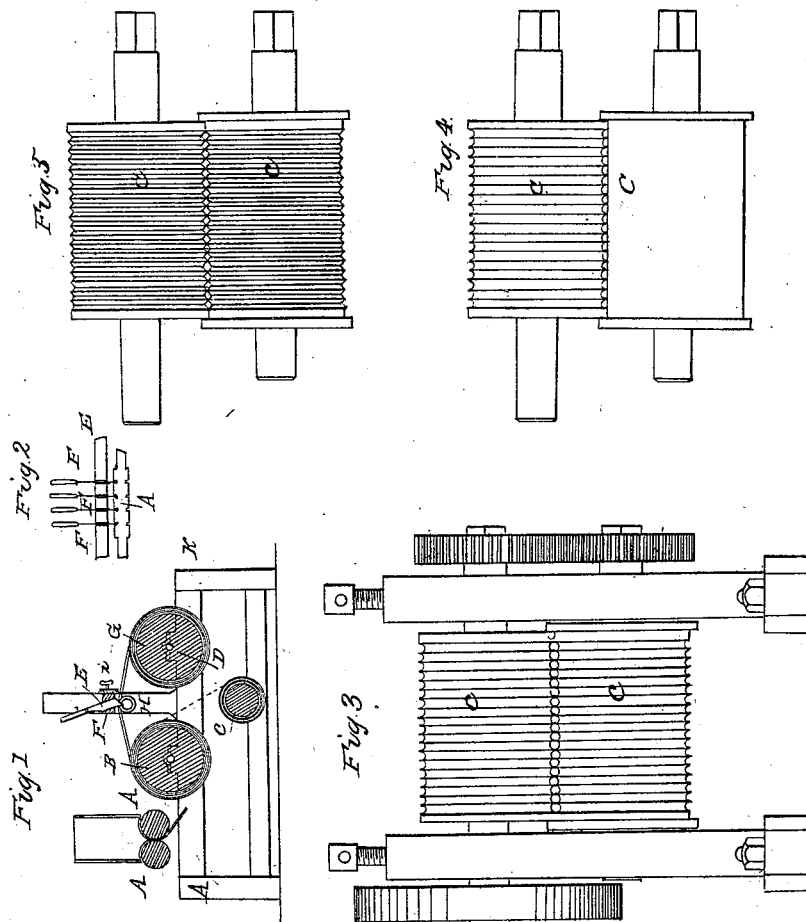


C. HANCOCK.  
Preparing Soft Rubber.

2 Sheets—Sheet 1.

No. 5,590.

Patented May 23, 1848.



Witnesses  
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Inventor  
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C. HANCOCK.

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Fig. 7.

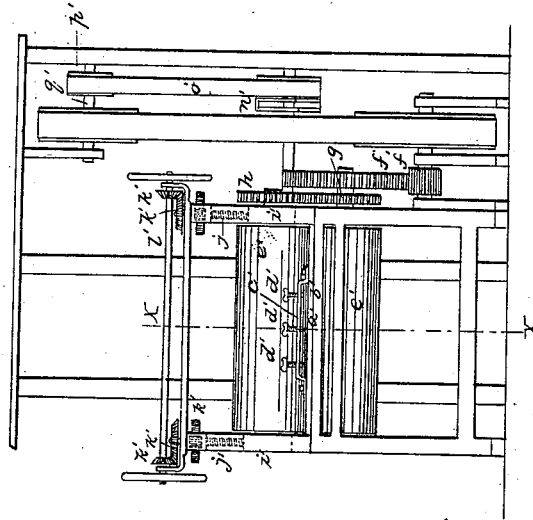
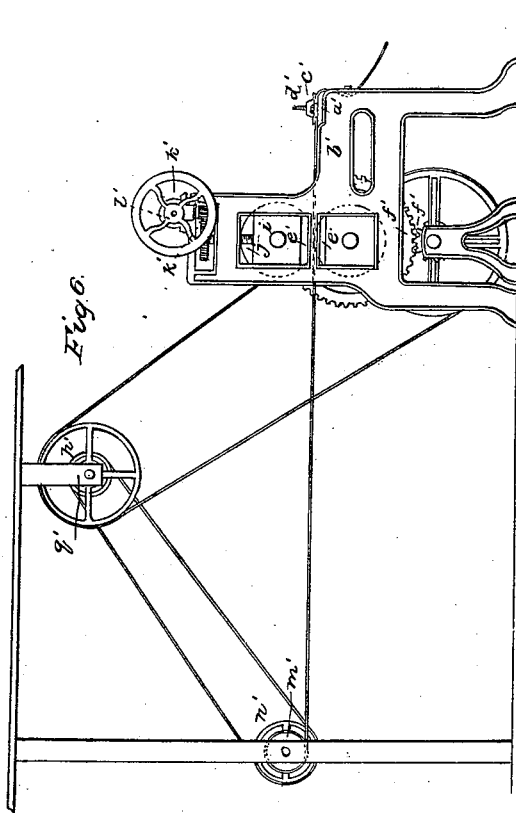
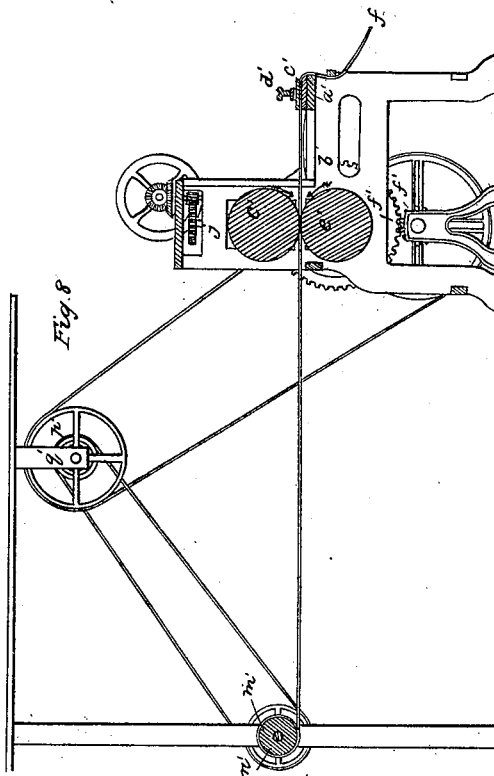


Fig. 6.



Witnesses  
J. B. Munn  
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Fig. 8.



Inventor  
Charles Hancock

# UNITED STATES PATENT OFFICE.

CHARLES HANCOCK, OF GROSVENOR SQUARE, ENGLAND.

## MAKING BANDS OR BELTS OF GUTTA-PERCHA.

Specification of Letters Patent No. 5,590, dated May 23, 1848.

*To all whom it may concern:*

Be it known that I, CHARLES HANCOCK, of Grosvenor Place, in the county of Middlesex, gentleman, a subject of the Queen of Great Britain, have invented or discovered new and useful improvements in the manufacture of bands and belts of gutta-percha for driving machinery and for all other purposes to which bands and belts of leather, india-rubber, and other substances have been applied, to be used alone or in combination with other substances; and I, the said CHARLES HANCOCK, do hereby declare that the nature of my invention and the manner in which the same is to be performed are particularly described and ascertained in and by this present instrument in writing—that is to say:

My said invention consists of an improved method of making bands or belts of gutta percha or its compounds by first forming and then stretching or drawing out gutta percha as it is imported from the East Indies frequently possesses great acidity with a fetid or unpleasant smell and is generally mixed with other impurities from which it ought to be cleansed before it can be beneficially applied in the production of many articles of manufacture.

For the purpose of cleansing gutta percha it is better that it should first be reduced into small pieces by means of saws, knives, choppers or other suitable instruments and the cutting of lumps of gutta percha will be very much facilitated by first steeping them in hot water until they are softened and then tearing them into shreds by a machine precisely similar to the "willy" or disentangling machine commonly used in the cotton and woolen manufactures.

The gutta percha having been reduced into small thin pieces (and the smaller and thinner the better) so as to expose a large extent of surface to the action of the liquid into which it is to be thrown is then to be immersed in an alkaline solution or in a solution of chlorid of some alkali or earth in which the gutta percha must remain until the acid and fetid impurities which it contains have been got rid of or materially diminished for which purpose it will generally require to be kept in the liquor for about a day or two according to the degree of impurity of the article at the time it is thrown into the liquor.

I prefer using common soda or potash for

forming an alkaline solution on account of the cheapness of these articles but if these alkalies are used in a more caustic state they will act more quickly and with great energy. I prefer also to use the chlorid of lime to any of the other chlorids in consequence of that article being cheaper.

The solution is made of the strength that I prefer by dissolving about one pound of alkali or chlorid with 10 gallons of water. If it is desired still further to diminish the acidity or smell of gutta percha it may in the first place be subjected to the action of an alkaline solution and then to a solution of chlorid of lime. Gutta percha thus prepared may be then subjected to any of the two following processes: The gutta percha in this purified state is transferred to a masticating machine such as is commonly employed in the preparation of caoutchouc and kept hot by any suitable means and work and knead the gutta percha until it is brought to the consistency of dough or putty or I take the plastic mass and pass it twice or as much oftener as may seem expedient between a roller and one or two more adjustable gauges, such as are used in caoutchouc manufacture for the spreading or cleansing of caoutchouc solution, (the rollers or gages being heated and kept hot by hot water steam or any other convenient means.) Or secondly I take the gutta percha as imported and dissolve it by means of rectified oil of turpentine or bisulfuret of carbon or any other suitable solvent and filter the solution while warm through flannel or felt or fine wire gauze, after which I distil off the solvent and evaporate the residuum to the consistency of dough or putty. It must be understood that while preparing gutta percha as above described it must be kept at such a temperature as will cause it to be in a plastic state.

For the purposes of my present invention I do not confine myself to the use of gutta percha prepared in the modes above indicated as these are merely purposes and may be pressed into blocks given to show how this substance may be prepared for the purpose of carrying into effect my present invention. The required heat for these various purposes may be obtained by means either of high pressure steam or of water heated under pressure or of hot air. Many of the compounds of gutta percha may be treated in the manner just described, but

the smaller the quantity of gutta percha in the compound the less effective will the operation be.

In forming bands and belts of gutta percha I have found that the pieces of gutta percha in a cold state cannot be permanently united together in the same way as cold pieces of caoutchouc are usually joined but if the edges or parts of gutta percha which are intended to be joined together are softened, or made plastic by the application of heat then they may by pressure be effectually and permanently united together. The heat necessary for rendering the edges or parts of gutta percha soft or plastic may be applied by means of a current of hot air heated iron or by any other means which may be found most convenient. Care ought however to be taken that the parts to be joined are not moistened with water or greased because such moisture or any kind of grease will have the effect of preventing the effectual adhesion of the parts. By adopting this mode of joining the edges of sheets or pieces of gutta percha together in the manufacture of bands or belts such as are usually made of leather it becomes necessary to sew or stitch such parts together the parts being more effectually joined by the mode hereinbefore described pieces of the compound of gutta percha may also be joined together in a similar manner with more or less effect according to the greater or less quantity of gutta percha of which the compound has been formed. I have also found that sheets of pieces of gutta percha or any of its compounds may be joined together when in a cold state by first covering the parts to be joined together with a solvent or solution of the gutta percha or any of its compounds as a cement and then bringing the parts together which are to be joined and keeping them in that state until they are effectually united which will be generally effected after two or three hours but much more quickly if bisulfuret of carbon should happen to be the solvent used. This mode of joining pieces of gutta percha or any of its compounds is not so effective as that before described, but may be useful in some cases in which the other mode cannot with facility be adopted. Either one or the other mode of uniting pieces of gutta percha or any of its compounds may be adopted for joining together bands or belts which may have been separately formed so as to complete the manufacture.

The apparatus for making bands or belts of gutta percha and its compounds which I employ is represented in the drawing annexed Figure 1, which is a vertical section in which A, A are two iron rollers which are set to a width corresponding to the thickness desired to be given to the intended band the material of which the band is made is

passed in a broad sheet between these rollers and carried thence around a drum or roller B. As it is wound on this roller it receives on its surface from the drum or roller C a sheet of cotton cloth or other suitable fabric (as indicated by the dotted lines in the drawing) which has been previously damped which prevents any two of the convolutions of the gutta percha material from sticking together. When the roller B has had a sufficient length of the gutta percha material wound upon it, it is removed for a time to allow the material to cool and after this cooling has taken place the roller B with the material still upon it, is restored to its bearings in the frame E is a strong frame or bar which extends across the frame (K K) in a direction parallel to the roller B and holds a series of knives F (see also cross section Fig. 2) fixed in the angular position represented. The edges of these knives face the roll of material on the roller B, the free end of the material is carried from the roller B on the opposite roller G and secured to it passing over an intermediate roller H which comes immediately under the knives A power being applied to the roller G the material is drawn from off the roller B and the knives as it passes under them cut it up into strips of any width for which the knives may be adjusted. Saw cuts or notches are made in the roller H for the reception of the points of each knife as represented in the drawing and the frame E has saw cuts to receive the edges of the knives corresponding with those in the roller H so as to keep the knives steady and true. The roller C is used during this cutting operation to receive back the damp cloth as it is redelivered from the roller B. The screw I serves to tighten the piece of wood at the back of the knives and to keep them properly adjusted. Circular knives or saws may be used instead of straight ones but I prefer the latter.

For the purpose of making round bands of gutta percha, instead of being rolled between two cylindrical rollers, such as represented at (A A Fig. 1, it must be drawn or rolled between two rollers (C, C,) Fig. 3, the peripheries of which are formed with a series of semi-circular grooves so that when the two are run in contact as shown in the drawing the gutta percha will be rolled out in a series of cylindrical bands of the size required to undergo the process to be hereafter described. If semi-cylindrical bands are required then the rollers (C C) should be made as shown in Fig. 4, that is one with the surface smooth and cylindrical, and the other grooved. But if the bands are to be made square then the rollers should be made as shown in Fig. 5, that is with rectangular grooves. It will be understood however that in either of these

modifications the other parts of the machine should be made as shown in Fig. 1, although this is not indispensable, as the construction of the machinery makes no part of my invention. The form of the grooves on the rollers must in all instances be such that when the two rollers are brought together the corresponding grooves of the two shall present the form of the cross section of the band to be produced, but of greater size than the band is intended to be after undergoing the stretching or drawing process to be presently described.

Instead of making the bands or belts by means of rollers, it can be done by forcing the gutta percha while in a heated state through dies in the head of a cylinder to which is fitted a ram or piston in the manner similar to a method of making threads of gutta percha as described in letters patent granted in England to Richard Archibald Brooman, which resembles in part the well known mode of making lead wire and pipes. And as these are well known and have been published it is deemed unnecessary to give a further description of the machinery employed. For making flat belts or bands the gutta percha may however be spread, while in a dissolved or semi-fluid state, on to cloth, and after the required thickness has been obtained and the solvent evaporated, it can be separated from the cloth preparatory to the stretching or drawing process. In whatever manner such bands or belts are made, and whether flat, square, round, or of any other form, before they can be used with any advantage they must be stretched from one to two thirds the original length, and then it is in a state technically termed springy; that is, it possesses great tension but for a short distance, which adapts it admirably to the driving of machinery, for the extent of this elasticity is just sufficient to admit of springing the band on to the pulleys, or drums, and then its tension continues for a great length of time, and of such force as to hug (as it is technically termed) to an extent not known with bands of any other material. The machine which I employ for stretching flat belts as represented in the accompanying drawings in which Fig. 6 represents a side elevation, Fig. 7 a front elevation, Fig. 8, a longitudinal vertical section, taken at the line (X X) of Fig. 7. The belt cut of the required width, but made of a thickness greater than is required when the belt is completed, is passed between a bed plate (*a'*) firmly attached to the frame (*b*) and a clamp plate (*c'*), which slides up and down by means of clamp screws (*d'*) and from this the end is introduced in the bight of two horizontal cylinders (*e' e'*) arranged in manner similar to a flattening mill, that is, the lower cylinder runs in permanent boxes in

the frame and is rotated in the direction of the arrow by some first mover, a train of cog wheels (*f'*) for convenience being interposed and on one end of the shaft outside the frame the cylinder has a cog wheel (*g*) which engages the cogs of a similar wheel (*h'*) on the shaft of the upper cylinder which has its bearings in boxes (*i' i'*) that slide vertically in the frame by means of two screws (*j' j'*) geared together by cog wheels (*k*) and a horizontal arbor, so that the attendant by turning the band wheel (*l'*) geared therewith can elevate and depress both ends of the upper cylinder equally to adapt height of the cylinders to the thickness of the belt.

As soon as the cylinders begin to draw the belt through, the clamp plate (*c'*) is forced down to make pressure on the belt, and in this way it is stretched and compressed at the same time, which has the effect to retain it at the same width for the stretch is all taken from the thickness. From the cylinders the belt is carried to and wound around a roller (*m'*) which is driven by a friction pulley (*n'*) constructed after any of the well known modes, and driven by a belt (*o'*) from a pulley (*p'*) on the driving shaft (*q'*). By this means the belt is kept in a distended state and further stretched. In this way all the stretch is drawn out of the gutta percha by a series of operations the number of which will depend on the thickness, the bight of the clamp, and the cylinder being at each operation reduced. Care must however be taken not to apply too great a tension at the first operation as gutta percha possesses comparatively but little tenacity before the stretch is taken out. The fibres of the gutta percha before the stretch is taken out appear to run together promiscuously in every possible direction, and as it is drawn out and stretched gradually they appear to take a longitudinal direction, and finally when all the stretch is taken out, they appear all to lie longitudinally, and then the substance possesses its maximum strength and retains a degree of spring which adapts it admirably to all purposes to which bands and belts of other substances have heretofore as may be applied. For the purpose of stretching bands made of forms other than flat, the stretching clamp and rollers must be grooved instead of being cylindrical. But for bands that are not flat I prefer to stretch them without the use of the clamp and rollers by attaching them at one end to some permanent fixture and by the other to a windlass or other purchase, taking care to apply the stretching power gradually to prevent the gutta percha from breaking before it is properly draw out. It will be understood that other modes of stretching and drawing out may be employed, as the me-

chanical means applied to this purpose which I have described above make no part of my invention, they being simply described and represented as the best modes  
5 which I have essayed for carrying my invention into operation.

Having thus described the nature of my invention and the mode of carrying the same into operation together with the best  
10 modes of conducting the various operations, what I claim as my invention and desire to secure by Letters Patent is the method of

making bands and belts of gutta percha or the compounds thereof by the process of forming in combination with the process of 15 stretching or drawing out substantially as described, and this I claim irrespective of the methods that may be employed for forming and stretching or drawing out the bands or belts.

CHARLES HANCOCK.

Witnesses:

I. C. ROBERTSON,  
G. H. BYERLEY.