A. M. NELSON.

COVERING OR MATTRESS FOR BANKS OR THE LIKE.

APPLICATION FILED JULY 12, 1915.

1,206,891.

Patented Dec. 5, 1916.

3 SHEETS—SHEET 1.

Fig. 2.

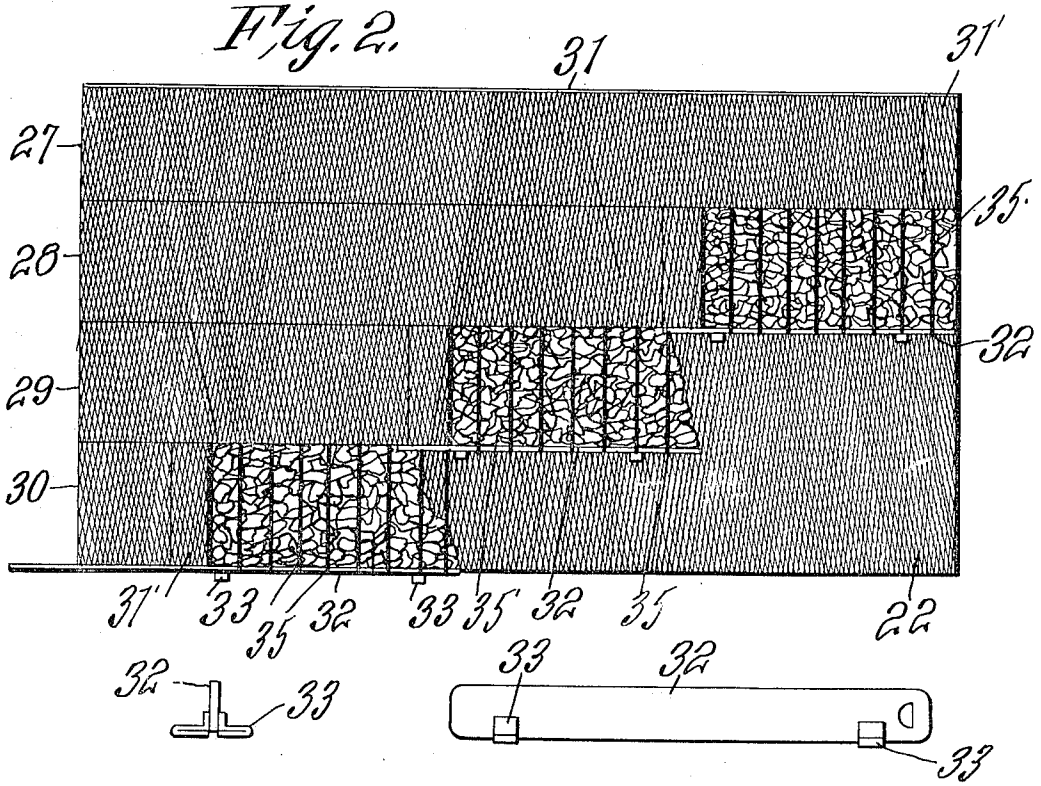
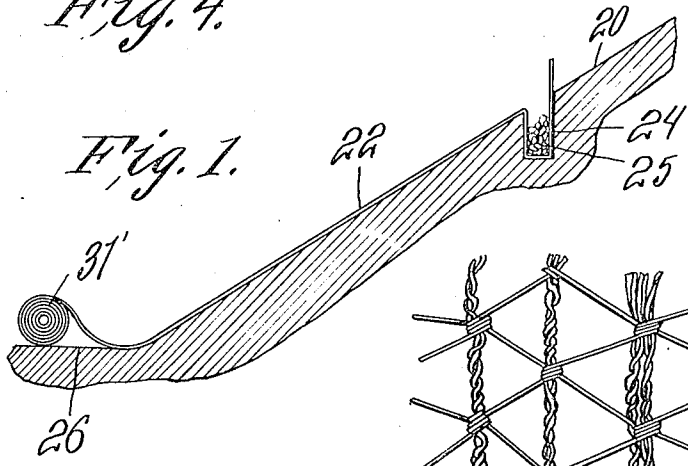


Fig. 4.

Fig. 3.

Fig. 1.



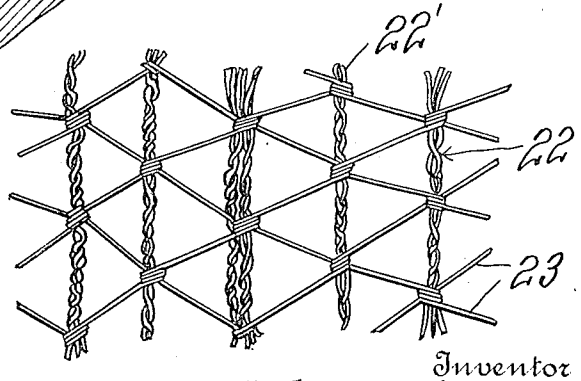


Fig. 5.

Witnesses

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3 SHEETS—SHEET 2.

Fig. 6.

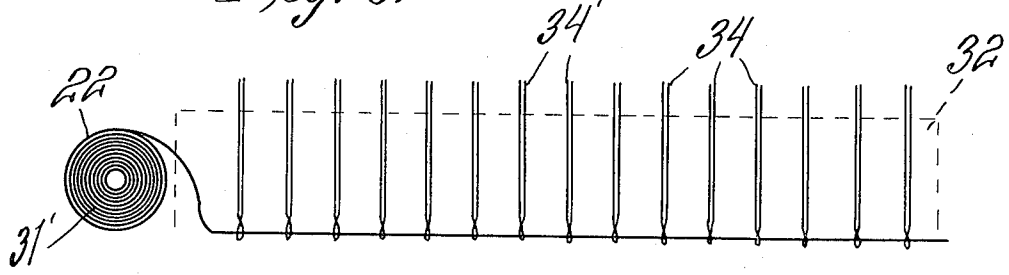


Fig. 7.

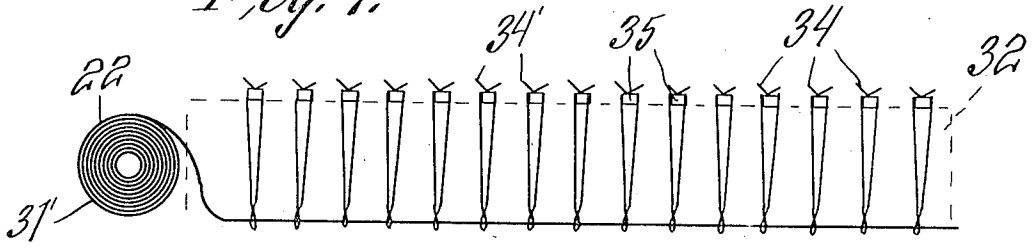


Fig. 8.

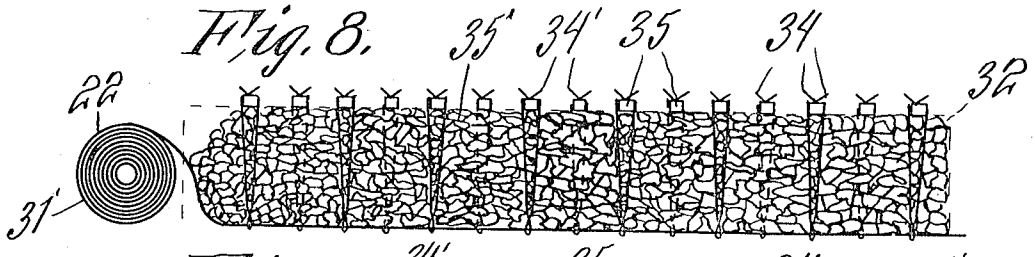
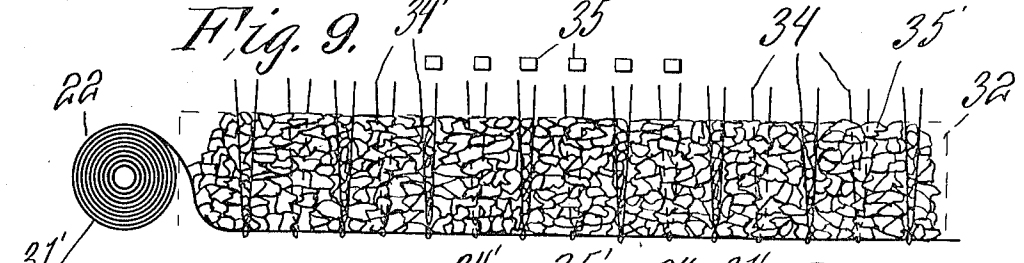


Fig. 9.



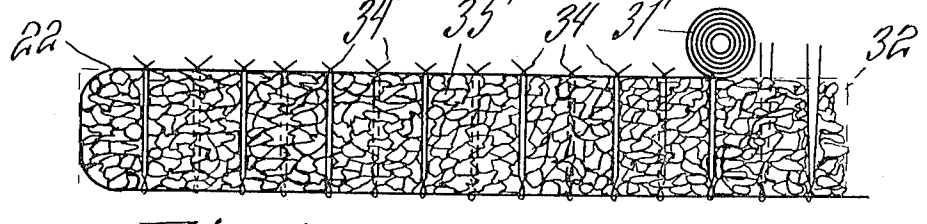


Fig. 10.

Witnesses

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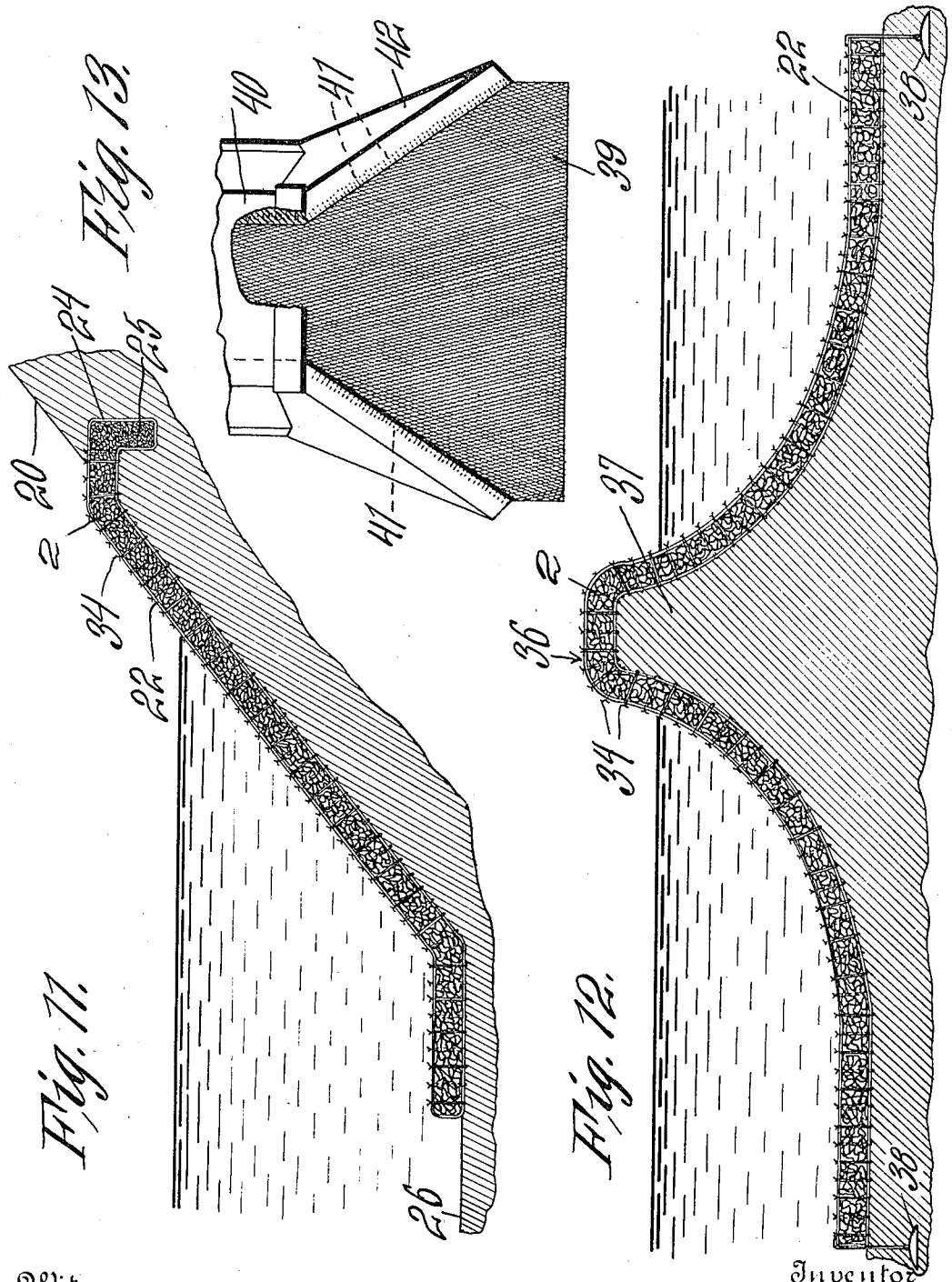
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3 SHEETS—SHEET 3.



Witnesses

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UNITED STATES PATENT OFFICE.

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COVERING OR MATTRESS FOR BANKS OR THE LIKE.

1,206,891. Specification of Letters Patent. Patented Dec. 5, 1916.

Application filed July 12, 1915. Serial No. 39,323.

To all whom it may concern:

Be it known that I, ARCHY M. NELSON, a citizen of the United States, residing at Salt Lake City, in the county of Salt Lake and State of Utah, have invented certain new and useful Improvements in Coverings or Mattresses for Banks or the like, of which the following is a specification.

My invention relates to improvements in flexible coverings or mattresses, for protecting banks, shores, break-waters, and the like, from the destructive action of water, and to a method of constructing the same.

An important object of the invention is to provide a mattress of the above mentioned character, which is highly flexible, preferably in all directions, so that it will yield locally and follow or descend with a portion of the bank or the like, when a wash-out occurs, thus serving to check it.

A further object of the invention is to provide a flexible mattress that will protect the bank or the like from wave action, scour or erosion at all times.

A further object of the invention is to provide a mattress of the above mentioned character, which is heavy, strong, and highly durable.

A further object of the invention is to provide a mattress of the above mentioned character, which may be advantageously constructed upon the bank or the like, where it remains in use.

A further object of the invention is to provide an economical and expeditious method of constructing the mattress.

Other objects and advantages of the invention will be apparent during the course of the following description.

In the accompanying drawings forming a part of this specification and in which like numerals are employed to designate like parts throughout the same, Figure 1 is a transverse vertical sectional view through a bank, showing the lower section of wire fabric, included in the mattress, in place thereon, Fig. 2 is a plan view of a plurality of sections of the mattress being laid, Fig. 3 is a side elevation of a strip-support, and gage used in constructing the mattress, Fig. 4 is an end elevation of the same, Fig. 5 is a fragmentary side elevation of the wire fabric, which is preferably employed in the manufacture of the mattress, Figs. 6 to 10 inclusive are longitudinal sectional views through sections of the mattress being formed, the same being partly diagrammatic, for illustrating the steps of the method of constructing the mattress, Fig. 11 is a transverse vertical sectional view through a completed mattress embodying the invention, and applied to the bank of a river or the like, Fig. 12 is a similar view through the mattress, applied to a break-water or bank, and, Fig. 13 is a plan view of the mattress embodying the invention, arranged at the outlet end of a conduit, or culvert and extending throughout its entire length forming the floor bottom or pavement in the structure.

As shown in Figs. 1 and 11, the numeral 20 designates the bank of a river or the like, which is first suitably leveled or graded. The numeral 22 designates a section of woven wire fabric, preferably wire fabric which is known in the trade as "K" Elwood woven wire, while other wire fabric may be employed. This wire fabric embodies relatively nonextensible strands of wire 22′, interwoven with diagonally arranged strands 23. The wire fabric is preferably arranged upon the bank so that the strands 22′ extend transversely thereof. By this means the fabric has a greater longitudinal elasticity than a transverse elasticity, with respect to the bank. This is an important feature of the invention, as it is advantageous to construct the mattress so that it has a higher degree of elasticity longitudinally of the bank than transversely thereof, as the wash-outs upon the bank or the like generally extend longitudinally thereof, or in the direction of travel of the water. The wire fabric is of course highly flexible and possesses a substantial degree of elasticity transversely of the bank. This wire fabric is preferably galvanized or otherwise treated to prevent it corroding in the salt water. In laying the mattress upon the bank 20 or the like, the bank is provided with a longitudinal opening, ditch or groove 24, preferably above the high water mark. The upper end of the wire fabric is arranged within the opening 24 and projects upwardly beyond the same, and is held therein by loosely laid heavy bodies 25, which may be mineral aggregates, such as broken stone, gravel, quarry, spalls, broken bricks, macadam, broken slag or the like. These solid bodies are free from cementitious material, such as concrete, lime or the like. The upper end of the section of wire

fabric being anchored to the upper portion of the bank 20, the roll of wire fabric is rolled downwardly toward the bottom 26 of the bank.

In Fig. 2, the mattress is shown as being constructed in transverse sections 27, 28, 29, and 30, the upper ends of which are arranged in stepped relation, during construction, as shown. The section 27 may be considered as completed and having one side closed by any suitable means, such as a tie wire uniting the upper and lower covering 31 or the like. Arranged at the opposite side of each succeeding section, in advance of the roll of wire fabric 31′ thereof, is a strip-support 32, which is temporarily used for closing the open side of and gaging the depth or thickness of the section. This strip-support is provided with feet 32, which holds it upon its edge in a vertical position.

In forming each transverse section of the mattress, the wire fabric is preferably unrolled from the top of the bank or the like until the bottom 26 of the bank is reached, as is obvious from the foregoing description. When this is done a suitable number of upstanding or transverse tie wires 34 are secured to the bottom section of the wire fabric. Each tie wire preferably consists of a section of wire bent upon itself between its ends and twisted or looped about a portion of the lower section of wire fabric. Each tie wire embodies a pair of arms or members 34′, as shown. These tie wires are preferably evenly distributed throughout the area of the lower section of wire fabric and the mattress including it. The number of tie wires 34 to be used, will depend upon the size of the mattress, the character of the filler, and the like.

Horizontal longitudinal holding rods or bars 35 are next placed upon the upper side of the portion of the section of the mattress being constructed, corresponding ends of these rods contacting with the completed portion of the mattress and the opposite ends contacting with the strip-support 32, to be supported thereby. The tie wires 34 are preferably arranged in rows, and the holding rods 35 are arranged between the arms 34′ of the tie wires in each row or set. The upper ends of the arms 34′ of the tie wires are then bent over or about the holding bars 35, at substantially a right angle thereto, as clearly illustrated in Fig. 7. By this means the tie wires are held in place, and retained substantially vertical, while the filler is fed upon the lower section of fabric, as clearly illustrated in Fig. 8. This filler is designated by the numeral 35′ and is formed of permanently loosely laid heavy bodies, having a specific gravity far exceeding that of water and insoluble therein, such as mineral aggregates, gravel, broken stone, quarry, broken bricks, macadam, and broken furnace slag. This filler is free from any cement, such as concrete, mortar, or the like, whereby its bodies or aggregates remain permanently loosely laid, which is essential to impart to the mattress a permanent flexibility. After the filler is properly placed in position, as above indicated, the rods 35 are elevated, while being retained substantially horizontal, as illustrated in Fig. 9. This upward movement of these rods serves to substantially straighten out the upper ends of the arms 34′ of the tie wires, as shown in Fig. 9. The rods 35 are then removed from proximity to the tie wires.

The roll of wire fabric 31′, is moved or rolled upwardly over or upon the filler 35′, until the top of the mattress is reached. The upper section of wire fabric is now cut from the roll 31′ and tied or otherwise united to the upper end of the lower section. When the upper section of wire fabric is being passed over the filler, the upstanding ends of the arms 34′ of the tie wires enter the openings in the wire fabric, and these ends are subsequently twisted about or tied to each other and the strands of the wire fabric. It is thus apparent that the tie wires serve to bind the upper and lower sections of the wire fabric together at spaced intervals, and prevent undue slipping of the filler therein.

The completed mattress, formed by the practice of the above stated method, is shown in Fig. 11. This mattress is permanently highly flexible, preferably in all directions, and when a wash-out occurs in the bank or the like, the mattress will yield locally and descend to remain in permanent contact with the wall of the wash-out, thus checking it.

In Fig. 12, I have shown a mattress, designated as a whole by the numeral 36. This mattress is substantially identical with the mattress shown in Fig. 11, except that it extends upon the opposite sides of a breakwater or bank 37, and has its ends anchored, as shown at 38. In constructing this breakwater, the mattress is preferably made in longitudinal halves, which are constructed upon barges. The outer ends of the mattress sections are anchored in place while their inner ends are disconnected, providing an opening through which sea sand or other material constituting the body of the breakwater 37 may be fed by means of a dredge or other machine. When a sufficient amount of this sea sand is fed into the space between the mattress sections, the upper ends of these sections are tied or otherwise united. Each mattress section is preferably constructed upon the barge, substantially in accordance with the method hereinabove stated.

In Fig. 13 I have shown a mattress 39, which is substantially identical with the other mattresses. This mattress is arranged at the outlet end of a conduit 40, to receive

the water thereon. The mattress 39 is preferably secured to the sides 42 of the conduit by anchor wires 41 or the like.

It is to be understood that the forms of my invention herewith shown and described are to be taken as preferred examples of the same, and that various changes may be resorted to in the shape, size, and arrangement of elements forming the mattresses, and in the steps of the method employed in constructing such mattresses.

Having thus described the invention, I claim:—

1. The herein described method of constructing a covering or mattress for a bank or the like, which consists in laying a lower section of wire fabric upon a support, securing upstanding tie wires to the lower section of wire fabric, arranging substantially horizontal holding rods above the section of wire fabric and adjacent the upper ends of the upstanding tie wires, bending the upper ends of the tie wires about the holding rods so that they are straightened out when the holding rods are elevated with relation thereto, placing a filler upon the lower section of wire fabric whereby the tie wires are embedded therein, elevating the holding rods whereby the upper ends of the tie wires are straightened out, placing an upper section of wire fabric upon the filler, whereby the ends of the tie wires project through openings in the upper section of wire fabric, and securing the upper ends of the tie wires to portions of the upper section of wire fabric.

2. The herein described method of constructing a covering or mattress for a bank or the like, which consists in partly unrolling a roll of wire fabric upon a support by moving the roll longitudinally of the support in one direction, securing upstanding tie wires to the lower section of wire fabric thus laid upon the support, supporting substantially horizontal holding rods above the lower section of wire fabric in proximity to the upper ends of the tie wires, bending the upper ends of the tie wires about the holding rods so that they are straightened out when the holding rods are elevated with relation thereto, placing a filler upon the lower section of wire fabric, rolling the roll of wire fabric in an opposite direction upon the filler and longitudinally of the support whereby the ends of the tie wires project through openings in the upper section of wire fabric thus laid, securing the upper ends of the tie wire to portions of the upper sections of wire fabric, and securing the upper ends of the upper and lower sections of wire fabric together.

In testimony whereof I affix my signature in presence of two witnesses.

ARCHY M. NELSON.

Witnesses:
K. D. HARDY,
BRUNO LANGE.