Feb. 27, 1940. W. F. ASTLEY 2,191,875

MACHINE FOR MAKING INSULATION

Filed March 10, 1938 4 Sheets-Sheet 1

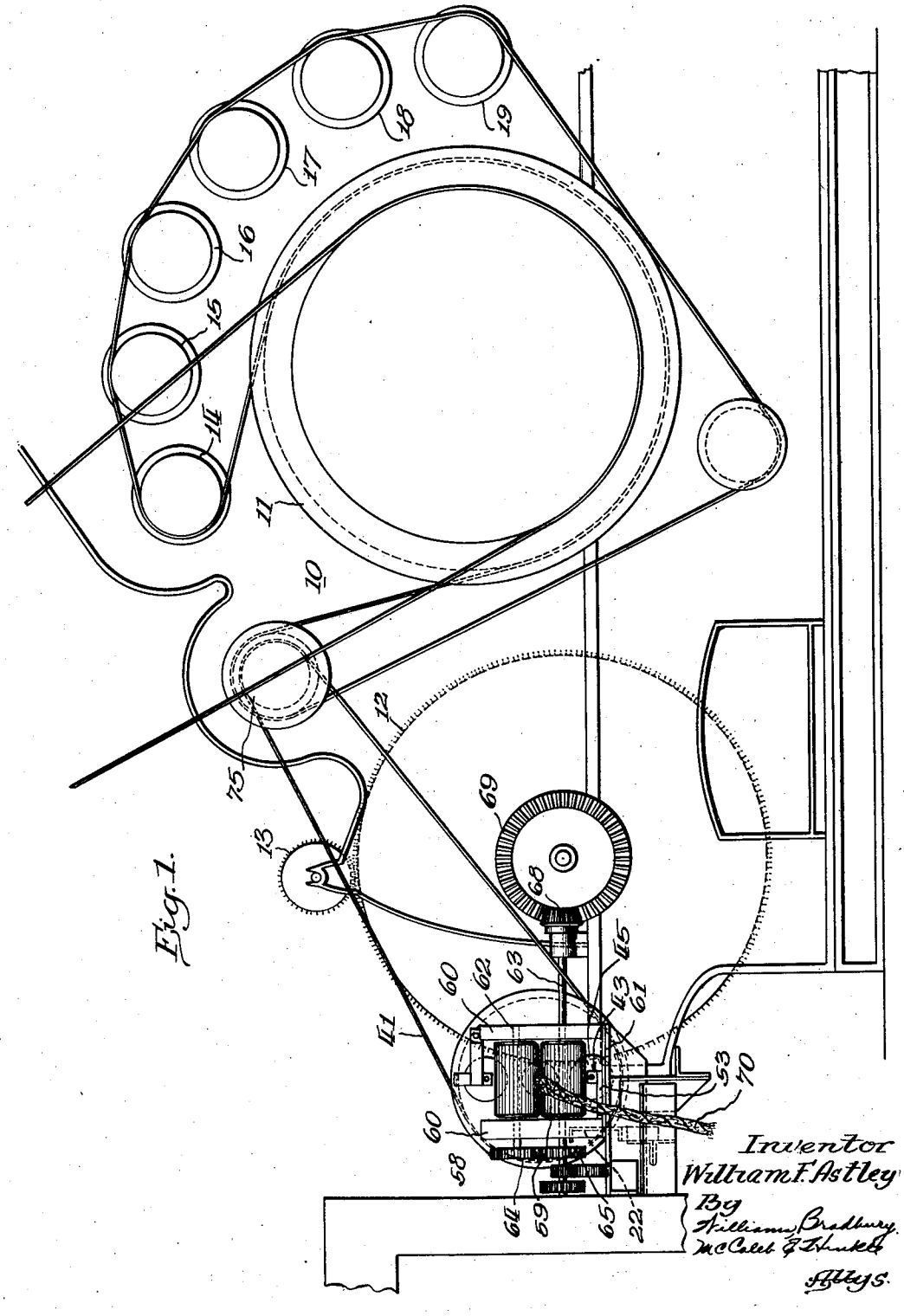


Fig. 1.

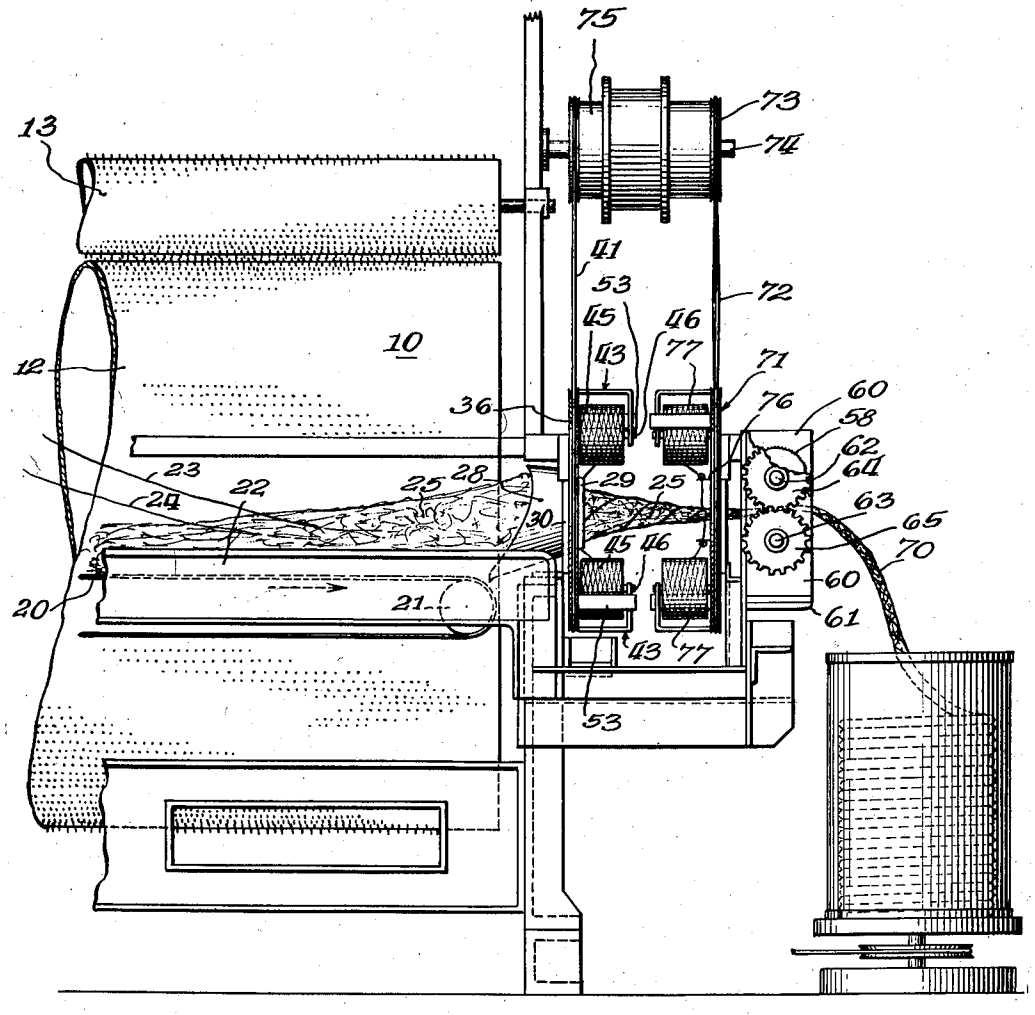
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Fig. 2.



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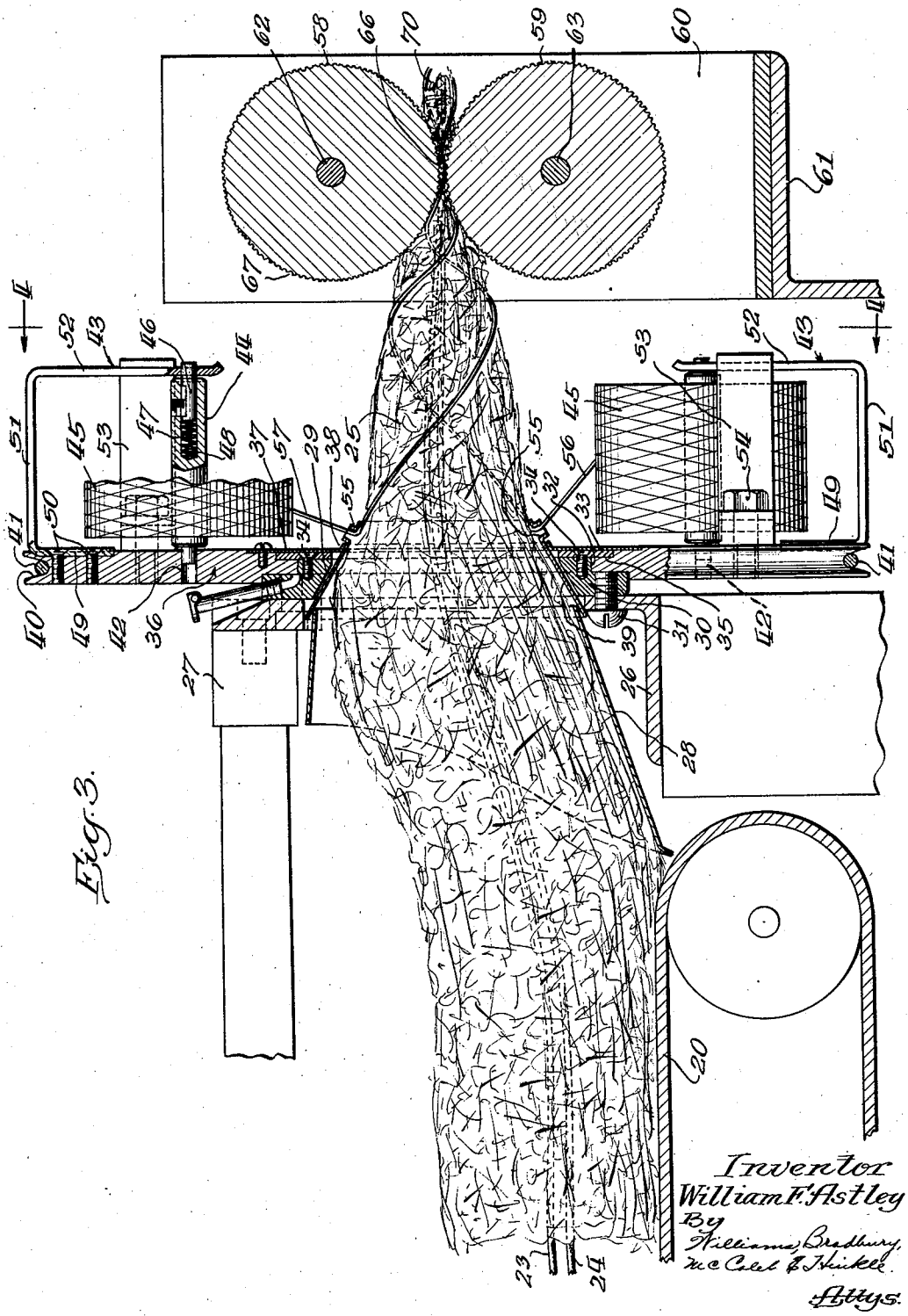


Fig. 3.

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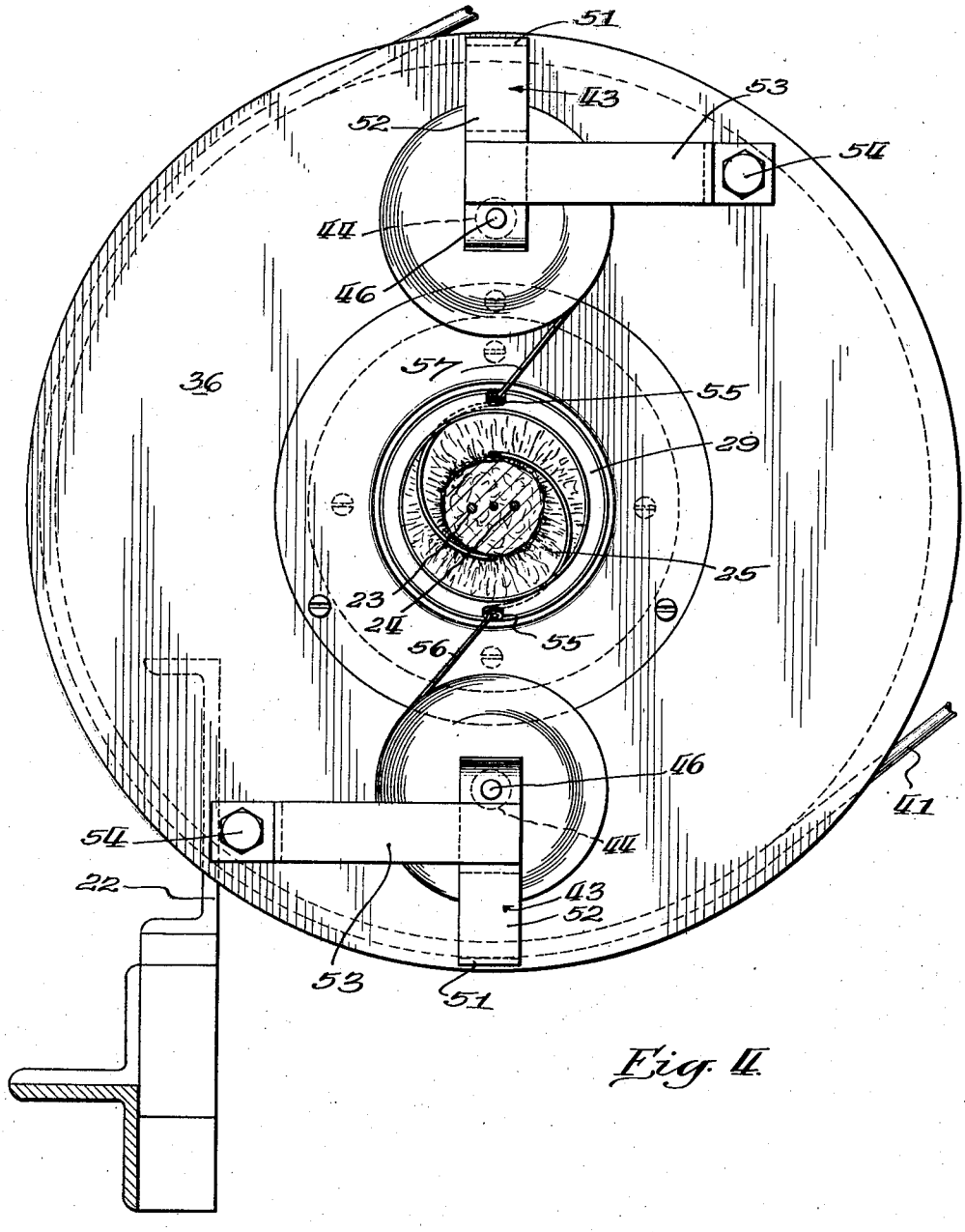


Fig. 4.

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UNITED STATES PATENT OFFICE

2,191,875

MACHINE FOR MAKING INSULATION

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Application March 10, 1938, Serial No. 195,117

3 Claims. (Cl. 57—5)

The present invention relates to methods and machines for making insulation, and is particularly concerned with methods and machines for making a unit of insulation that is adapted to be used in making a heat insulating material of the type covered by my prior application, Ser. No. 188,720, filed February 4, 1938, for Heat insulating materials and methods of making the same.

The insulation of which this unit is a part has marked advantages over the insulation of the prior art, due to the structure and arrangement of the elements of the insulation, and the materials may be used in all places where flexible or blanket insulation of the prior art may be used.

One of the objects of the invention is the provision of an improved flexible and highly efficient insulating material which is capable of meeting special conditions, such as use at higher temperatures, as, for example, up to 750 degrees or 1,000 degrees F.

Another object of the invention is the provision of improved machines which are adapted to be utilized for handling fibers in the form of sliver or other loose fibers and transforming these fibers into an insulating unit of sufficient strength to maintain its individuality so that it may be coiled and later used in building up an insulating blanket.

Another object of the invention is the provision of an improved machine of the class described, which is adapted to provide the asbestos fibers in the form of sliver or other fibers with one or more interlacing or spirally wound strands wound all in one direction or wound in opposite directions.

Other objects and advantages of the invention will be apparent from the following description and the accompanying drawings, in which similar characters of reference indicate similar parts throughout the several views.

Referring to the four sheets of drawings accompanying this specification,

Fig. 1 is a diagrammatic side elevational view of a carding machine which is equipped with an attachment or machine for forming insulating units constructed according to the present invention;

Fig. 2 is a fragmentary plan view of the same mechanism in connection with a part of the carding machine;

Fig. 3 is a fragmentary enlarged view of a machine similar to Fig. 2, except that it is adapted to wind threads spirally only in one direction about the insulating fibers;

Fig. 4 is a vertical sectional view, taken on the plane of the line 4—4 of Fig. 3, looking in the direction of the arrows.

Referring to Fig. 1, 10 indicates in its entirety the conventional carding machine, which includes the usual carding cylinders 11—19. The carding machine is adapted to take the fiber or sliver at the right hand end of Fig. 1 and card it, and it is deposited at the left hand side of the carding cylinder 12 in Fig. 1 upon a conveyor belt 20 (Fig. 2), which is disposed in a trough between the carding cylinder 12 and a baffle or side board 22 in such manner that it is adapted to support the amount of carded sliver which is deposited upon the belt 20, and the belt 20 moves toward the right, as indicated by the arrow in Fig. 2, constantly feeding the sliver toward the right in Fig. 2.

The carding machine is provided with one or more, preferably a plurality, of ordinary reels for supporting cords 23, 24, which may be fed into the sliver 25 from the left of Fig. 2 so that the cords 23, 24, which may be provided with thin wires of steel or other suitable material and formed out of asbestos threads, are adapted to be embedded in the sliver and fed toward the right with it after the threads have once been started. At the right hand of the carding machine in Fig. 2 the machine is provided with an attachment, one form of which is shown in Fig. 2 and another form in Fig. 3.

Referring to Fig. 3, this attachment is mounted upon the frame members 26, 27 of the carding machine, and it preferably includes a funnel shaped sheet metal member 28, the larger or left side of which in Fig. 3 is of sufficient size to receive the maximum amount of sliver which may be fed to the attachment by the carding machine.

This funnel 28 is fixedly secured to the frame, and it extends into a second funnel member 29, which is rotatably mounted on the frame, as follows: The frame member 26 may support an annular member 30 by means of a plurality of screw bolts 31 passing through the frame member 26 and threaded into the annular member 30. The annular member 31 is provided with a reduced cylindrical portion 32 and with a radially projecting annular guide plate 33, which is secured to the annular member 30 by a plurality of screw bolts 34.

This forms an annular groove 35 within which is mounted the rotating pulley wheel 36 (Fig.

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3). In order to provide a support for the secondary funnel 29, the pulley 36 is provided with an annular plate 37, which overlies the guide plate 33 and extends beyond it and is provided with an outwardly turned attachment flange 38. The attachment flange 38 is secured to the secondary funnel 29, and the annular member 30 may have a tapered bore 39 with a clearance between the walls of the bore 39 and the secondary funnel 29.

Thus the funnel 29 is adapted to rotate with the pulley 36, for a purpose further to be described. The pulley 36 is provided with an outer peripheral groove 40 for receiving the belt 41, which drives the pulley in a clockwise direction in Fig. 1 by a connection to a pulley carried by the other rotating parts of the carding machine, as shown in Fig. 1. The speed of rotation of the pulley 36 depends upon the speed of the conveying belt 20 and upon the number of turns which are desired to be wrapped about the sliver as it progresses from the machine.

The pulley 36 is formed with a plurality of bearings 42 and with a plurality of corresponding bearing brackets 43 each for rotatably supporting the removable shaft 44 that carries a ball of suitable cord 45 made out of asbestos fibers. The shaft 44 may be provided with a spring pressed trunnion 46 located in a bore 47 and engaged by the spring 48 so that it is removable from its bearings. The bearing bracket 43 comprises a sheet metal member having an attachment flange 49 which is secured to the pulley by a plurality of screw bolts 50.

The bracket has an arm 51 at right angles to the attachment flange 40 and an inwardly extending arm 52 provided with a bore to form a bearing for the trunnion 46. Additional support for the bracket 43 may be provided in the nature of another angle bracket 53 secured to the pulley 36 by screw bolts 54 and extending over into engagement with the arm 52.

The rotating arm 29 is preferably provided with a cord guide 55 adjacent each of the balls 45 of cord, and the cords 56, 57 may extend downward from the balls 45 through the guides 55 into engagement with the sliver 25. The funnels 28 and 29 are adapted to reduce the size of the sliver, that is, to condense it, and the sliver emerges from the rotating funnel 29 in the form of a substantially round body of loose fibers, carrying with them the two or more cords 23, 24 which are embedded in the sliver. The pulley 36 rotates as the sliver 25 emerges from the funnels and wraps the cords 56, 57 about the sliver 25 in a spiral direction, and spaced from each other.

The sliver 25 is thus interlaced or partially confined between the inner cords 23, 24 and the spirally directed cords 56, 57. The machine is also preferably provided with feeding rolls 58, 59 rotatably mounted by trunnions in bearings upon the upwardly extending frame members 60, which are also carried by the frame members 61 of the carding machine, and the feeding rolls 58, 59 have their respective shafts 62, 63 connected to gears 64, 65 so that these rolls rotate in opposite directions, but their peripheries move in the same direction at the point of engagement of the feed rolls 58, 59, with the sliver 25.

These feed rolls may be serrated or toothed as shown at 67 over the entire periphery of the rolls, and they may be driven, for example, by means of a bevel pinion 68, engaging a crowned gear 69, carried by the same shaft which carries the carding cylinder 12. The resulting insulating member 70 comprises a body of loose and fluffy asbestos sliver, which is interlaced between the spirally wound threads 56, 57 and the internal threads or cords 23, 24. It is not definitely cylindrical in form, as the sliver is not actually confined by the external threads except at the actual point of contact of the threads with the sliver, and the sliver protrudes from the spirally wound threads at all other points. The resulting unit 70 thus drops from the feed rolls 58, 59 into a barrel, which preferably rests upon a turntable and is rotated at a substantially constant speed so that the insulating unit 70 is coiled in the barrel.

The resulting insulating unit has a minimum amount of tensile strength, as the threads or cords merely serve to hold it again sufficiently to permit its coiling and to permit its subsequent removal from the barrel for use in weaving the blanket insulation of the type described in my prior application mentioned above.

Various types of fibers may be handled which have never before, so far as I am aware, been handled by the weaving machines of the prior art, such as, for example, plane uncondensed sliver of any fiber, condensed sliver, rovings, rock wool, or any vegetable, mineral, or animal fibers.

Referring to Fig. 2, this machine is similar to the one previously described, except that it is provided with an oppositely rotating pulley 71, located between the pulley 36 and the feed rolls 58, 59 and connected by a crossed belt 72 to a drive pulley 73, which may be on the same shaft 74 as the drive pulley 75, which supports the belt 41.

In this case the pulley 71 bears a rotating collar 76 provided with similar cord or thread guides, and the two balls 77 of cord are rotated with the pulley 71 in an opposite direction to the direction of rotation of the pulley 36. Thus the machine of Fig. 1 is adapted to wrap threads spirally of the sliver in both directions, but it is not necessary to utilize the double spiral wrapping of Fig. 2 except in the more refined embodiments of the invention, as I have found spiral wrapping in one direction sufficient to hold the sliver in place until it is woven in the blanket.

My method of handling the carded sliver for producing the insulating unit 70 comprises the deposit of the carded sliver upon a conveyor, the continuous conveying of the carded sliver in a stream upon a conveyor in a predetermined direction toward a condensing funnel, or funnels, and the inclusion in the body of sliver of one or more longitudinally extending threads or cords, preferably three in number, as shown in my prior application, and the wrapping of the body of carded and condensed sliver with a plurality of spiral cords whereby the sliver is confined between the internal and external threads and supported sufficiently so that it may be conveyed as a body to a weaving machine for forming a blanket of insulation out of insulating units of the class described.

It will thus be observed that I have invented an improved carding machine or attachment for a carding machine by means of which an improved insulating unit may be constructed that includes the carded asbestos fibers in their most open and fluffy condition.

The separate felt units of the class described may be woven into a continuous felt blanket, which has no place of separation or cracks, and

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the material has a substantially uniform insulating value over its entire area.

Such insulating material constructed of the present units will withstand vibration and is permanently flexible and permanently efficient.

It will not sag, and it may be removed and reapplied without deterioration. It has a high degree of flexibility, strength and resiliency, so that it is not compacted by the application of severe abuse, such as foot traffic, which it withstands without injury.

Its weight is approximately one-half of the weight of many of the block type materials of the prior art, and may therefore be used in many applications where light weight is an important factor. It will withstand higher temperatures than the materials of the prior art when constructed with fibers of the preferred type, which may consist of Amosite fibers or mineral wool fibers, such as rock wool.

While I have illustrated a preferred embodiment of my invention, many modifications may be made without departing from the spirit of the invention, and I do not wish to be limited to the precise details of construction set forth, but desire to avail myself of all changes within the scope of the appended claims.

Having thus described my invention, what I claim is new and desire to secure by Letters Patent of the United States, is:

1. In a machine for making insulating units, the combination of a supporting frame, with a plurality of carding rolls adapted to receive asbestos fibers and card them to an open and fluffy condition, said asbestos fibers being deposited at one end of said machine, a conveying belt at that end of the machine for receiving the carded asbestos fibers, said conveying belt conveying the fibers laterally at a predetermined rate, a condensing funnel located to receive said asbestos fibers, whereby the stream of fibers is condensed to a coherent body, said frame also supporting a plurality of reels having cords extending into the body of said carded asbestos on said conveyor belt whereby the cords are embedded in the body of asbestos, a pair of feed rolls located opposite the discharge end of said condensing funnel and adapted to engage the fibers issuing from said funnel to draw the fibers and cords through said funnel, means for driving said feed rolls at a predetermined rate of speed, and a rotating member surrounding said funnel, said rotating member having means for driving it at a predetermined speed, and being provided with a pair of oppositely disposed supports for rolls of cord, said supports rotating with said rotatable member, and said funnel having an extension fixedly secured to said rotating member for further condensing the fibers, said extension being provided with guide members for receiving cords from the rolls of cord carried by said rotatable member whereby the rotatable member is adapted to wrap cords about the fibers issuing from said funnels and further condense said fibers, and to partially confine the fibers to form an insulating member of loose carded fibers with embedded cords and spirally wrapped cords.

2. In a machine for making insulating units, the combination of a supporting frame, with a plurality of carding rolls adapted to receive asbestos fibers and card them to an open and fluffy condition, said asbestos fibers being deposited at one end of said machine, a conveying belt at that end of the machine for receiving the carded asbestos fibers, said conveying belt conveying the fibers laterally at a predetermined rate, a condensing funnel located to receive said asbestos fibers, whereby the stream of fibers is condensed to a coherent body, said frame also supporting a plurality of reels having cords extending into the body of said carded asbestos on said conveyor belt whereby the cords are embedded in the body of asbestos, a pair of feed rolls located opposite the discharge end of said condensing funnel and adapted to engage the fibers issuing from said funnel to draw the fibers and cords through said funnel, means for driving said feed rolls at a predetermined rate of speed, and a rotating member surrounding said funnel, said rotating member having means for driving it at a predetermined speed, and being provided with a pair of oppositely disposed supports for rolls of cord, said supports rotating with said rotatable member, and said funnel having an extension fixedly secured to said rotating member for further condensing the fibers, said extension being provided with guide members for receiving cords from the rolls of cord carried by said rotatable member whereby the rotatable member is adapted to wrap cords about the fibers issuing from said funnels and further condense said fibers, and to partially confine the fibers to form an insulating member of loose carded fibers with embedded cords and spirally wrapped cords, and a receiver for said insulating member comprising a container located on the side of said feed rolls opposite to said funnels to receive the insulating member as it drops by gravity, said container being rotatably mounted on a turntable, and means for rotating said turntable at a predetermined speed, whereby the insulating member is coiled in said container.

3. In a machine for making insulating units, the combination of a supporting frame, with a plurality of carding rolls adapted to receive asbestos fibers and card them to an open and fluffy condition, said asbestos fibers being deposited at one end of said machine, a conveying belt at that end of the machine for receiving the carded asbestos fibers, said conveying belt conveying the fibers laterally at a predetermined rate, a condensing funnel located to receive said asbestos fibers, whereby the stream of fibers is condensed to a coherent body, said frame also supporting a plurality of reels having cords extending into the body of said carded asbestos on said conveyor belt whereby the cords are embedded in the body of asbestos, a pair of feed rolls located opposite the discharge end of said condensing funnel and adapted to engage the fibers issuing from said funnel to draw the fibers and cords through said funnel, means for driving said feed rolls at a predetermined rate of speed, and a rotating member surrounding said funnel, said rotating member having means for driving it at a predetermined speed, and being provided with a pair of oppositely disposed supports for rolls of cord, said supports rotating with said rotatable member, and said funnel having an extension fixedly secured to said rotating member for further condensing the fibers, said extension being provided with guide members for receiving cords from the rolls of cord carried by said rotatable member whereby the rotatable member is adapted to wrap cords about the fibers issuing from said funnels and further condense said fibers, and to partially confine the fibers to form an insulating member of loose carded fibers with embedded cords and spirally wrapped

cords, and a second similar rotating member rotatably mounted on said frame co-axially with the first-mentioned rotating member and provided with supports for rolls of cord, and each roll having a guide, the guides being oppositely disposed with respect to a centrally located aperture in said second rotating member through which the insulating unit passes, said second rotating member rotating at a predetermined speed in an opposite direction to the first-mentioned rotating member, whereby cords are wrapped spirally in both directions about said insulating unit.

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