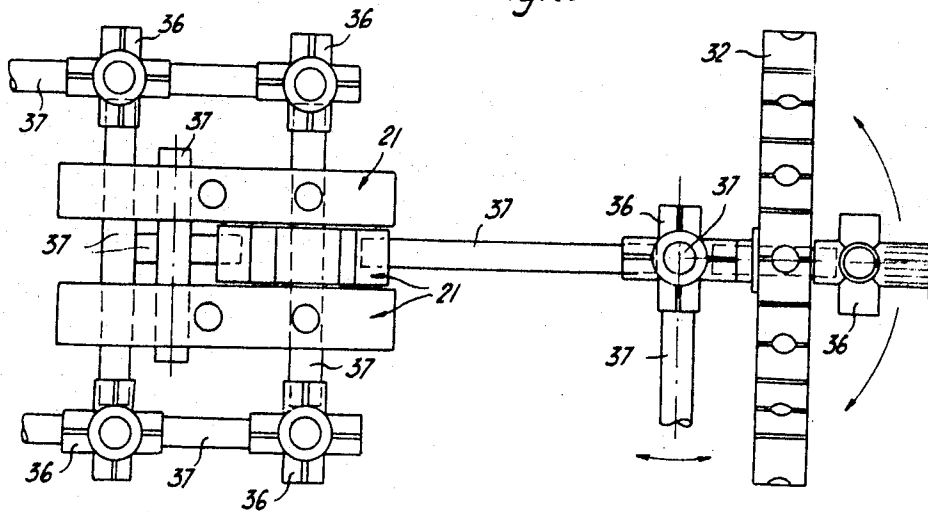
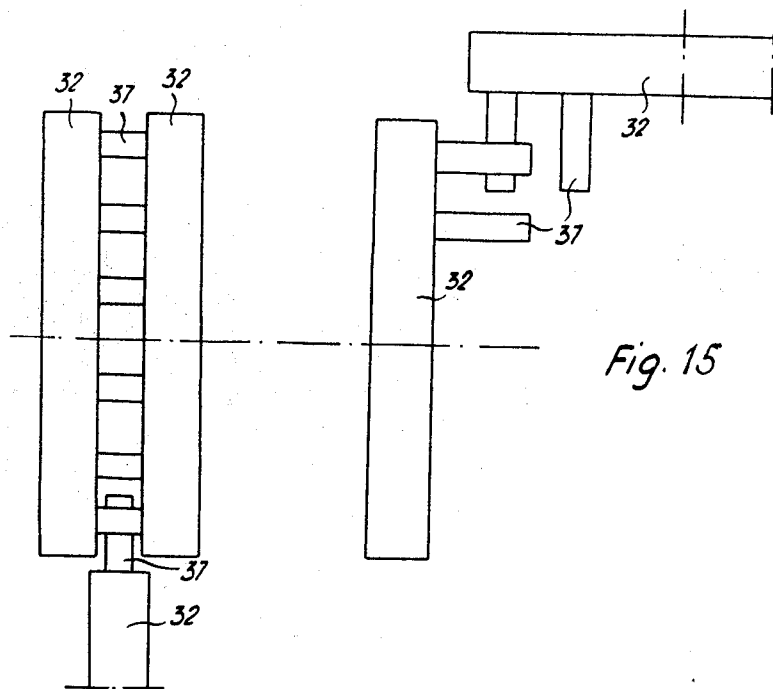
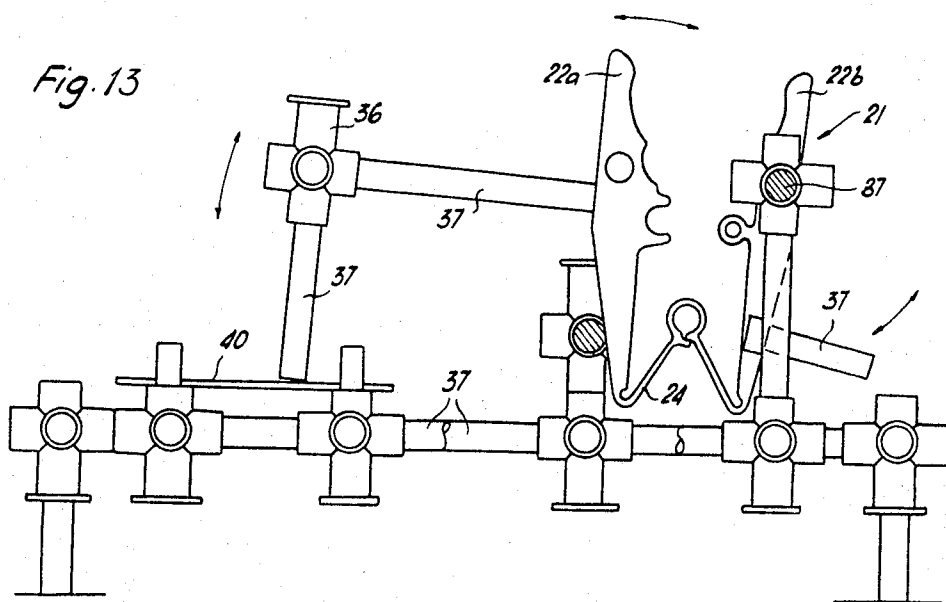


Fig. 12



INVENTOR.  
JOSEF BUCHELI  
BY *John J. McEwen*



*Fig. 14*

*Fig. 15*

INVENTOR.  
JOSEF BUCHELI  
BY *John J. McBlaw*

## TOY BUILDING ELEMENT CONSTRUCTIONS

## SUMMARY OF THE INVENTION

This invention relates in general to the construction of toy building elements and, in particular, to a new and useful toy building element or erector set having a plurality of individual interengageable structural elements, one of which includes pivotally connected clamping arms which are held together by a biasing spring and which have a plurality of receiving recesses or bores for connection to a structural part.

The usual sets of elements for erector sets for toys contain mostly a number of prismatic blocks which can be assembled together directly or through intermediate members. Such blocks which are produced exclusively for toys and models must usually be provided in a relatively great number of variants so that a suitable structural element is available for all desired functions, for example, compression joints, rotary joints, sliding joints, junctions, etc., which may be required in the assembly of different toy structures. Such sets therefore are suitable principally for older children who already have a relatively good distinction capacity and they usually require of the child a relatively good imagination instead of permitting stimulation of the child's imagination.

In accordance with the present invention, there is provided a set of elements for toys which can be assembled with simple additional elements such as rods, bars, wheels, couplings, etc., to practically any imaginable toy structure. To this end the set of elements includes at least one clamping part which is advantageously made of a material such as plastic and which includes two pivotal arms which are joined together at a pivotal ball and socket interconnection and which include end portions which are connected centrally to an inwardly extending V-shaped spring disposed between the arms and holding the arms so that the opposite ends are disposed in a closed clamping condition. The ball and socket joint may be spread apart if desired or it may be used for the pivoting of the arms to open or close the clamping jaws.

The apex of the spring interconnection of the arms is advantageously formed as an elastic ring piece which can be used as an additional clamping point. Preferably, additional recesses, or through openings are defined on the sides or ends, or both, of each arm. These openings may be perpendicular to or at an angle to the plane of motion of the arms and provided, for example, to receive rod or bar-shaped elements. Each arm is advantageously formed of a generally T-shaped cross section with the center of the T forming either a receiving socket or a projecting ball to permit interengagement of the adjacent arms and pivotal movement thereof. The socket and rings are advantageously made elastically deformable so that they can be either snapped into engagement or released from engagement. The ends of the arms which are opposite to the spring interconnection between the arms are formed as clamping jaws which are advantageously curved to permit them to be engaged around the elements as is customary with clothes-pins, for example. The arms form by suitable curving additional inserts or through openings at their clamping ends for engaging with an additional element such as a rod-like member. A particularly effective arrangement is the provision of the ring-shaped apex to the spring extending between the arms which forms an

additional clamping point for engagement with a rod-like member. In order to insure that, particularly with a relatively thin wall ring piece joining the spring arms together, the ring piece can support each other, each spring arm of the clamping element at the apex is provided with a partially cylindrical cross bar which engages a corresponding groove on the other spring arm to form a hinge. The groove is preferably not undercut so that with the arms of the clamping element uncoupled the bar and the groove can easily become disengaged when the ring piece opens.

Additional elements in the form of hexagonal rod couplings whose six sleeve-shaped arms form a right angle to each other can be widened elastically by oblong slots. As additional auxiliary elements the set of elements contains preferably disk wheels whose edge portion have a ring or margin of axis parallel through openings through rods. The circumference of the wheel is provided with radial insert openings. Both the axis parallel openings and radial openings are staggered in relation to each other in the circumferential direction of the wheel and they are expandable by edge slots arranged in axial planes. Axis parallel through openings are also provided in the center part of the disk wheels.

Accordingly, it is an object of the invention to provide an improved toy building element which includes for at least one part thereof a clamping member formed in the general configuration of a clothes-pin and having a first arm and second arm which are pivotally connected together by a snap-fit pivotal connection joint and which have their one ends interconnected by a V-shaped spring and the opposite ends formed into clamping jaws, the building element having a plurality of receiving recesses or through openings for receiving building elements such as rod-like members.

A further object of the invention is to provide a combination of building elements one of which includes a clamping member having pivotal arms which are interconnected by springs having a ring-shaped apex and including a rod-like member which may be passed through the ring-shaped apex or through any one of a number of receiving recesses or through openings and which may be also secured in the clamping jaws at the opposite ends of the arms.

A further object of the invention is to provide a building set of easily interengageable elements which are simple in design, rugged in construction, and economical to manufacture.

The various features of novelty which characterize the invention are pointed out with particularity in the claims annexed to and forming a part of this disclosure. For a better understanding of the invention, its operating advantages and specific objects attained by its uses, reference should be had to the accompanying drawing and descriptive matter in which there is illustrated preferred embodiments of the invention.

## BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings:

FIG. 1 is a side elevational view of a clamping element of a toy building set constructed in accordance with the invention;

FIG. 2 is an end elevational view of the clamping element shown in FIG. 1;

FIG. 3 is a bottom plan view of a toy carriage assembled from elements of a building set constructed in accordance with the invention;

FIG. 4 is an enlarged vertical section taken along the line 4—4 of FIG. 3;

FIG. 5 is a top view of the portion shown in FIG. 4;

FIG. 6 is a top view of a frame structure made up of various building elements constructed in accordance with the invention;

FIG. 7 is a view similar to FIG. 1 of another embodiment of the invention;

FIGS. 8a and 8b show a side and end elevational view of a rod coupling element constructed in accordance with the invention;

FIGS. 9a and 9b are side elevational views of two different embodiments of rod elements;

FIG. 10 is a side elevational view of a wheel element constructed in accordance with the invention;

FIG. 11 is a side elevational view of another model construction of a set of elements in constructional arrangement;

FIG. 12 is a top plan view of the elements shown in FIG. 11;

FIG. 13 is a side elevational view similar to FIG. 11 of another constructional arrangement;

FIG. 14 is a plan view of an arrangement of driving wheel construction; and

FIG. 15 is a top plan view of a bevelled gear connection using two wheel elements constructed in accordance with the invention.

#### GENERAL DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to the drawings in particular, the invention embodied therein comprises, as shown in FIG. 1, a toy building element which is advantageously made of a material such as a plastic and which is designed in a form which is similar to an ordinary clothes-pin. Any number of such clamping elements can form a part of the set of elements for a toy.

In accordance with the invention, the clamping element 1 comprises arms 2a and 2b which are made of a generally T-shaped cross section and which are pivoted together at a pivot joint 3 which is formed by a projecting ball-shaped member 3a on the arm 2b which fits into a receiving socket or recess 3b on the arm 2a. Both the ball 3a and the socket 3b are advantageously resilient so that the ball may be snapped into or removed from the socket as desired.

Each arm 2a and 2b includes a handle or gripping end and these ends are joined together by a V-shaped spring 4 having an apex formed as a resilient ring 4a. The spring apex extends inwardly between the arms and biases the arm so that the opposite clamping end is in a closed clamping position with clamping points 5a and 5b on each arm being in contact or closed.

The thickness of the ring piece 4a can be equal to or preferably smaller than the two spring arms as shown in the drawings. In the coupled state of the arms 2a and 2b the spring 4 is slightly stretched and the ring piece 4 is closed practically as a circular cylinder. The elasticity of this spring 4 permits the opening of the hinged joint 3 so that the arms 2a and 2b assume the position of the clamp designated 1' at the center of the FIG. 6. The arms are held in this spread apart substantially parallel position by the relaxation of the spring 4.

The inner flanges of the arms 2a and 2b on the clamping side are made concave as is customary in clothespins in a form through opening 6 as shown in FIG. 1 between the two clamping points 5a and 5b. Between the

inner clamping point 5b and the hinge 3, the inner flanges of the arms are curved concavely again so that a second clamping or through opening 7 is formed. In the represented embodiment of FIG. 1 the opening 7 is smaller than the opening 6. Directly laterally of the opening 7 are recessed in the web of the arms 2a and 2b circular cylindrical through openings 8 to accommodate rod-like members, for example, similar to the rod members 13 and 14 shown in FIGS. 3, 4 and 5. In the range of the hinge 3 circular cylindrical insert openings 9 are provided on the outer flange of the arms 2a and 2b and they extend perpendicular to the element plane (see FIG. 2). Depending on the cross sectional form of additional structural elements such as the rod elements 13 and 14 to be inserted or put through these openings can also have different, for example, square or rectangular cross sections.

By means of the above-described clamping element 1 which can also be used as a clothes-pin, a number of toy models can be produced by using a few additional structural elements such as rods, wheels, etc. Naturally, it is also possible to use improvised structural parts, for example, cardboard or wood panels, sleeves, etc., provided they can be grasped in some way by one or more clamping parts of the clamped member 1.

FIGS. 3, 4 and 5 show an embodiment of a toy carriage. This carriage has two axle rods 11 on whose end parts is attached one wheel 12 each. Inside the wheels 12 are arranged on each axle rod 11 two clamping elements 1 with upwardly pointing clamp parts. The axle rod 1 is formed in ring piece 4a of the spring 4. In order to secure the wheels 12 on the axle rod 11, clamping elements 1 can also be clamped on the free axle rod ends. Above each axle rod 11 is clamped in the clamping opening 6 of the respective element 1 an additional rod 13. The wheel frames thus formed are thus connected with each other by longitudinal rods 14 which are inserted into insert openings 9 of the corresponding clamping elements 1 which face each other. Such a wheel frame can naturally be provided in different ways with attachments and clamping elements 1 can be again used as fastening elements, which can be inserted in the rods 13 and 14.

In the embodiment shown in FIG. 6, two horizontally arranged pairs of clamping elements 1 are arranged in opposition. The elements 1 of both pairs are connected with each other by cross bars 14 inserted into the lateral openings 9 of the elements 1. The element pairs arranged with the clamping part facing each other are also connected by bars 15 to a frame. The bars are inserted into the clamping points of the clamping elements 1 which face toward each other. On one cross bar 14 is arranged an additional clamping element 1 and the cross bar 14 is advantageously clamped into the ring piece 4a of the spring part 4 of this clamping element. Into the upwardly pointing insert opening 9 of this clamping element is inserted another rod 16, on which is attached a ring piece 4a of a spring 4 of another clamping element 1, which has been opened by disengagement of the hinge 3. Because of the opening of this element 1 an easy rotary fit of the ring piece 4a on the rod 16 is achieved.

On these basic elements can be built any desired structure. To this end, additional rods can be provided in addition to the rod 17 clamped into the ring pieces 4a of the closed clamping elements 1 presented in the drawings which can be inserted, for example, into the



through openings 8. In FIG. 7, a one part clamping element 21 of plastic is indicated. In this construction, the arms 22a and 22b are jointed with each other for each detachment by a snap-fitting hinge 23 between the clamping end and the gripping end. The gripping ends of the arms are connected to each other by a V-shaped inwardly extending spring having an apex which forms an elastic ring piece 24a of a lesser material thickness than the spring arms. One spring arm has directly at the transition to the ring piece 24a a part cylindrical cross bar 24b which engages a corresponding groove 24c of the other spring arm so that a hinge is formed about which the spring arms can turn during the tightening or the relaxation of the spring 24. The hinge 23 jointing the arms 22a, 22b, with each other substantially in their longitudinal center is formed by an undercut groove 23a provided on the inner flange of one arm 22a and by an elastic ring cam 23b provided on the inner flange of the other arm 22b and engaging the groove. The inner flanges of the parts 22a, 22b on the clamping side of the arm are concave as is customary with clothespins, and they thus form therebetween two clamping points 25a and 25b and a through opening 26. Between the inner clamping point 25b and the hinge 23, the inner flanges of the arms are again curved concave so that a second, although a smaller, through opening 27 is formed. Directly laterally of the opening 7 are recessed in the web of the arms 22a and 22b cylindrical circular through openings 28. In the range of the hinge 23 and toward the gripping end there are circular cylindrical insert openings 29a and 29b which are located on the outer flange substantially perpendicular to this flange. The axes of the openings 29a and 29b are slightly inclined toward each other but they can also be parallel to each other.

FIGS. 8a and 8b show additional building elements in the form of plastic rod couplings 36 each of which comprises six sleeve arms some of which are designated 36a and some of which are designated 36b, and the arms extend at right angles to each other. The bores of the sleeve arms are continuous. One slightly longer sleeve arm 36b has an end flange 36c and it is longitudinally grooved on its exterior surface. All of the shorter sleeve arms 36a which are of equal length are elastically expandable by oblong slots 36d.

The insert or through openings of the clamping elements 21 and the bores of the rod couplings 36 have the same diameter which in turn corresponds to the diameter of the rods 37 shown in FIGS. 9a and 9b. Rod 37a is of small diameter and the rod 37b has a circumferential notch at spaced locations therealong and this rod may be broken into smaller rods if necessary.

In FIG. 10, there is indicated another embodiment of disk wheel 32 made of plastic material. It includes a reinforced edge part 32a which has a plurality of circumferentially spaced through openings 33 which may be spread apart by transverse slots 33a which extend radially. The radial inner circumferential portions of the through openings 33 is enclosed by a partial cylindrical slot 33b which extends through the adjacent slot 33a. Between the openings 33 are provided on the wheel circumference radial insert openings which are longitudinally slotted by axial sections 34a. The wall of the openings 33 and 34 are kept sufficiently elastic by the different slots 33a, 33b and 34a to ensure easy insertion and a clamping action on the inserted rods 37. In the central part 32b of the disk wheel 32 there are pro-

vided, in addition to a central through opening 35 and an eccentric through opening 38, three additional through openings 39 which are arranged in the corners of an isosceles triangle with the center of the triangle being the wheel axis opening 35. The openings 35, 38 and 39 are provided on both wheels sides and they are surrounded by raised portions or beads and they also include longitudinal slots 35a, 38a and 39a which permit the expansion of the openings. Similar to the openings 33, the openings 39 are also half enclosed by partial cylindrical slots 39b which are connected through the slots 39a.

The present invention provides a whole series of building elements including the clamping member 21, the coupling member 36, the rod members 37, and the wheel members 32 which may be interengaged in any number of ways to provide realistic life-like constructions and toy models. FIGS. 11 and 12 show, for example, a wheel suspension for a steerable bicycle wheel. A fixed frame portion is formed by two transverse and two longitudinal rods 37 connected by couplings 36. On the longitudinal rods 37 are arranged two spaced horizontal clamping elements 21, the longitudinal slots extending through the opening 26 and through the ring piece 24 of the clamping elements 21 and serve as an additional clamping point. Short connecting rods 37 extend through the openings 28 of the clamping elements 21 and form an additional connection of the two clamping elements 21. Between these two horizontal clamping elements 21 there is arranged a ring piece on the longitudinal rod which extends through the ring pieces of the clamping elements 21. The clamping element 21 whose ring piece is carried on the rod 37 has a hinge 23 which is disengaged. In the insert opening 29b of the arm 22 of the clamping element 21 at the gripping end thereof is arranged a short rod 37 which protrudes between the connecting rods 37 and bears against the inner longitudinal rod 37 and thus prevents this arm 22a from swinging outwardly.

In the openings 29a and 29b of the outer arm 22b of the uncoupled clamping element are affixed two steering rods 37 which carry the wheel axle which are connected through couplings with each other through a vertical rod. The wheel axle is formed by a rod 37 arranged at the center of these couplings 36. Wheel 32 is affixed to the axle by an additional coupling 36. In the horizontal sleeve arm of the above-mentioned central coupling 36 and extending perpendicular to the wheel axle, is affixed a steering rod 37. The elastic suspension of the steering wheel is similar to a flexible front drive axle of an ordinary automobile with the elastic action being due to the uncoupled clamping element 21. This shows how a technical construction of an actual operating mechanism can be satisfactorily copied with the building elements of the invention.

Another example of a building construction which can be accomplished with the invention building elements is shown in FIG. 13. In this construction, metallic sound plates 40 are mounted on a frame formed of rods 37 and couplings 36 and they are formed as a xylophone. A transverse holding rod 37 is affixed on the rod supports connected to the frame and a number of uncoupled clamping elements 21 corresponding to the number of plates 40 is arranged by means of the connections into the openings 28 of the arms 22b. In the opening 29a of the other arm 22 of each clamping element 21 is arranged a rod 37 which carries a coupling

36. An additional rod 37 cooperates with the plate 40 and acts as a hammer as shown. By means of a rod which is inserted into the opening 29b of the arm 22b of each clamping element 21, the arm 22b of the clamping elements can turn on holding rod 37 into a position such that the uncoupled clamping element opens wide enough to permit the arm 22a to lift itself from the stop rod 37 under the action of the spring 24. This is accomplished by pressing the finger on the clamping end so that the arm 22a is released just forward toward the holding rod 37 and strikes the hammer on the associated plate 40. This action is similar to that found in ordinary pianos.

In the construction shown in FIG. 14 by way of example, two disk wheels 32 are joined together by short rod elements 37 which are inserted through the openings 33 thereof. This wheel structure shown in FIG. 14 can be used as a cord pulley or as a spur gear which can cooperate for example with another spur gear formed by a disk wheel 32 and having short rods 37 which are inserted into the circumferential openings 34. A gear is formed from two disk wheels 32 arranged at right angles to each other with the short rods 37 inserted into openings 33 around the periphery of the wheel and arranged in engagement as shown in FIG. 15.

Despite the practically unlimited possibilities, the necessary structural elements are simple and easy to handle. Though the most important elements have been described above, additional larger and smaller clamping elements or other elements can be provided. In addition, it is also possible to make the clamping elements in the form of toy figurines, etc.

While specific embodiments of the invention have been shown and described in detail to illustrate the application of the principles of the invention, it will be understood that the invention may be embodied otherwise without departing from such principles.

What is claimed is:

1. A set of toy building elements, comprising a clamping element having first and second arms, ball and socket joint means detachably pivotally interconnecting said first and second arms intermediate their lengths, a spring connected between the common ends of said first and second arms and having a ring-shaped portion defining an elastic receiving opening for rod-

shaped building element, a rod-shaped building element adapted to be passed through the opening through said ring-shaped portion, the opposite common ends of said first and second arms defining a clamping jaw which is closed by said first and second arms under the biasing of said spring, said rod-shaped building element being clampable between the arms of said clamping element, and including a coupling element having six sleeve arms arranged at right angles to each other, one sleeve arm being provided with an end flange and with an outer longitudinal corrugation, the other of said sleeve arms being elastically expandable by longitudinal slots.

2. A set of elements, according to claim 1, including a disk wheel having a through element which is centrally positioned to form an access for said wheel which is engageable with said rod element, said disk wheel having a side face with a plurality of eccentrically positioned openings therethrough, a ring of access parallel through openings arranged around the marginal periphery of said wheel and at least one radial insert opening defined in the cylindrical surface of said wheel.

3. A set of elements, according to claim 2, wherein said disk wheel includes walls having slots therein adjacent the openings for permitting a resilient expansion of the openings.

4. A set of toy building elements, comprising a clamping element having first and second arms, ball and socket joint means detachably pivotally interconnecting said first and second arms intermediate their lengths, a spring connected between the common ends of said first and second arms and having a ring-shaped portion defining an elastic receiving opening for a rod-shaped building element, a rod-shaped building element adapted to be passed through the opening through said ring-shaped portion, the opposite common ends of said first and second arms defining a clamping jaw which is closed by said first and second arms under the biasing of said spring, said rod-shaped building element being clampable between the arms of said clamping element, said opening being positioned relative to said first and second arm common ends so as to clamp a said rod passed therethrough when the clamping jaw clamps the said clampable rod therein.

\* \* \* \* \*

50

55

60

65