May 7, 1946. M. M. CUNNINGHAM 2,399,628

MATTRESS

Filed April 19, 1943 2 Sheets-Sheet 1

Fig. 1.

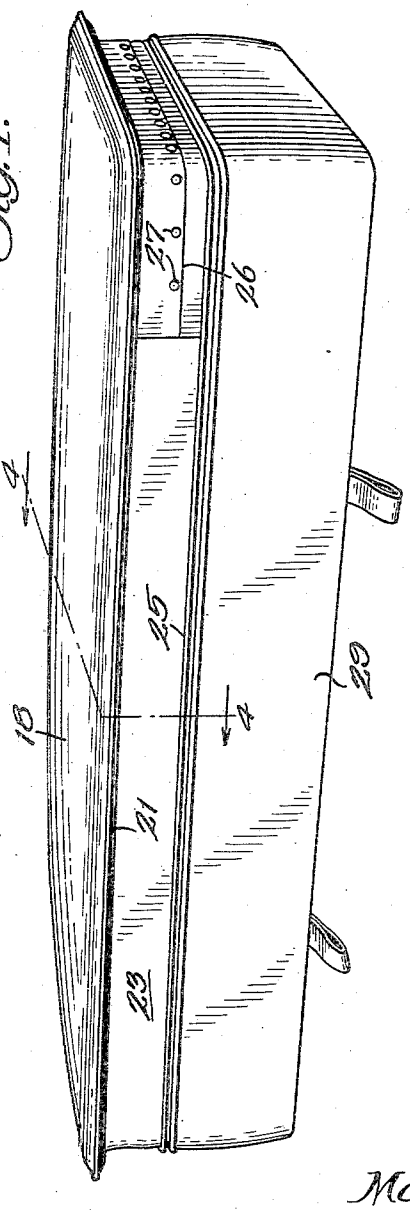
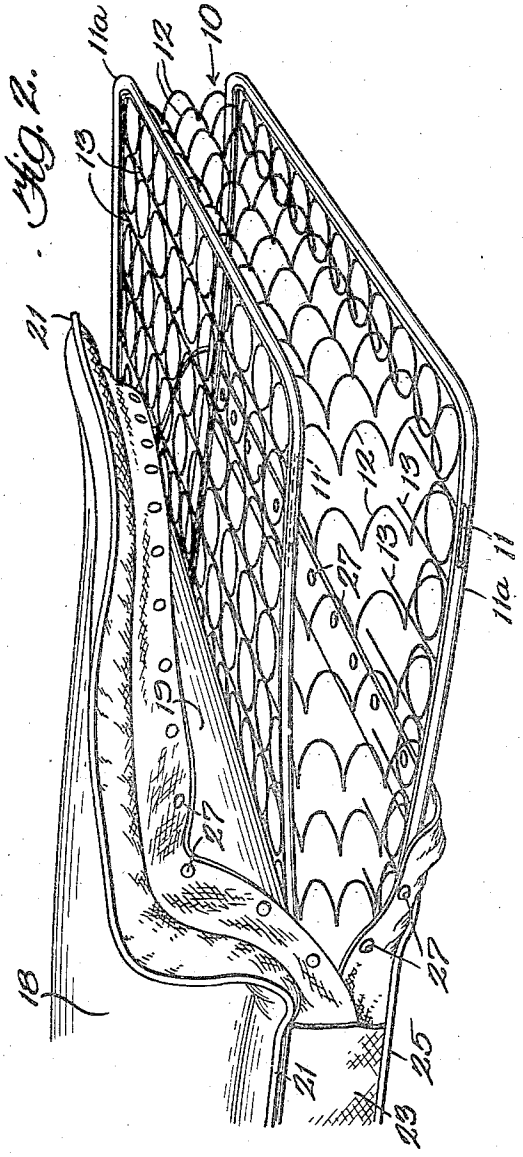



Fig. 2.




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MATTRESS

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Fig. 3.

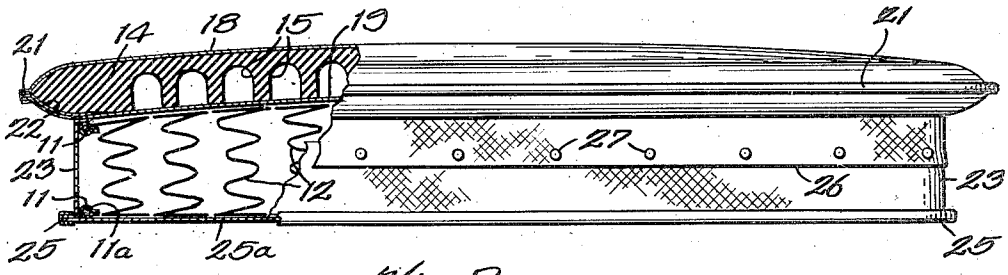



Fig. 7.

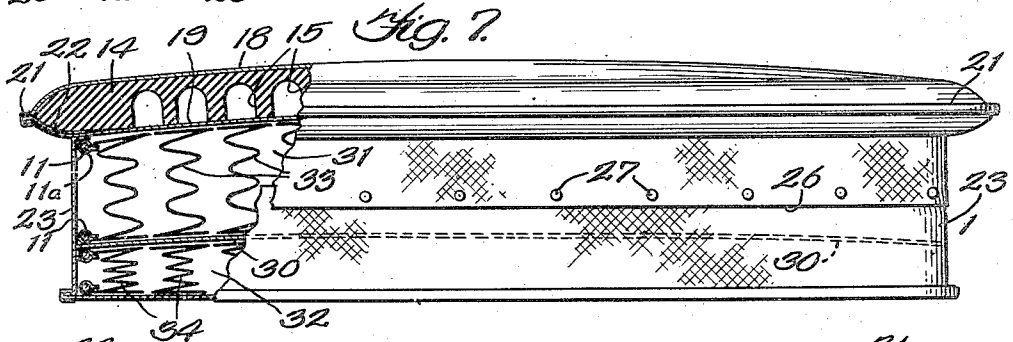



Fig. 4.

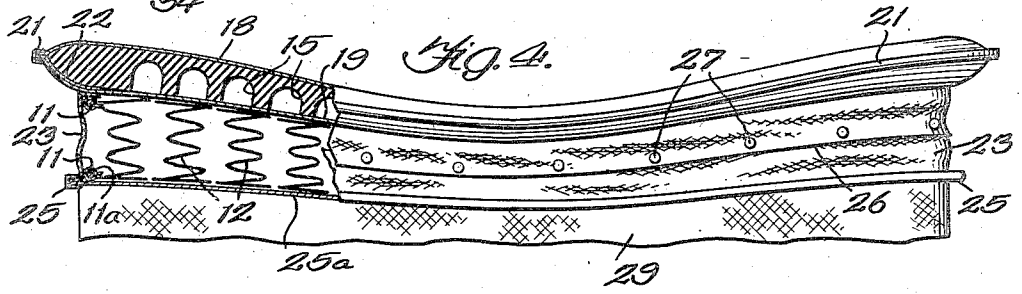



Fig. 5.

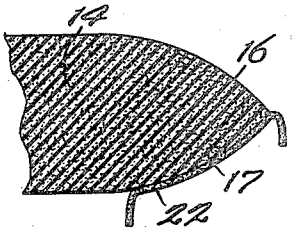
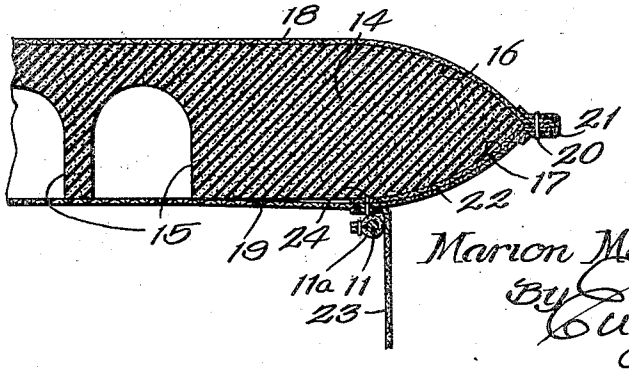



Fig. 6.




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Patented May 7, 1946 2,399,628

# UNITED STATES PATENT OFFICE

2,399,628

## MATTRESS

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Application April 19, 1943, Serial No. 483,560

1 Claim. (Cl. 5—351)

The present invention relates to mattresses, and particularly to combined inner spring and sponge rubber mattresses. The invention, in general, aims to provide a highly serviceable and comfortable mattress by assembling a foam sponge rubber pad with a spring unit or units made up of a number of coil springs.

A specific object of the invention is to provide a mattress of the character indicated, including a resilient spongy rubber body supporting element or pad, a spring assembly and a covering or ticking therefor, which may be easily disassembled when it is desired to substitute other spring units of greater or lesser resiliency, or when the pad and ticking is to be washed and/or sterilized.

Another object is to provide a mattress construction which permits air to permeate all of its walls for thorough and continuous ventilation. A further object is to provide separate but united fabric compartments for the pad and springs, so that the pad may be anchored to the springs yet may be easily removed therefrom, along with the fabric.

Other objects are to unite the metallic springs with soft foam rubber in such a way that the foam rubber cannot be torn or cut by ordinary usage; to protect the user under all conditions from contact with the spring unit; to provide a mattress of pleasing appearance so that it is readily salable; to facilitate sliding the spring unit in and out of the fabric compartment; and to provide a mattress which may be sold at a reasonable cost.

Still another object of the invention is to provide, in a mattress having a spongy rubber body supporting member, an arrangement utilizing a plurality of spring units of differing tension, strength or supporting power whereby the mattress, and particularly the upper part thereof, has ample compressibility and resilience accompanied by a high hysteresis value as a whole, irrespective of the particular type of covering or ticking employed.

With these and other objects in view the invention resides in the construction, operation and novel combination and arrangement of parts hereinafter fully described, illustrated in the accompanying drawings and particularly pointed out in the appended claim, it being understood that various modifications may be made in the form, proportion and minor details and arrangement of parts, within the scope of the claim, without departing from the spirit of the invention or sacrificing any of the advantages thereof.

In the accompanying drawings:

Fig. 1 is a perspective view of one form of mattress embodying features of the present invention shown supported on a conventional box spring foundation or beadstead;

Fig. 2 is a partial perspective view, on a larger scale, of the mattress seen in Fig. 1, showing the mattress cover or ticking opened at one end, as for insertion or withdrawal of the spring unit;

Fig. 3 is an end elevation, looking at the mattress of Figs. 1 and 2 from the right-hand end thereof, with parts in section;

Fig. 4 is a transverse cross section, as on the line 4—4 of Fig. 1, showing the mattress depressed as when supporting a person and also showing in elevation the upper portion of the box spring foundation;

Fig. 5 is a fragmentary vertical section on a larger scale showing the attachment of tape to the foam rubber pad for the securing of the ticking thereto;

Fig. 6 is a fragmentary vertical section through the pad on the scale of Fig. 5 showing the manner of securing it to the fabric envelope or ticking which encloses the springs; and

Fig. 7 is an end elevational view, partly in section, showing a modified form of mattress wherein spring units of differing supporting power are employed.

In general, the present invention, according to an important aspect thereof, comprises an enveloping casing or mattress ticking in an upper portion or compartment of which is secured preferably in a more or less permanent fashion, a pad or body supporting member of sponge rubber. Such pad is preferably of the type molded of an aqueous dispersion of latex which has been whipped into a foam in the presence of a frothing agent or which has been combined with a separately prepared foam, and generally contains internal cavities formed in the molding operation. Underneath the said pad the ticking is formed, substantially throughout its area, with a separate compartment into which is inserted a set or assembly of coiled springs, preferably of a type commonly employed in so-called inner spring mattresses. At one end of the spring compartment the ticking walls are divided or slitted to afford an opening for the ready insertion or removal of the spring unit, and are provided with suitable fastener elements to maintain the opening closed when the spring unit is within the compartment.

According to a further aspect of the invention

the ticking with contained rubber pad may be provided with two lower compartments for the reception of two individual spring units which, preferably, may have differing characteristics as to stiffness, supporting power, and the like. In this aspect of the invention the ticking is preferably provided with an opening or openings for the ready insertion and removal of the springs. The latter feature, however, is not necessarily an essential component, since the providing of a mattress comprising a sponge rubber pad and a pair of springs of differing characteristics, all enclosed within an enveloping ticking, is deemed to constitute a novel and important aspect of the present invention, irrespective of whether the spring units are readily removable from the ticking or are substantially permanently incorporated therewithin.

In accordance with a preferred form of the invention, I employ a coil spring unit 10 of conventional construction embodying heavy marginal or frame rods or wires 11, coil springs 12 and tie wires 13 connecting the coil springs to each other and to the marginal wires 11. The latter are preferably covered with suitable padding material 11a for the purposes of comfort and the prevention of damage to the ticking or casing presently to be described. Such a unit is extremely flexible, in fact it will yield in every direction, and it is excellently adapted for supporting a foam rubber pad if the pad is properly anchored and adequately protected against the cutting or tearing action of the upper ends of coil springs 12. It will be understood that foam rubber is extremely soft and does not have a great deal of strength, but because of its compressibility and low internal friction, and for other reasons known to those skilled in the art, it is highly desirable for use in mattresses.

The foam rubber pad 14 (Fig. 3 et seq.) may be from one to two inches in thickness and preferably is both wider and longer than the spring unit, so that when assembled with the spring unit it overhangs the marginal wires 11 on all sides by about one inch. All the edges of the pad are made more flexible by being beveled both from the top and from the bottom, as best shown in Figs. 5 and 6, said beveling being indicated at 16 and 17 and obviously comprehending the overhanging portion of the pad. On the underside, the pad 14 has a large number of preferably cup-shaped recesses or cavities 15 not only to increase the compressibility of the pad, but also to insure adequate and continuous ventilation thereof, as will be explained. The described pad must be protected by a cloth casing, to which it should be secured immovably without interference with flexing of the pad, and to this end a heavy cotton duck or other porous cloth sheet 18 is stretched over the top of the pad, while a similar or even heavier fabric sheet 19 is stretched over the bottom of the pad, both sheets 18, 19 being stitched together, as indicated at 20, outside the thin edge provided by beveling 16, 17. Cloth tape 21 may be secured over the seam by the stitching 20 to make a better appearance. To anchor the sheets 18 and 19 to the pad, a rubberized tape 22, cemented or vulcanized to the foam rubber pad along the lower beveled edge 17, may be secured by the stitching 20 to the upper and lower sheets, the lower sheet 19 being outside of tape 22 as shown in Fig. 6. Tape 22 of course extends all around the pad and affords a very strong anchorage for the upper and lower cover sheets, which thus provide a compartment for the foam rubber pad that yields with the pad when the latter is compressed but is otherwise practically immovable relative to the pad.

To provide an envelope, casing or compartment for the spring unit, heavy cotton duck or other porous fabric walls 23 are attached along their upper margins, as by stitching 24, to the cover sheet 19 and tape 22, Fig. 6, thus securing the pad 14 and its covering to the compartment enclosing the spring unit. Walls 23 may be integral with or sewed along a seam 25 to a bottom fabric wall 25a which completes the envelope or casing, there being four walls 23 which provide two side walls and two end walls.

At one end of the envelope the material of the end wall and the adjoining side walls is slitted or divided, as at 26, to make an opening large enough to admit the spring unit 10 endwise, if the spring unit is compressed as illustrated in Fig. 2, and suitable fastening elements, such as snap fasteners 27, may be employed to seal the opening (see Fig. 1) when the spring unit is inside the envelope. It will be appreciated, of course, that the opening 26, preferably, will be so constructed that the fabric forms overlapping lips for proper operation of the fastening elements, as clearly seen in Figs. 1 and 2.

The height or width of walls 23, preferably, is such that the spring unit is somewhat compressed throughout its area when it is within the envelope. Thus the walls 23 are maintained under tension except when the mattress is supporting a load as shown in Fig. 4. The reaction from the compression of the spring unit tends to hold the heavy wire frames 11 in the inside corners formed at the upper and lower margins of the side and end walls, as seen in Figs. 3 and 6.

When it is desired to separate the spring unit 10 from its envelope, the fastening means 27 are separated and the opening 26 is spread apart whereupon the envelope or ticking, and contained rubber pad, may be drawn off the spring unit, as will be clear from Fig. 2. When inserting a spring unit, the cotton or other padding 11a which covers all of the marginal wires 11 will facilitate sliding the unit, and the fabric sheet 19 on the bottom of the pad 14 cooperates in making the introduction of the unit, even though under compression, a relatively easy operation. Other spring units of different resiliencies or load-capacities may be substituted at any time for the unit 10 in a mattress of the invention to adapt the mattress to the comfort or whim of the user. Thus the invention is especially valuable for use in hospitals, hotels and wherever the public is particularly catered to. When maximum comfort is desired, as in a hotel, the mattress will be supported probably on box springs 29 of conventional form (Figs. 1 and 4). Of prime importance, however, is the fact that the described removable envelope, and contained pad, may be readily removed from the spring unit and washed and sterilized as a unit, without any injurious effect, and this feature is obviously of the greatest importance in hospitals and asylums.

Another feature of the invention is the extraordinary provision for thorough ventilation of the mattress. The foam rubber itself is essentially a mass of intercommunicating air cells formed in vulcanized latex, and it permits continuous circulation of air; a circulation which is not impeded by the porous fabric layers 18 and 19 which enclose and protect the foam rubber. The side walls 23 of the lower compartment where the spring unit is contained are likewise

porous, and the spring unit itself is of very open construction, so that ventilating convection currents may continuously enter and leave through the side walls and may also pass up through the fabric 18 and pad 14, or downwardly through the pad, as determined by the temperature of the room, etc. The cavities 15 play an important part in ventilating the mattress, as the cavity walls are collapsed by the weight of a body lying on the mattress, and the extent of collapse of the walls of each cup-like recess or cavity 15 depends upon the weight or compressive stress imposed on that part of the pad 14. The body of a person lying on a mattress is constantly shifting or changing its position, and with every movement of every limb, with every turn of the head or trunk, the walls defining some of the cavities 15 are deformed and compressed or are relieved of pressure, the result being a continual compression of air in the different cavities, followed by relief of such compression as the air seeps through the porous fabric 19 covering the openings in said cavities. The sudden compression of air in any cavity also causes some of the air to be forced through the intercommunicating air cells of the foam rubber pad and thus ventilation of the pad itself, which normally takes place very slowly but continuously, is accelerated by normal use of the mattress. It will be understood that the ventilating air currents which constantly pass through the mattress of the invention are entirely unnoticeable and do not in any way detract from the comfort of the user. On the other hand adequate ventilation of the mattress will usually enhance the comfort of the user, especially in hot weather, as will be understood without further description.

While the cavities or recesses 15 are distributed uniformly over the greater part of the area of the underside of the foam rubber pad, as best shown in Fig. 6 there is an area adjacent the marginal wires 11 of the spring unit where the foam rubber pad has no cavities and hence offers adequate padding for the wires 11, which would be very uncomfortable if felt through the pad. When one sits on the side of the bed, the projecting or overlapping portion of the pad will bend or fold down, again to prevent discomfort from the wires 11. This downward bending or folding takes place more readily because of the beveling 16 and 17 of the edges of the pad, said beveling making the pad edges much more flexible.

When a person lies down on the mattress, the top pad cover 18 will be depressed (Fig. 4) with concomitant compression of the foam rubber pad, and as pad cover 18 fits smoothly over the top surface of the pad, central downward depression of pad cover 18 will cause a tension in the pad cover adjacent both side edges and this tension will lift the beveled edges of the foam rubber pad and will tend to pull said edges inwardly. The pad and its covers 18 and 19 are free to move inwardly relative to the upper marginal wires 11 because they are not fast to said marginal wires, and with slight downward movement of either of the upper marginal wires 11, responsive to compression, the side wall 23 may slide over the wire 11 and follow the pad in its inward movement. As soon as the compression is relieved, the pad, pad covers and side walls are restored to their normal positions, Fig. 6. The described action enhances the sleeping qualities of the mattress.

The strong duck or other heavy fabric sheet 19, besides cooperating in holding the pad against shifting, provides substantial protection for the foam rubber against the tearing or cutting action of the upper ends of the coil springs 12, and as previously stated, assists in facilitating sliding of the spring unit into its envelope or compartment. A further function of sheet 19 is to cooperate with the foam rubber in insulating the coil springs, which, being of metal, will draw off body heat rapidly in a cold room.

Desirably the spring unit is so made that the coil springs in the center are slightly higher than those at the margins adjacent wires 11. This causes the spring unit to have a slight crown or convexity which is imparted to the top of the rubber pad when the mattress is assembled, as best shown in Fig. 3. Thus the mattress has a better appearance and is more readily sold.

In Fig. 7, as previously indicated, there is shown a modification of the present invention, wherein two spring units of differing characteristics are employed. In this form there has been shown, for purposes of illustration, the same type of integrated envelope or ticking, and contained sponge rubber pad, as previously described. Thus there is seen the pad 14, with its enveloping cover layers 18 and 19, the depending walls 23, and the bottom wall 26a, the space within the said walls accommodating a pair of springs as will presently be described. The end wall, seen partially in elevation, is preferably provided with a mouth or opening 26 adapted to be normally maintained closed by the fasteners 27, in the manner and for the purpose previously described.

In the present instance the vertical length of the side and end walls 23 is somewhat greater than in the first described form of the invention, thus providing an enclosed space below the pad 14 of substantially greater depth. This enclosed space is divided by a horizontal fabric partition 30, which may be stitched or otherwise attached along its margins to the walls 23, into two superposed compartments 31 and 32, each of which is adapted to accommodate a separate individual coil spring unit, as indicated by the numerals 33 and 34. Thus it is possible to provide the mattress of Fig. 7 with a pair of springs of differing characteristics, and this end may be accomplished by having the compartments 31 and 32 of substantially equal depth and utilizing, in one compartment, a spring unit of heavier construction or gauge than that employed in the other.

However, I prefer to so construct the ticking that the depth or thickness of the upper compartment 31 is materially greater than that of the lower compartment 32, to snugly accommodate spring units of corresponding depth or thickness. Accordingly, I have constructed a highly desirable mattress wherein the upper compartment 31 encloses, under slight compression, a coil spring unit approximately six inches in thickness, and the lower compartment 32 contains, also under slight compression, a coil spring unit of about four inches in thickness; an overall spring height of about ten inches.

One advantage of such an arrangement is that the upper spring unit may be of a fairly readily depressible nature so as to respond easily to depressive forces and thus contribute factors of softness and comfort, while the lower unit may have a stiffer, stronger spring action so as to afford a firm foundation and prevent or minimize sagging tendencies. Since the lower spring unit 34 is not required or desired to yield downwardly to the extent necessary in the case of the

upper unit 33, the former may be of relatively small depth as compared with the latter.

Thus, it will be readily appreciated that the provision of a mattress having a surface or top pad of sponge rubber and an underlying assembly of spring units of differing supporting characteristics, all enclosed within an integrated envelope or ticking, constitutes, in and of itself, a novel and advantageous contribution to the art. Accordingly, while this arrangement has been shown in a ticking equipped with the desirable feature of the spring removal opening 28, it will be understood that the ticking, with sponge pad top layer, may completely envelope the dual or superposed spring assembly and be stitched substantially permanently therearound, devoid of any slit or opening. Correspondingly, the internal partition 30 may be omitted, although it is generally advisable to employ a layer of fabric, such as burlap or the like, between the lower face of the upper spring unit 33 and the upper face of the lower unit 34 in order to prevent the noise and wear which would otherwise occur incident to relative movement between the said faces.

While I have described my invention in connection with certain types of spring units and a certain kind of foam rubber pad, other spring units and pads might be used, and various changes and modifications may be made without departing from the principles of my invention, the scope of which is to be determined by the appended claim.

What I claim is:

A unitary composite spring and pad mattress structure comprising a fabric envelope with separate upper and lower compartments, a flat coil spring assembly in the lower compartment and a flat spongy rubber pad in the upper compartment and extending marginally outward beyond the surrounding wall of the lower compartment, and an attaching strip of fabric extending around the spongy rubber pad and adhesively secured to the underside of the outwardly extending margin thereof, said attaching strip being secured along its outer margin to the periphery of the upper compartment and along its inner margin to the top of the surrounding wall of the lower compartment.

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