(No Model.)

G. C. REESE.

GALVANIZED OR METALLIC COATED WIRE CLOTH.

No. 600,250. Patented Mar. 8, 1898.

FIG 1

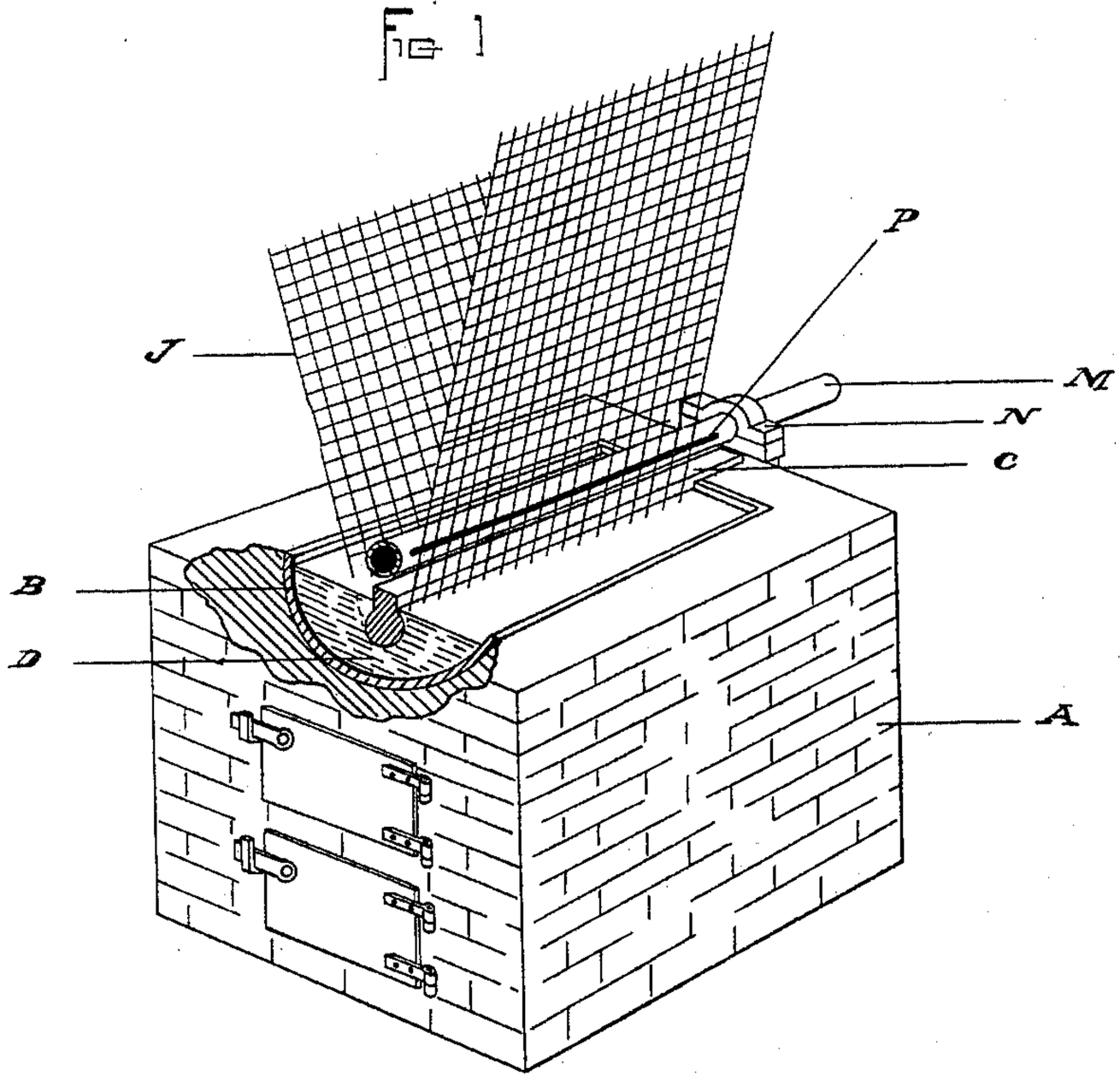


FIG 2

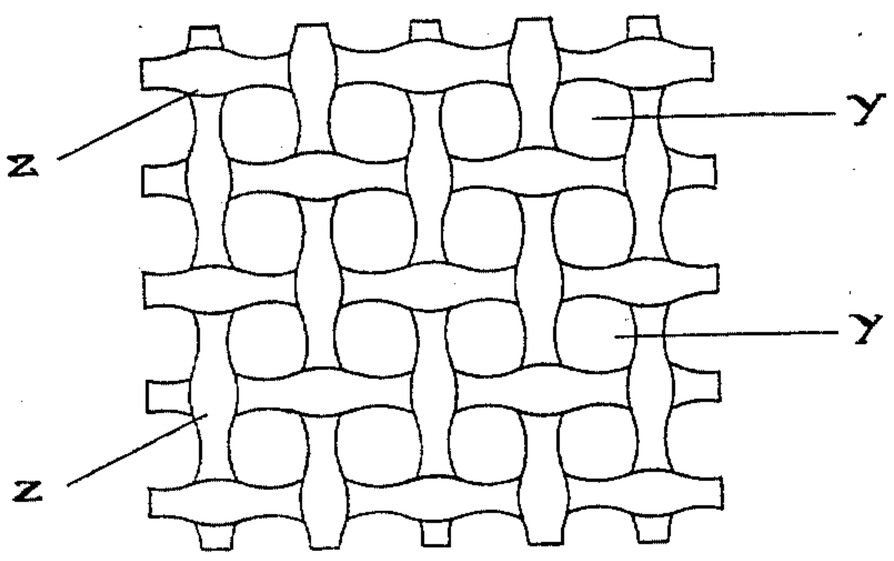
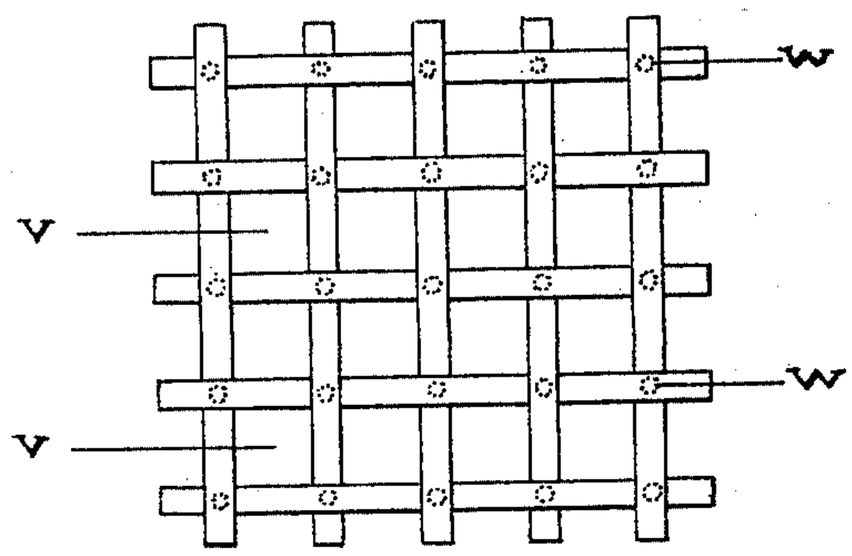


FIG 3



George C. Reese
INVENTOR

WITNESSES:
Walter Reese
Horace E. James

UNITED STATES PATENT OFFICE.

GEORGE C. REESE, OF SHARON HILL, PENNSYLVANIA.

GALVANIZED OR METALLIC-COATED WIRE-CLOTH.

SPECIFICATION forming part of Letters Patent No. 600,250, dated March 8, 1898.

Application filed April 9, 1896. Serial No. 586,795. (No specimens.)

To all whom it may concern:

Be it known that I, GEORGE C. REESE, a citizen of the United States, residing at Sharon Hill, in the county of Delaware and State of Pennsylvania, have invented a certain new and useful Improvement in the Manufacture of Galvanized or Metallic-Coated Wire-Cloth, of which the following is a full, clear, and exact description.

My new article differs from other forms of coated wire-cloth in having all of the intersecting wires soldered together and the meshes or spaces between the wires of the same angular configuration as is produced in the weaving of the cloth, whereas in other coated cloths the intersecting wires are either not soldered or the configuration of the mesh is changed after coating and its angular shape destroyed. To secure this result, I make a departure from the usual method of "wiping" or surface-cleansing when the cloth is being galvanized and substitute in place thereof the radically new feature of perforating the cloth after it passes out of the bath by passing a gaseous stream transversely through the meshes. I am thereby enabled to produce over twenty grades of cloth which it has heretofore been impossible to produce by the old methods and to secure many other advantages in the manufacture.

In other methods where "wipers" or other cleansing material act longitudinally upon the cloth the "dross," oxids, and other impurities are forced back into the bath to be taken up again by another part of the cloth, which makes each succeeding piece operated upon more difficult of cleansing. In my method the impurities are blown away from the bath when once formed.

What I consider as a most advantageous feature in my method is that it differs from others in this respect: While in other methods it is absolutely necessary that the cloth be drawn very slowly through the bath, so as to allow time for the superfluous coating material to gravitate back into the bath, in my method exactly the reverse is necessary. The cloth is passed through the bath very rapidly, so that the coating does not chill before being further acted upon. I am thus enabled to coat from seven to ten rolls of cloth to one by the old method, thereby increasing the production and decreasing the cost.

Before describing my invention I will give a brief account of the methods of producing coated cloth as shown in the prior state of the art and now in successful operation in the large manufacturing establishments; also, the kinds of cloth produced, with their respective advantages and defects.

Prior to my invention two kinds of galvanized, tinned, or metallic-coated wire-cloth have been produced, each of which has radically different and distinct properties. For most purposes it is essential that the meshes or openings between the wires shall be of uniform shape and size and that the wires shall be woven at regular intervals from each other. This is necessary where the cloth is used for screening, sifting, or bolting grains or pulverized substances into different sizes or degrees of fineness. For other purposes absolute accuracy in the size or shape of the mesh is not necessary, the demand being for a cloth which is stiff, strong, and not liable to rust. The first kind is produced by weaving wires which have been previously galvanized or coated into cloth having the desired number and shape of meshes. By this method the size and shape of the meshes can be easily and accurately regulated during the weaving operation, and as the cloth is not subjected to any coating operation after it is woven the size and shape of the meshes remain unaltered. Hence cloth of accurate size and spaced meshes can be produced. Very fine wire can be successfully coated, and by weaving these close together a cloth can be produced having meshes of very small size and capable of very fine and accurate screening. This kind of cloth is costly to produce on account of the difficulty and cost of galvanizing or coating the single wires before they are woven. An objection to this kind of cloth is that the closely adjacent surfaces of the wires where they cross each other absorb and retain moisture by capillary attraction, causing the cloth to rust rapidly when used for screening damp material. It also "bags" readily and is easily pulled out of shape, which renders

the size and shape of the meshes different and varying from those originally woven in the cloth. These disadvantages have led to the production of the second kind, which is known in the trade as "solder-jointed wire-cloth."

In the manufacture of solder-jointed cloth uncoated wire is woven into ordinary wire-cloth. This is "pickled" and treated in the usual manner to prepare it for the reception of the coating material, and is then passed slowly through a bath of galvanizing, tinning, or other coating material and, upon emerging from this bath, through some wiping material—such as sand, pulverized coke, or coal—all by the use of apparatus well-known to those skilled in the art. The surface of the galvanizing-bath used in the production of this second kind is generally divided into two compartments by means of a partition or "sinker," which extends from the surface of the containing-pot to within a few inches below the surface of the molten metal. In one of these compartments the surface of the metal is exposed, having a slight coating of sal-ammoniac or other fluxing agent. The other compartment is filled up with sand or pulverized coke, coal, or other non-conducting material, which by friction, as the cloth passes out of the bath, polishes and to a certain extent removes an excess of the coating.

In practice it has been found that when sand, coke, coal, or other wiping material is used the purpose for which they are intended is not fully accomplished, and when operating upon cloth having meshes less than one-eighth of an inch they are altogether inoperative. The reason is obvious. When the cloth enters the bath, the molten metal immediately forms a very intimate and strongly-adherent coating upon the wire and completely closes up all the meshes and spaces between the wires where they cross each other, and upon emerging from the bath an excess of this coating material is retained upon the cloth and held there so firmly by capillary attraction that no wiping material acting longitudinally will completely remove it. Cloth having meshes larger than one-eighth of an inch may be coated without having the meshes entirely closed; but the superfluous amount of coating material adhering to the wires where they intersect each other cannot be entirely removed by the employment of such wiping material, which acts in a longitudinal direction, and all cloth made by the various wiping processes is defective in having the meshes distorted and reduced in size, and the wires where they cross each other are encumbered with a superfluous amount of the coating material, which adds to the weight of the cloth, increases the cost of manufacturing it, and renders it inoperative for accurate screening.

When attempting to galvanize wire-cloth having more than eight meshes per lineal inch, the coating material which closes up the meshes is held there so firmly by capillary attraction that no wiping material acting longitudinally upon the cloth will remove it from all of the meshes. This defect increases as the cloth increases in fineness until a point is reached where every mesh in the cloth is entirely closed. The product of this operation is known as "solder-jointed wire-cloth," all of the wires being soldered or united together at the points of intersection. This feature imparts to the cloth advantages not possessed by that first described. They are as follows: The cloth is far more durable and is much stiffer and stronger and maintains its finished shape, the presence of the solder at the joints prevents the entrance and retention of moisture at the points where the wires cross each other, and, finally, it is much cheaper. The defects in this kind of cloth are: The shapes of the mesh-openings, in the finished product, do not conform to those woven in the cloth. They not only vary in shape in different meshes of the same cloth, but are of irregular sizes. Hence this cloth is not possessed of either accurately shaped or spaced openings. In every case all of the meshes are more or less closed by a fillet of solder in the angles made by the intersection of the wires, and in many cases a large percentage of the openings are totally closed with the coating material. This defect increases so rapidly with the increased fineness of the mesh that manufacturers are unable to produce by this method a marketable cloth containing more than six or eight meshes per lineal inch, the defects being so glaring in finer grades as to prohibit their manufacture.

It will be seen that in galvanizing or coating wire-cloth after it is woven either by drawing it directly through the bath or by the employment of wiping materials, which act longitudinally upon the cloth, the article thus produced is limited to a very few sizes, all of which are more or less defective as screens in having their meshes partially closed by an unneccessary amount of coating material, which renders the cloth objectionable for some purposes and altogether unfit for others. Many inventors and manufacturers of this quality of cloth have with indifferent success endeavored to obviate the objectionable features in the wiping processes and the defects in the cloth produced by it by wiping the cloth longitudinally with various kinds of wiping material; but all attempts of this kind, when they have met with any success at all, have merely reduced in degree some of the defects, as it is impossible to obviate them entirely by wiping the cloth longitudinally with any known wiping material.

After a long series of experiments I have succeeded in producing a new kind of cloth which differs in configuration from both of the preceding kinds and which is possessed of properties that neither of the other kinds have. My invention relates, therefore, to

means for embodying and carrying out this discovery; and it consists in a new article and the method of manufacturing the same.

The new article of manufacture consists in galvanized or metallic-coated wire-cloth having clean and imperceptibly-soldered joints and accurately sized and shaped mesh-openings conforming with those woven in the cloth. The method for its production consists in subjecting uncoated wire-cloth to the usual "pickling" or preparing operations to receive its coating and then submerging it in a bath of spelter or molten material to receive its coating, and upon emerging from the bath it is perforated by passing a jet of steam or stream of air, driven at a high velocity, transversely through the meshes of the cloth, which forces all the coating material out of the meshes and leaves the cloth with imperceptibly-soldered joints and accurately sized and shaped mesh-openings, conforming with those first woven in it. The objects of my invention, which are secured in the use of the article produced by this method, are mainly a cheap, durable, strong, solder-jointed, galvanized, or tinned screen-cloth having accurately sized and shaped spaces or openings, which may be made extremely fine for fine screening purposes, as contradistinguished from the imperfect large-meshed solder-jointed cloth heretofore produced.

I shall now describe my invention more fully, so that others skilled in the art may make and use the same, reference being had to the accompanying drawings, in which—

Figure 1 shows a sufficient portion of a galvanizing apparatus by which to practice my method. Fig. 2 shows a small piece of the ordinary solder-jointed wire-cloth in which may be seen the fillets in the corners of the irregularly-shaped meshes. Fig. 3 shows a small piece of my new kind of solder-jointed wire-cloth in which the meshes are square and of equal size and without fillets in the corners.

Like letters on the drawings represent like parts.

Referring to the drawings, A represents the usual furnace; B, the kettle containing the molten galvanizing metal; C, the partition therein, having its lower edge immersed in the said metal; D, the galvanizing metal; J, the wire-cloth to be galvanized.

In Fig. 1 large M represents a steam-pipe held in place by a support N and having a fine slot P, through which the steam or air is blown through the meshes of the cloth.

The method of producing my new article of manufacture is as follows: Wire-cloth is woven with the various sizes and number of meshes demanded by the trade for screening, bolting, and other purposes, and after being properly prepared to receive its coating is galvanized or coated by drawing it through the coating-bath and upon emerging from the bath and while the coating is still liquid perforating the cloth by subjecting it to the action of a stream of air or steam forced through the meshes of the cloth with such a high velocity as to carry with it all of the coating material except the coating upon the wires and a sufficient amount to firmly solder the wires together.

To enable those skilled in the art to fully understand and practice my invention, I show in the drawings a suitable form of apparatus by which my method may be put in practice.

Fig. 1 shows the apparatus to be used with a steam-jet. The pipe M has a very fine longitudinal slit or saw-kerf P extending along its surface and of sufficient length to blow a thin stream of steam through the entire width of the cloth. In practice I find that the use of steam is preferable to an air-blast, as it can be applied without the use of blowing machinery and is cheaper. In operating this device a stream of air or blast of steam is forced through the pipe M and slit P, and at the same time will draw the cloth through the bath at such a speed that the air or steam may pass through the cloth while the coating is still liquid. My best results on very fine cloth have been obtained with a steam-pressure of from twenty to sixty pounds. After being subjected to the foregoing operation the cloth will be found to have a metallic coating and to have imperceptibly-soldered joints and accurately spaced and shaped openings free from fillets in the corners and corresponding with those woven from the uncoated wire.

I do not confine myself to the use of the particular apparatus described, as modifications of the same may be used by substituting well-known equivalents, and suggest, in cases where the escaping steam would be objectionable, the employment of the atmospheric pressure alone in lieu of steam-pressure by exhausting the air from a suction-box placed on one side of the cloth.

The differences in kind which enable any one to readily distinguish my new article of manufacture from any which have preceded it and which mark and characterize it over any other kind are that it has no fillets at the angles of the wires, the meshes are composed of uniform and unobstructed angular openings of accurate shape and size, corresponding with those first woven in the cloth, such as square or rectilinear meshes, and in many cases is composed of much finer wire and mesh than could heretofore be produced in solder-jointed wire-cloth.

In use the advantages of my new article of manufacture are that it combines all of the good qualities of both the old kinds and is free from all of their defects. It is stronger, stiffer, and more durable and has greater stability than that woven from previously-coated wire. It is not subject to "buckling," "bagging," and fraying out, nor is the shape of the cloth and the space-openings liable to

distortion from pressure, tension, or other strain. Hence it is better adapted for screening, bolting, and other purposes where retention of accuracy in the size and shape of the mesh-openings is required. As compared with the old solder-jointed cloth all of the meshes will screen to a uniform size on account of the uniformity in the size and shape of the openings, whereas in the use of the old cloth the irregular size and shape of the openings causes irregular-sized screening, and totally-closed meshes prevents screening altogether. Finally, the absence of fillets at the solder-joints permits better screening action.

The advantages secured by the use of my method are mainly the production of many grades of very fine meshed solder-jointed cloth which could not be produced by the old method. Cloth is also produced having soldered joints and meshes of the same angular configuration as those originally woven in the cloth, as is readily seen by reference to Fig. 3, in which V represents the angular-shaped meshes, and the dotted circle W represents the soldering connection between the wires, as compared with the old form of solder-jointed cloth produced in the old way and illustrated by Fig. 2, in which Y represents the irregular-shaped mesh, and Z the fillets or braces at the angles of the wires. Another advantage is that wire-cloth of any number of meshes to the inch and of a superior quality having solder-joints can be produced cheaper and more rapidly than the accurately-spaced cloth made by weaving galvanized wire by the old method.

The advantages arising from the use of my method are due mainly to the employment of four radically new features which constitute the fundamental difference between it and those preceding it in the art of forming solder-jointed screens and bolting-cloth—first, in perforating the cloth or drifting the coating material through the meshes after the cloth is coated; second, in the use of a transverse blast; third, in the forcible passage of an equal pressure of blast through every mesh; fourth, in drawing the cloth rapidly through the bath.

By perforating the cloth after it is coated instead of using wipers, which merely glide over the surface, I am enabled to produce over twenty new grades or sizes of cloth which are too fine to be produced by the old methods.

By the use of a transverse blast, instead of acting longitudinally upon the cloth the bath is kept free from dross, oxids, and other impurities.

By the forcible passage of an equal pressure of blast through every mesh each mesh is drifted out to the same shape and size and can be made to assume the same angular configuration that was originally woven in the cloth.

By withdrawing the cloth very rapidly and perforating it after it leaves the bath, instead of allowing sufficient time for the coating to gravitate back into the bath, I am enabled to coat from seven to ten rolls to one made by the old processes, with a corresponding decrease in cost of manufacture.

The essential conditions required for the operation of my process are, first, the wire must be scaled or deoxidized by treatment with sulfuric or other acids; second, either a dilute bath of muriatic acid or an equivalent must be used in treating the wire, or if passed without such treatment sal-ammoniac must be used when it enters the molten metal in order that muriates of zinc, iron, &c., may form on the surface of the wire to enable the zinc to alloy with the same; third, the bath of spelter, tin, or zinc must be maintained at a temperature sufficiently high above the fusion-point to keep it thinly liquid; fourth, the steam or air jet must be located as near down to the surface of the bath as possible and close to the wire; fifth, wiping-baths must be dispensed with entirely or practically; sixth, the orifice through which the steam or air is forced against the cloth must be extremely narrow, and in practice I form it in the pipe by sawing a groove with a No. 30 or No. 40 gage hack-saw; seventh, the blast must be driven through this narrow orifice directly by steam-boiler pressure or indirectly by using steam air-compressing machinery, as the air must strike forcibly and with violence to cause instantaneous ejection of the superfluous zinc, for the coating material solidifies almost instantly when the wires emerge from the bath, and hence fan-blasts cannot be employed, because the extremely-limited pressure obtainable in the use of all blast-machines of that principle of operation prevents the operation of my process; eighth, the force or pressure of the blast ejected must be increased as the number of meshes increase in the cloth used.

Having described my invention, what I claim, and desire to secure by Letters Patent, is—

1. As an improved article of manufacture, wire-cloth, galvanized or coated with metal, having its crossing strands or wires soldered at their intersections by the coating, and open, angular meshes, free of fillets, substantially as described.

2. The herein-described method of manufacturing wire-cloth, which consists in passing wire-cloth, woven in any suitable manner, through a bath of molten coating metal, thereby coating the wires and soldering or uniting them at their intersections, and then removing impurities and surplus metal by driving a gaseous stream through the cloth at a velocity sufficient to restore the original angularity of the meshes, substantially as described.

3. The herein-described method of manufacturing wire-cloth, which consists in rapidly

passing wire-cloth, of usual construction, through a bath of molten metal, and thereby coating the wires, soldering or uniting them at their intersections and filling up more or less their meshes, and then driving off impurities and surplus metal, and clearing out and opening the meshes so as to restore and retain their original angularity, by forcibly passing a gaseous stream through the cloth as it emerges from the bath, substantially as described.

GEORGE C. REESE.

Witnesses:
WALTER REESE,
HORACE E. JAMES.