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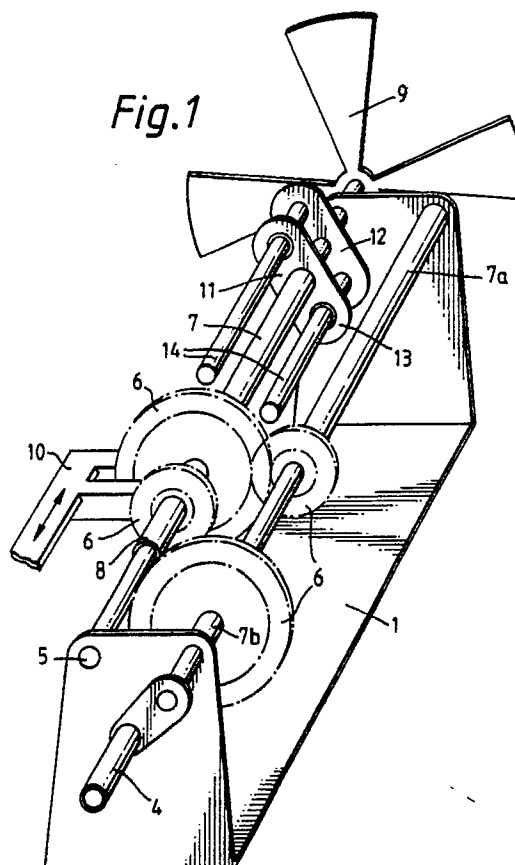
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(54) **Cardboard models.**

(57) Working cardboard models are provided constructed entirely of cardboard and comprising at least one pair of intermeshing gear wheels (6) driving a moving part, the gear wheels (6) also being of cardboard.



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CARDBOARD MODELS

This invention relates to working cardboard models and assembly kits therefor.

In the following specification and claims the term "working cardboard model" refers to cardboard models having one or more parts which move relative to other fixed or stationary parts of the model. As examples of working cardboard models are cardboard windmills with sails which rotate and possibly other moving parts, model sand- or water-mills with sand or water wheels which rotate and again possibly with other moving parts, not only rotating parts, but possibly also parts which undergo reciprocating or other form of linear movement. Also, the word "model" as used herein is not to be construed narrowly as meaning merely a replica of some other structure, for example, a "model" windmill or a "model" watermill, but more simply as a relatively small scale cardboard "structure" intended primarily as an amusement or pastime for children, or for that matter adults, but also useful as an advertising display item. Thus the invention applies to quite whimsical cardboard machines or structures having one or more moving parts.

Working cardboard models are of course known, for example, model cardboard cars or cut-out toys with moving wheels, model cardboard windmills with sails that move, and many other items. So far as is known, however, working cardboard models have not previously been proposed which comprise intermeshing gears to drive the moving parts, and certainly not gears that are themselves cut out of cardboard and mounted on cardboard shafts and bearings.

In accordance with a first and broad aspect of the present invention, working cardboard models are provided the structural components of which are constructed entirely of paper and cardboard, and which comprise one or more moving parts driven by a drive mechanism comprising at least one gear wheel and preferably a pair of gear wheels intermeshing one with the other, the entire drive mechanism including said gear wheel likewise being constructed of cardboard.

In accordance with a second broad aspect of the present invention, there is provided a cardboard model construction kit comprising a plurality of cardboard cut outs connectable together to form a cardboard model, which model includes one or more movable parts, and wherein the kit contains a plurality of cardboard cut out parts providing, when the kit is assembled, a drive mechanism for said movable parts, said drive mechanism comprising at least one gear wheel, and preferably a pair of gear wheels which, in the assembled condition, inter-

mesh one with the other.

As indicated the cardboard model or construction kit provided in accordance with this invention comprises at least one cardboard gear wheel, which may be used to drive another gear wheel, as for example, in a spur, wheel assembly, or as a pinion in a rack and pinion mechanism. Whilst such gear wheels can be cut out from a single thickness of cardboard, it is preferred, partly to strengthen the gear, especially the gear teeth, but also to minimise alignment problems in assembly of the model, and to improve interengagement of the intermeshing gears and thus ensure smooth work of the model, to use either double or treble thickness cardboard as the gear wheel, as opposed to the thickness of cardboard used in other parts of the model, or more preferably to use the same thickness cardboard, but to build up the gear wheel as a series of laminates all of equal thickness secured, e.g. by gluing, in face to face contact one with the other. A particularly preferred form of cardboard gear wheel for use in this invention comprises two cardboard gear wheels of equal thickness secured, e.g. by gluing, together with a cardboard spacer, preferably of the same thickness located therebetween. Such a sandwich construction (gear-spacer-gear) is found, surprisingly, to reduce quite considerably the need for highly accurate alignment of the gears to obtain intermeshing, and thus facilitating quite considerably the assembly of the model.

For most economical manufacture, as many parts as possible will be of the same gauge cardboard and which may range from 750 to 3500 microns in thickness, more preferably from 1500 to 2000 microns, thus enabling a single cutting operation. In the case of shafts and bearings and possibly other parts, depending on the model in question may have to be fabricated separately. However, it is to be understood that within the concept of this invention, virtually the whole structure, gears and all is to be of cardboard. This, however, does not apply to other non structural elements, e.g. essentially decorative items which can be of paper or any other suitable material.

Central to the concept of this invention is the drive mechanism for the moving parts of the model, all essential parts of which, including at least one gear wheel, are likewise constructed of cardboard. Depending upon the type of model, a wide variety of mechanical devices can be incorporated into the drive mechanism, and all of which will be constructed of cardboard. Besides the spur gear and rack and pinion mechanisms already described, other mechanical devices which can be

incorporated into the working parts of the model include shafts, bearings, cams, cranks, levers, fan wheels, wheels, pulleys, star wheels, pin wheels, lost motion drives, Geneva movements and a whole host of others, the nature of which is not important, save that in accordance with the essential concept of this invention all will be constructed of cardboard.

When provided in kit form, or indeed when preassembled, the cardboard pieces making up the model can be assembled and held together in a variety of ways. For stronger and more permanent structures, the parts will generally be glued together. For more simple structures simple tab and slot connections may suffice.

The essential elements and concepts of this invention are illustrated in the accompanying drawings in which:

Figure 1 is a hand crank drive mechanism for a model fan;

Figure 2 shows an alternative sand-wheel drive;

Figure 3 shows one of the cardboard gear wheels used in accordance with the invention, in its preferred form;

Figure 4 is an edge view of the gear wheel; and

Figure 5 is a vertical median section therethrough.

Referring to Figure 1, this is provided merely to show the essential principles of this invention, and is not intended to be an actual model construction. In accordance with one of the basic principles of this invention the whole structure including all the working parts are of cardboard. The main structural items, e.g. the stand (1) for the fan (Figure 1), the sand hopper (2) and sand-wheel (3) (Figure 2) is or are constructed from cardboard cut outs. Preferably 1.5 or 2 mm in thickness. In Figure 2, the parts of the hopper (2) and sand-wheel (3) are glued together, but in other constructions other suitable connecting means can be used, e.g. tab and slot connections.

Mounted in the cardboard stand (Figure 1) is a spur gear assembly driven by a hand crank (4), or in an alternative possibility by the sand-wheel of Figure 2. The spur gear assembly is likewise constructed of entirely cardboard down to the compressed paper stick axles (5) which mount the spur gear wheels (6) or, in Figure 2, the sand-wheel (3). Such compressed paper sticks are commercially available and are regarded herein as comprised within the term "cardboard". So also are the tubular bearing sleeves (7) mounted on the axles (5) as bearings for the gear wheels (6), or simply as distance spacers (7a).

As shown in Figure 1, two different diameter cardboard gear wheels (6) are shown rotatably fixed in spaced apart relationship on the paper stick axle (5) rotatable by means of the cardboard crank

handle (4). Axial positioning of the axle carrying the crank (4) and the two gear wheels (6) is maintained by the two tubular cardboard spacing sleeves (7a, 7b) slidably mounted on the other parallel axle via a concentric sleeve axle (8) are two further cardboard gears (6) which can be selectively engaged with either of the two gear wheels driven by the crank (4) to provide either a step-up or step-down drive to the fan wheel (9). The gear change is effected by means of the gear lever, also of cardboard and shown at (10). Output from the gear train to the fan wheel (9) is via a telescopic drive coupling (11). This comprises a first transverse member (12) rotatably fixed on the axle (5), a second transverse member (13) rotatably fixed on the sleeve axle (8) and slidably coupled to the first member (12) via the two parallel rigid paper rods (14).

The preferred construction of gear wheel is shown in Figures 3-5. Once again the gear wheel is entirely of cardboard and consists of two outer gears (15,16) with aligned teeth and a spacer (17) glued in between. This results in a laminated gear wheel construction with a plurality of teeth equispaced around the wheel, each tooth consisting of two projecting and aligned cardboard projections with a space in between. As already stated, this laminated construction is particularly effective in providing an effective drive giving maximum tolerance during operation and assembly, so that highly accurate alignment during assembly of the cardboard model is not a prime necessity, as would be the case were a single thickness of cardboard to be used for the gear wheel. The three layer sandwich structure shown, i.e. with a reduced diameter spacer in between, is, in fact, surprisingly more effective than a single double thickness gear wheel. As shown the gear wheels preferably have round profile teeth, but other profiles can be used.

The principles of construction outlined above can be extended to a whole range of other working cardboard models either preassembled in self-assembly kit form incorporating an extremely wide variety and construction of mechanical drives to operate the moving parts.

In conclusion, the invention also extends to a laminated cardboard gear wheel construction as above described, and to drive mechanisms incorporating such a gear wheel and one or more rigid paper shafts or tubular cardboard bearings or sleeves and/or one or more levers, cranks, cams, wheels, pulleys, star wheels, pin wheels, fan wheels, lost motion drives, or Geneva mechanisms all constructed of cardboard.

Claims

1. A working cardboard model, as hereinbefore defined, the structural components of which are constructed entirely of paper and cardboard, and which comprise one or more moving parts driven by a drive mechanism comprising at least one gear wheel and the entire drive mechanism including said gear wheel likewise being constructed of cardboard.

2. A cardboard model according to claim 1, wherein the drive mechanism comprises at least one pair of intermeshing cardboard gear wheels.

3. A cardboard model according to claim 1 or 2, wherein essentially all the structural components of the model are constructed from a cardboard sheet of uniform thickness.

4. A cardboard model according to claim 3, wherein the cardboard sheet has a thickness in the range of 750 to 3500 microns.

5. A cardboard model according to claim 4, wherein the cardboard sheet has a thickness in the range 1500 to 2000 microns.

6. A cardboard model according to any one of claims 1-5, wherein the drive mechanism comprises one or more rigid paper sticks or cardboard sleeves serving as axles, shafts, bearing sleeves and/or as other components of the drive mechanism.

7. A cardboard model according to any one of claims 1-6, wherein the gear wheel(s) is or are of a multiple thickness construction.

8. A cardboard model according to claim 7, wherein said multiple thickness construction comprises a laminate consisting of two equal thickness gear wheels secured and aligned one with the other in face to face relationship with a spacer in between.

9. A cardboard model according to claim 8, wherein the spacer is of the same thickness as the two gear wheels.

10. A cardboard model according to claim 8 or 9, wherein the spacer is of a reduced diameter relative to the diameter of the gears, thereby providing the gear wheel construction with a plurality of teeth equispaced around the wheel, each tooth consisting of two projecting and aligned cardboard projections with a space between.

11. A cardboard model according to any one of claims 1-10, wherein the teeth of the cardboard gear wheel or wheels have a rounded profile.

12. A working cardboard model as claimed in any one of claims 1-11 in self-assemble kit form.

13. A laminated cardboard gear wheel construction consisting of two equithickness cardboard gear wheels aligned one with the other with a spacer in between.

14. A laminated cardboard gear wheel construction according to claim 13, wherein the spacer is of a reduced diameter relative to the diameter of the

gears, thereby providing the gear wheel construction with a plurality of teeth equispaced around the wheel, each tooth consisting of two projecting and aligned cardboard projections with a space between.

15. A laminated cardboard gear wheel construction according to claim 14, wherein the teeth of the cardboard gear wheel or wheels have a rounded profile.

16. A drive mechanism for cardboard working models constructed entirely of cardboard and comprising one or more laminated cardboard gear wheels according to claim 13, 14 or 15.

17. A drive mechanism according to claim 15, incorporating one or more rigid paper shafts or tubular cardboard bearings or sleeves and/or one or more levers, cranks, cams, wheels, pulleys, star wheels, pin wheels, fan wheels, lost motion drives, or Geneva mechanisms all constructed of cardboard.

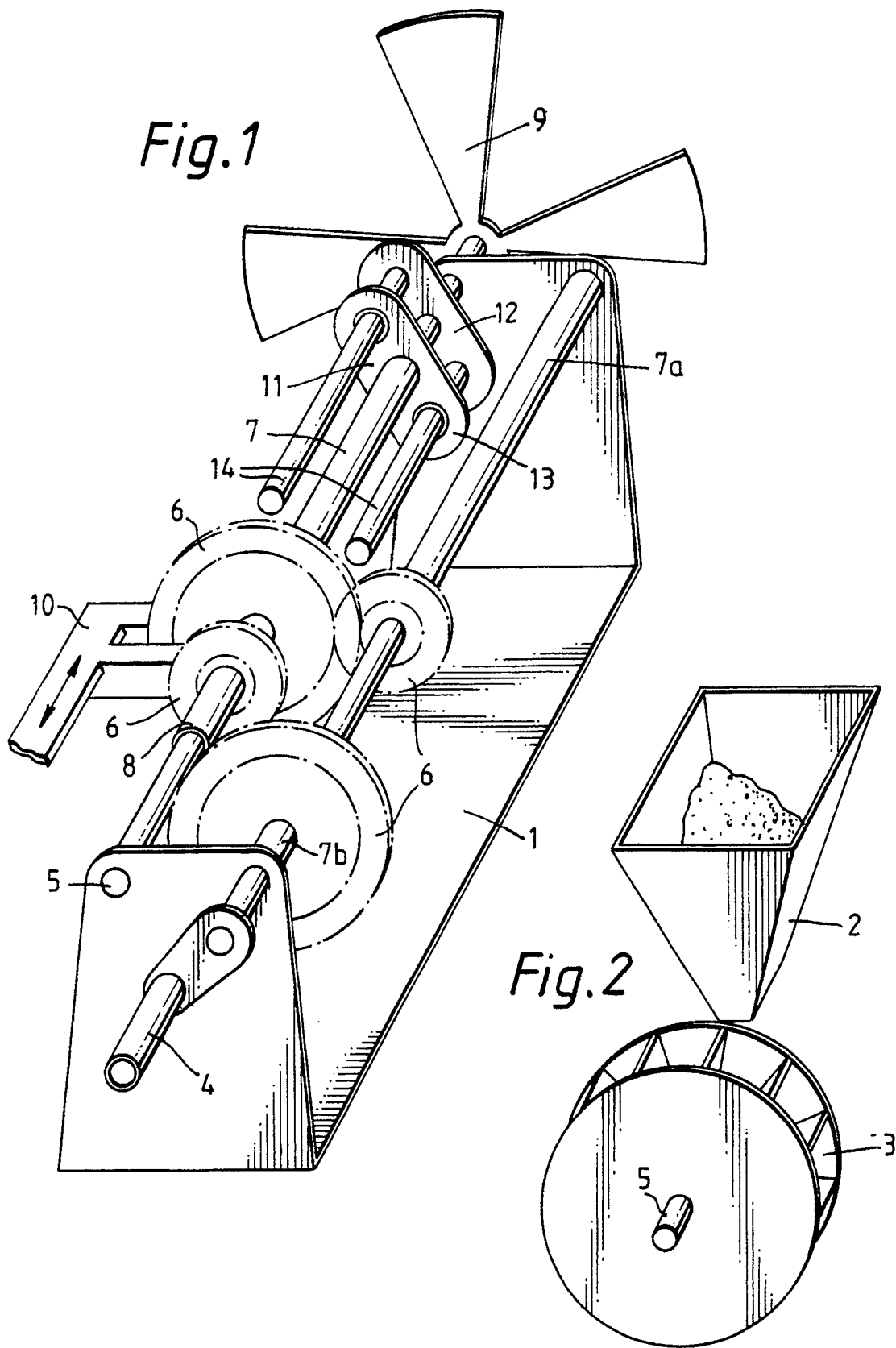


Fig.3

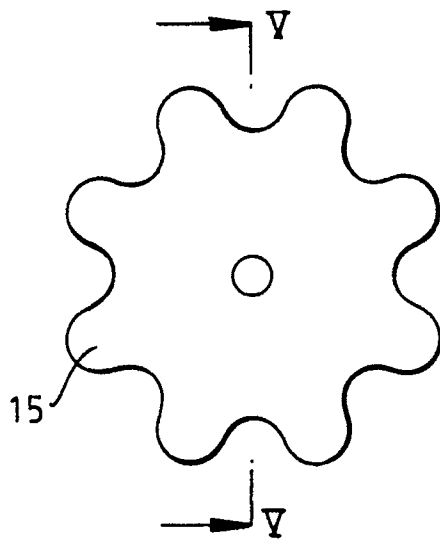


Fig.4

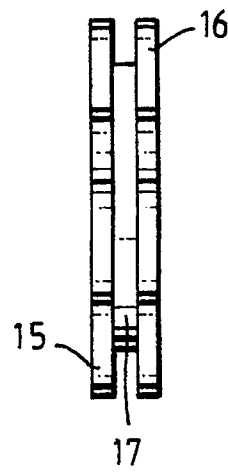
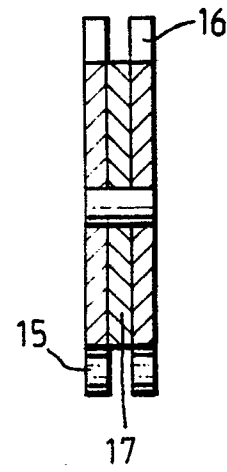


Fig.5





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EUROPEAN SEARCH REPORT

Application Number

DOCUMENTS CONSIDERED TO BE RELEVANT			EP 90308324.4
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	FR - A - 789 550 (BOURGUINON) * Totality *	1, 2	A 63 H 33/16
A		6, 7, 8, 12, 13, 16, 17	
A	US - A - 2 665 522 (JUNDO) * Totality * -----	1, 3, 6, 12, 17	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			A 63 H 33/00 A 63 H 29/00
The present search report has been drawn up for all claims			
Place of search VIENNA		Date of completion of the search 06-09-1990	Examiner BRÄUER
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ----- & : member of the same patent family, corresponding document			