Aug. 14, 1945. A. M. GOODLOE 2,382,560

METHOD OF PRODUCING A FILTER MEDIUM

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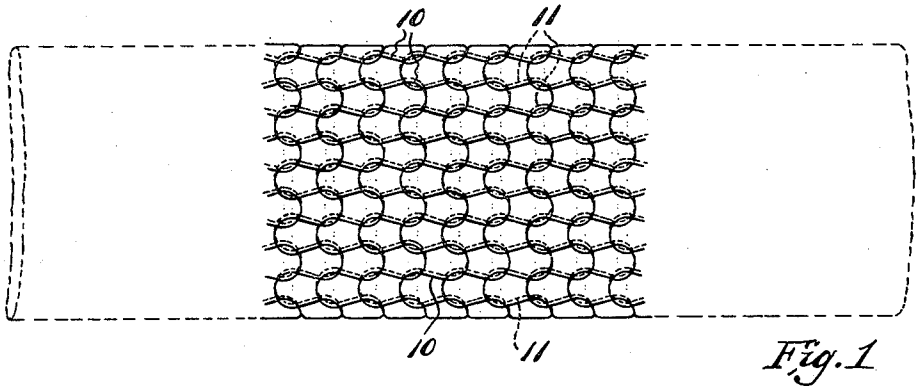


Fig. 1

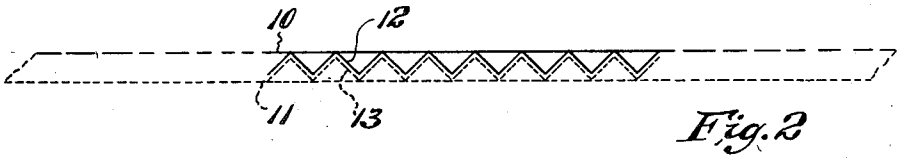


Fig. 2

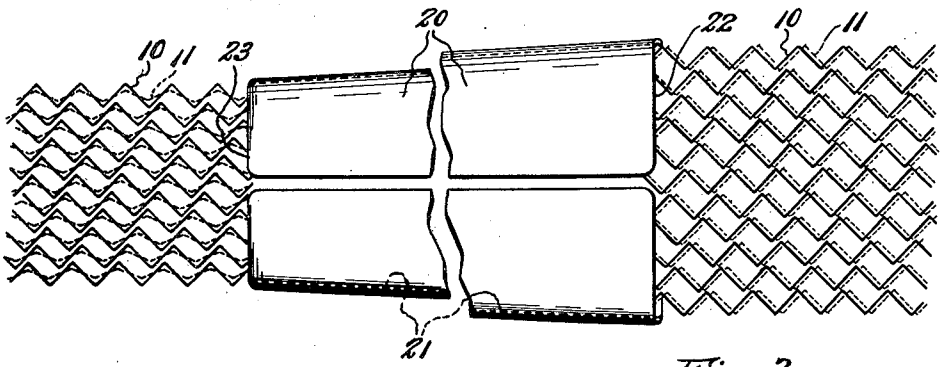


Fig. 3

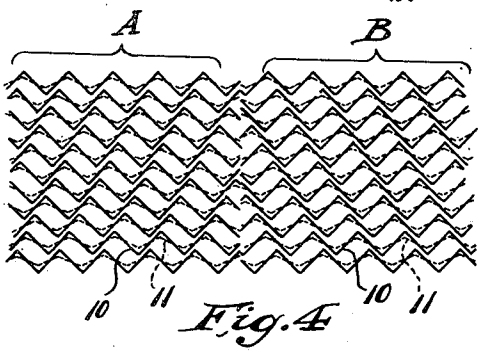


Fig. 4

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METHOD OF PRODUCING A FILTER MEDIUM

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Application October 4, 1941, Serial No. 413,602

1 Claim. (Cl. 140—71)

This invention relates to method of producing a filter body medium; and the invention has reference, more particularly, to a novel form of filter body medium produced from tubular knit metallic mesh adapted for forming the foraminous mass of various kinds of impingement type air and gas filters, and especially well adapted for forming a foraminous filter body for an oil bath type filter, such e. g. as used for cleaning air admitted to the carburetion systems of internal combustion engines.

In the use of tubular knit metallic mesh for forming a foraminous filter body, especially one of the oil bath type, it has heretofore been the practice to flatten a suitable length of the tubular knit mesh into a double ply strip of suitable width, and then roll said strip upon itself to form the mass of the filter body. Preparatory to thus rolling the flattened tubular mesh strip, it has also been the practice to first corrugate the strip transversely at an angle other than ninety degrees to the length of the strip, and then superimpose a plurality of the corrugate strips so that the corrugations of contiguous strips cross each other; the purpose of so doing being to somewhat separate the strips for better flow of air or gas through the filter mass without undue restriction, and also to give better access to all parts of the mass for washing the same with oil or other similar viscous fluid adapted to coat the metallic material of the mass so as to catch and hold and thus separate dust and other solid foreign substances from an air or gas stream caused to pass through the filter.

When a flattened tubular knit metallic mesh strip is corrugated as described, the corrugating operation tends to nest the corrugations of one ply thereof into those of the other contiguous ply. Such effect is not satisfactory, for the reason that metallic strands of one ply tend to closely but non-uniformly traverse or cross the mesh openings of the opposed contiguous ply, thus rendering the mass of the filter body formed therefrom irregular in density, so that it is more restrictive in some portions than it is in others, whereby separated dust and foreign material is likely to irregularly accumulate with choking effect at separated points within the filter body mass. This also results in unduly increasing restriction of air or gas flow through the filter body, so as to considerably reduce the capacity and efficiency of the filtering performance thereof. In addition to this, such effects also reduce the free flow of the washing or coating oil bath uniformly in contact with all areas of the filter body mass.

Further contributing to these undesirable conditions and effects is the fact that when the flattened tubular knit metallic mesh strip is corrugated as above stated, it frequently results in irregular relative distortion of adjacent longitudinal rows of the knitted loops of its metallic strands in such manner as to form longitudinal lines or zones of excessively spread mesh openings somewhat similar in appearance and effect to "ladders" or "runs" which sometimes occur in knitted fabrics. Such distortion, whereby unduly widely open streaks or zones appear in the corrugated mesh, I have hereinafter referred to as "zoning." Such zoning tends to produce, when the strips containing the same are rolled upon themselves or otherwise superimposed to form a filter body mass, a filter body lacking in uniform density and porosity.

Having the above stated objectionable conditions and effects in mind, it is an object of this invention to provide a corrugated flattened tubular knit metallic strip which is free therefrom, and wherein the contiguous plies thereof are somewhat separated one from the other, while at the same time being laterally compressed so as to prevent obstructing contiguity of strand parts of one ply relative to loop openings of the other ply, and at the same time to eliminate zoning, thus better assuring a uniform interstitial formation or porosity of a filter mass formed from such strips, as well as one which is free from tendency to local restriction with consequent tendency to unevenly accumulate dust or other foreign material with local choking effect, while at the same time providing a filter mass to all parts of which a treating oil bath may readily find access.

This invention has for another object to provide a novel method of producing, for filter body formation, corrugated tubular knit metallic mesh having the novel characteristics above referred to.

Other objects of this invention, not at this time more particularly enumerated, will be understood from the following detailed description of the same.

This invention is schematically illustrated in the accompanying drawing, in which:

Fig. 1 is a face view of a flattened tubular knit metallic mesh strip ready to be submitted to a corrugating operation, the obverse ply of the strip being indicated by full lines and the reverse ply by broken lines.

Fig. 2 is an edge view of the strip after it has been corrugated, one ply being indicated by full lines and the other by broken lines.

Fig. 3 is a plan view of means for laterally

compressing the corrugated tubular knit metallic mesh strip, the latter being shown in passage therethrough, the obverse ply thereof being indicated by full lines and the reverse ply by broken lines.

Fig. 4 is a fragmentary plan view of two corrugated and laterally compressed tubular knit metallic mesh strips superimposed so that their corrugations cross, in which relation said strips are ready to be rolled upon themselves to form a filter body mass in the manner well known to the art.

Similar characters of reference are employed in the above described views, to indicate corresponding parts.

To produce the novel filter body medium according to this invention, a length of tubular knit metallic mesh of suitable diameter is first pressed into flattened condition so as to provide a two-ply strip, with one ply, as the obverse ply 10 shown by full lines in Fig. 1, superposed contiguous to the other ply, namely the reverse ply 11 shown by broken lines in Fig. 1.

The thus flattened two-ply strip is next passed through the nip of a pair of corrugating rolls of such character as will corrugate the strip transversally at an angle relative to the length of the strip which is other than ninety degrees, whereby the formed corrugations cross the width of the strip diagonally.

In thus corrugating the strip, the two plies 10 and 11 of the strip are pressed into close contiguity, and so that the corrugations 12 of the one closely nest into the corrugations 13 of the other (see Fig. 2). Since the knitted loops of the respective plies 10 and 11, when the latter are pressed together by flattening of the tubular knit material, do not register symmetrically, it frequently happens that the loop strands of one ply variously cross loops of the contiguous ply, so that the interstitial character of the strip is of considerable irregularity, i. e. the interstices at one point will vary considerably in size as compared with those of another point, whereby when the strips are rolled into a filter body mass the porosity of the latter will vary considerably at different areas with detriment to the efficiency of the filter body in respects already hereinabove referred to. Such lack of interstitial uniformity is further aggravated by the fact that the variable distortion of the knitted loops under the strip corrugating operation tends to run in lines more or less parallel to the length of the strip, thus forming excessively open zones at one point, and excessively narrow or restricted zones at another point. This effect I have characterized as "zoning," and it also tends to defeat attainment of a desired substantially uniform interstitial or porous structure in a filter body mass formed from the strips.

I have discovered that a corrugated two-ply strip may be rendered more uniform as to its interstitial character and the zoning thereof may be eliminated by subjecting the same to transversely applied lateral compression while holding the strip against bulging or undue separation of its contiguous plies. To accomplish this I provide a compressing means comprising a flattened tubular jig 20 adapted to provide a passage 21 of tapering width from its receiving end 22 to its discharge end 23, and of a height but slightly in excess of the overall thickness of the corrugated flattened strip of tubular knit metallic mesh. The receiving end of the passage of the jig 20 approximates in width to the initial width of the corrugated mesh strip.

To laterally compress the corrugated mesh strip, the same is entered in and drawn through the passage 21 of the compressing jig 20. As the strip moves through the jig passage, in engagement with the progressively narrowing sides thereof, the mesh plies of the strip are laterally squeezed or compressed, and are thus contracted in width. This lateral compression of the strip produces several effects, first, it tends to somewhat separate the corrugations of the plies 10 and 11, within limits, from their initial tightly nested relation, and, second, it tends to narrow down the lateral width of the knit loops of the mesh plies, especially those which were unduly or disproportionately widened or distorted during the corrugating operation, thus not only removing the zoning effects heretofore referred to, but also tending to reduce all the loops to substantially uniform width, and thereby rendering the interstitial structure of the mesh plies substantially uniform in character throughout the entire areas thereof. It also appears that, in addition to these effects, the raised humps of the underlying ply 11, formed by the corrugating operation in the metallic strands which define the knit loops thereof, will be caused to move or spring laterally past the depressed humps of the obverse ply 10, likewise formed by the corrugating operation in the metallic strands which define the knit loops of the latter ply, whereby these humps not only tend to interlock with one another, thus aiding in both retaining the mesh strip in the desired laterally compressed or contracted condition, as well as operating to hold the corrugated plies in the somewhat separated condition which breaks down tight nesting of the corrugations of one ply with those of the other ply.

The sum of these effects upon the corrugated mesh strip is to so form the same that the passages or openings thereof are brought to an approximate average size and uniform distribution through the thickness of the two-ply mesh material, thus avoiding spots or areas of varying resistance to air or gas flow therethrough, or like resistance to access of bathing oil or the like to all areas of the mesh. The comparative and highly desirable uniformity of interstitial character is maintained when mesh strips so treated and formed are superposed, and then rolled upon themselves into a foraminous filter body mass, with the result that the porosity of the resulting mass is substantially uniform in all areas thereof, so that occurrence of locally restricted areas is avoided, all with the attendant advantages hereinbefore referred to.

In assembling the corrugated tubular knit metallic mesh strips, having the novel structural formation according to this invention as above described, to make up a filter body mass, two such strips A and B (see Fig. 4) are superposed so that the angular corrugations of one will cross those of the other, whereby to sufficiently separate the strips so as to maintain the required foraminous conditions intermediate the superposed strips. The thus superposed strips are then rolled or otherwise superimposed to build up a mass of desired shape, volume and capacity, all as already well known to the art.

I am aware that some changes could be made in the above described mesh structure and method of producing the same without departing from the scope of this invention as defined in the

following claim. It is therefore intended that all matter contained in the foregoing description or schematically shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

I claim:

A method of producing a filter medium from a tubular knit metallic mesh body comprising first flattening the body to produce a two-ply strip, the plies of which are contiguously superposed, then passing the flat two-ply strip through the nip of a pair of corrugating rolls adapted to form corrugations across the width of said strip, and finally passing the corrugated strip through a flattened tubular jig having a passage tapering in width from its receiving end to its discharge end and of a height but slightly in excess of the overall thickness of the corrugated two-ply strip, the receiving end of said jig passage being somewhat in excess of the initial width of said corrugate strip and its discharge end being substantially less than said initial width of the corrugate strip, whereby the mesh strip is transversely contracted to laterally displace hump bends in the metallic strands of one ply of the corrugate strip relative to contiguous hump bends in the metallic strand of the other ply of said corrugate strip, so as to cross and mutually interlock said respective hump bends in staggered non-parallel nesting relation.

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