Improved Spring Bed.

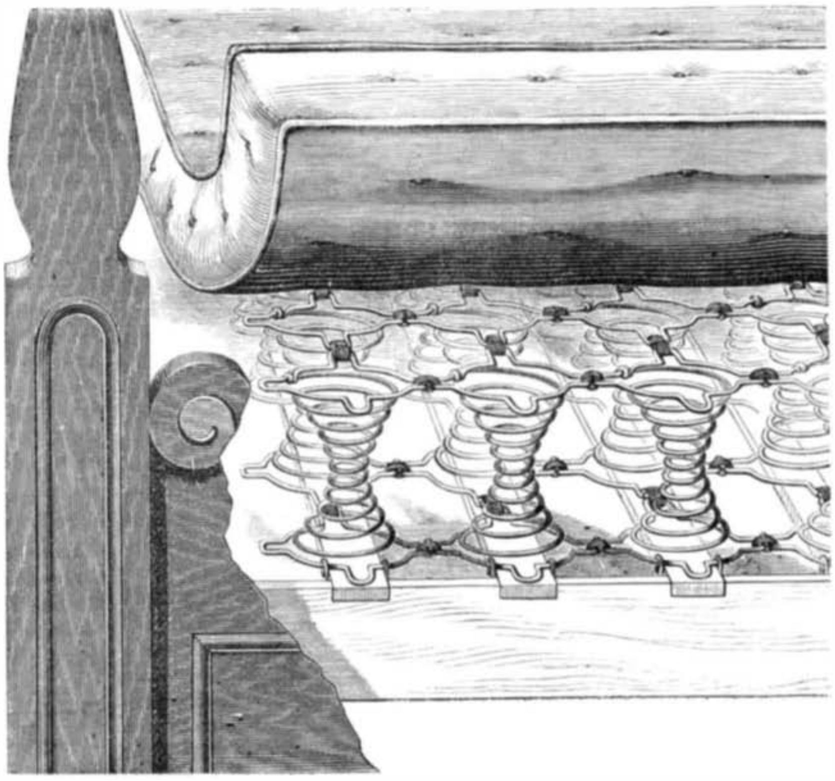
The production of a spring bed which should afford no haunt for vermin, and which should be perfectly easy and accommodating to the form, distributing the pressure equally over the entire surface, and which should at the same time be far more portable than the spring beds hitherto used, has been the object sought in the invention shown in our engraving.

It is claimed that all these objects have been attained in this device, and that it comprises all the desirable features of such beds with none of their defects. We think after a personal trial of this bed in our own residence, that these claims are fully substantiated.

The principle of construction adopted is the connection of all the springs together, so that no one can be compressed without at the same time drawing upon the others. This is accomplished by making four abrupt bends in the upper and lower convolutions of each spring, as shown, and connecting these bends by links, as indicated in the engraving.

The springs are attached at the bottom to a series of slats, as shown in the engraving, and are left entirely uncovered. In use a mattress is laid upon the springs, and when it is desired to move the bed, or pack it for transportation, the slats and springs may be rolled up together as easily as a mattress and corded together so as to be very compact.

These mattresses are on exhibition at the Fair of the American Institute. For further information address David S. Mallory, manufacturer, 385 Main street, Poughkeepsie, N.Y.



IMPROVED SPRING BED.

Manufacture of Portland Cement.

Portland cement was introduced to public notice under a patent by an Englishman nearly fifty years ago; and we have hitherto possessed a partial monopoly in its production, inasmuch as we have fortunately inexhaustible beds of the raw material from which it is made, and an abundant supply of fuel necessary for their economical manufacture. It is strange that under these conditions French engineers should have obtained the start of their professional *confreres* in this country, and that they should have been the first to demonstrate by experiments, and subsequently by the erection of magnificent harbor works on their seaboard, the valuable properties of this excellent constructive material. We may date the *extensive* employment of Portland cement in England from the commencement of the metropolitan main-drainage works. During the last fifteen years the manufacture of Portland cement has gone on steadily increasing, until at the present day we find that little short of 400,000 tuns per annum are made in the county of Kent—the center of cement manufacture—irrespective of the productions of many minor factories in different parts of the country.

The chemistry of the setting of Portland cement is by no means so well understood as it ought to be. There is no doubt, however, that, like the hydraulic lime and natural cements, it is, chemically speaking, a double silicate of lime and alumina; silicic acid is generated by the hydration of the cement, and forms insoluble salts with the lime and alumina bases. It is a curious fact that Portland cement hardens more rapidly when salt water is employed. According to Schweitzer, 1.000 grains of sea-water in the English Channel contain 27 060 grains of chloride of sodium; soluble silica has a known preference for alkaline bases, and it is not improbable, when the cement is hydrated with sea-water, that the chloride of sodium is decomposed, the silicic acid of the cement combining with the sodium and oxygen of the water, and forming thereby a silicate of soda, or a species of crude glass.

Portland cement is of two classes, which, for the sake of distinction, may be termed "Engineers'" cement and "Plasterers'" cement. The former is the more costly; it is usually described by manufacturers as "best heavy tested"; it weighs from 112lbs. to 120lbs. to the bushel, is slow setting, and of great strength: the latter is a light cement, quick setting, and of inferior strength when compared with the other. It must be understood that our remarks apply exclusively to "Engineers'" cement.

Portland cement is made from chalk and alluvial clay; the factories on the banks of the Thames use white chalk, those on the Medway gray chalk; the latter is probably preferable, inasmuch as it contains large quantities of silicious matter. Mr. Read, in his treatise on "Portland Cement," says that "the present and safest proportions, provided both chalk and clay are selected free from sand, are four parts of chalk from the Medway (gray), or three parts of Thames (white), with one of clay by measure." These materials are placed in mills of simple construction, each having a circular pan, 6ft. in diameter and 2ft. deep, in which two "edge runners," 4ft. 6in. in diameter, are kept continually going; a constant stream of water flows into the pan, and as the "edge runners" revolve, the chalk and clay are thoroughly ground, and, being thus converted into a fluid state, they filter through a band of fine brass-wire gauze fixed to the side of the pan, and flow through wooden "launders" into tanks or settling reservoirs. One washmill will feed four tanks, each of which is about 100ft. long, 40ft. broad, and 4ft. deep. When one of these has been filled in the manner just described the same process is applied to the others in succession. About three weeks after the tanks are filled the whole of the materials will be precipitated, the clear water being drained off in the mean time through a small weir in the brick side of the tank; the residuum is a plastic mixture of the consistency of "putty," and not much unlike it in color. The next process is to convey this precipitate from the tank to the "drying floors," over which it is spread in a layer about 6in. thick; each floor is 40ft. by 30ft.; it consists of an outer skin of boiler plates resting on a series of brick ovens and flues. The object of this arrangement is to render the plates sufficiently hot to effect the rapid desiccation of the water from the superincumbent layer, a process generally accomplished in about twelve hours. The materials having thus been thoroughly dried are ready for conveyance to the kilns. The "charge" consists of alternate layers of coke and raw materials, the burning generally occupying thirty-six hours. When the contents of the kiln becomes sufficiently cool, the "clinkers," or cement stones—for the mixture has now assumed that form—are drawn and removed to a floor where the larger pieces are broken, and the whole of the burnt materials are then conveyed to the hoppers of the grinding-mills, where, passing under rapidly revolving horizontal burr-stones, they are ground into an almost impalpable powder. The cement issues from the mill at a temperature of about 160°, and the now manufactured material is wheeled away, and placed in a layer from 2ft. to 3ft. thick over the floor of a cool shed; it is subsequently packed in casks or sacks for conveyance from the works. The essential conditions for the manufacture of good Portland are: 1. The chalk and clay should be thoroughly mixed in the wash-mills, and the fluid materials delivered by "launders" over the *entire* area of the settling tanks. 2. The contents of the kilns ought to be burnt equally throughout. 3. The burnt materials should be ground very fine. 4. After coming from the mill the cement should be spread over the floor of a shed, and allowed to remain there for *at least* a fortnight previously to being packed into casks or sacks.

The strength of Portland cement increases as its specific gravity increases; the tensile tests are usually made with briquettes the standard size for the neck being 1½in. by 1½in.; and it must be understood that all experiments referred to have reference to the weight necessary to sever 2¼ square inches of neat cement.

It appears from Mr. Grant's valuable paper, read before the Institution of Civil Engineers in December, 1865, that Portland cement gains from 20 to 30 per cent in strength by setting under water; it is usual, therefore, to place the best briquettes in water, after gaging, and to allow them to remain there until they are to be tested. The following table has been compiled from a recent series of experiments; it shows the average tensile strength of Portland cement as compared with the natural cements; the test blocks were of standard size of 2¼ square inches, and placed in water as before described:

	Weight per bushel.	Breaking weight two days old.	Breaking weight four days old.	Breaking weight seven days old.
	lbs.	lbs.	lbs.	lbs.
Portland cement	119	598	914	1,024
Roman cement	76	200	240	280
Medina cement	69	[illegible]	313	313
Cement de Zumaya (Spanish)	84	206	...	409

The *Builders' Trade Circular* vouches for the accuracy of these figures.

Mr. Grant's tables show conclusively that the strength of gaged Portland cement increases with age; from his experiments it appears that the breaking weight of rest blocks, one week old, one year old, and two years old, are as 1, 1·5, and 1·62. The ultimate maximum tensile strength has not as yet been ascertained; experiments are, however, being conducted periodically with a view to determine this important point. Mr. Grant gives the average tensile strength of cement weighing 119lbs to the bushel as 777lbs., whereas we give it as 1,024lbs., the excess of the breaking weight as recorded by us may probably be accounted for by improved manufacture since Mr. Grant's experiments were made.

Portland cement now forms an important item in the list of our manufactures, but even now its valuable properties are not as fully appreciated as they deserve to be.—*Eng. Mech'ic*

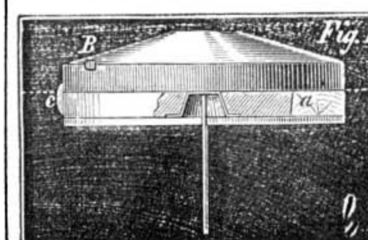
Correspondence.

The Editors are not responsible for the opinions expressed by their Correspondents.

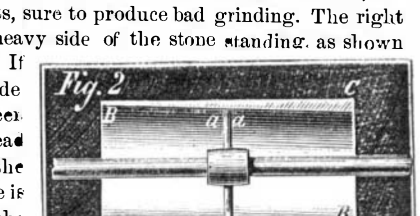
Balancing Cylinders, pulleys, and Runner Millstones.

MESSRS. EDITORS:—I see in the SCIENTIFIC AMERICAN of Sept. 3d, page 148, present volume, W. O. Jacobi and J. G. F., are trying to instruct C. E. M. how to balance his cylinder or shaft and pulleys. But either one of the parties does not give C. E. M. the right plan to balance a cylinder perfectly, although they both have a pretty good idea of the matter. I have had a good deal of experience in balancing machine cylinders and runner millstones.

To balance a pivot millstone true is something very nice to do, and no one that does not understand it will ever get them right unless he does it by accident. No cylinder can ever be balanced perfectly true after being once built and finished, if long. If it is a narrow or thin wheel, it can be balanced true, providing its axles and everything else are done in workmanlike manner. But a long cylinder must be built and balanced all at the same time. For instance: you want to build a cylinder two feet long, with a spindle three feet long, so as to allow bearings on each side, with two heads for staves to be fastened on to form a drum; or it may be longer or shorter, with more or less head. The first thing to be done is to turn up the spindle true just as it ought to be for the purpose intended. Then make the heads, bore, and finish them just as they ought to be. Then have your balancing bars right, and put on the first head you want to go on the spindle, exactly in its proper place, and fasten it then lay the spindle on the balancing bars and balance the head perfectly. Then put on the next head and balance as before, and so on till you get everything on. In this way every head wheel or pulley gets balanced separately. Then I will warrant you this spindle and head will run in balance at any speed. It will be both in running and standing balance. The next thing is, if you want to make a drum of this, to make all the staves just as you want them, all ready to be fastened on the heads, whether iron or wood. If they are to have any attachments like spikes as a thrasher cylinder, the spikes should all be put in, and every thing finished just as they must be. To balance these staves I have two horizontal points, like lathe centers, very fine and sharp, just strong enough to bear the weight of the staves. I then find the middle of the stave lengthwise and the middle sidewise, and insert a scribing awl, if of wood, or a center punch, if of iron. I then put them in the balancing machine, with the points in these holes; one of the points is worked like a lathe, with screw, backwards and forwards to admit the center. By this means I find the heavy and light ends of each stave, then add on to the light end till they balance endwise. I don't care whether they are all of a weight or not after they are all balanced in this way. I fasten them all on cylinder heads as they are to be; I then lay the cylinder on the balancing bars, find the heavy side for standing balance, and whatever it takes to put it in standing balance, I divide it all along on the light side in three or four different parts, from end to end. Then the cylinder will be in running and standing balance. A drum or cylinder built and balanced in this way cannot help running steady.



The pivot millstone is the hardest machine to balance of any, and next in order of difficulty is the wide-cast band pulley, with one set of arms. See the millstone in Fig. 1. If the stone was swinging on the point of the spindle, as shown, and there was a heavy block put in at *a*, the stone would hang down at that point, while standing; but if you should run the stone up to its proper speed, the heavy block at *a* will draw that side up on a line with the cock-head. A millstone left in this way will never grind well, and the most of millers, to remedy this, will put in weight at B, to put the stone in standing balance, which is entirely wrong, it only puts them that much more out of running balance, and helps the heavy block to draw on a line with the cock-head and make the face wabble, the greatest of all faults, sure to produce bad grinding. The right way is to find the heavy side of the stone standing, as shown in the engraving. If it is heavy on one side it is always between the point of cock head and the face of the stone. If the stone is built right and the irons put in the center, I always find what weight it will take to put the stone in standing balance by laying iron at B; then I fasten that much on the stone, at *c*



about half way between the cock-head and the face of the stone. This puts them in running as well as standing balance, as the standing balance will counterbalance with the heavy block at *a*.

After putting on the iron at *c*, and the stone is in standing balance, or nearly so, I raise the runner by the spindle three quarters of an inch above the bed stone, the back having been previously turned true while grinding the face of the stones together. The driving iron should drive very true at both ends, back and forth. I then run up to grinding speed. I can now see by the eye whether the stone runs true on its face or back; if it seems to run pretty true it is about right, but if it wabbles a little too much I hold a pencil from a rest near the back, and let the high place touch the pencil four or five times; if it touches all on one side I add in a little lead at the point where the pencil touched out against the band and as near the top as is safe to prevent its flying out; and I also put as much more lead on the opposite side down as near the face as it can be put, say, fasten it to the driving band, repeating this till they run true on the face. Then the miller can make good flour with common care.

Such a pulley as is shown in Fig. 2, if it should be cast or made in any other way, bored, and turned up and hung on the shaft, no man could guess where the weight must be put, even to put it in standing balance. At *a a* it might put it more out of running balance; the rim being a little thicker at C C, it would be best to put weight at B B. If the rim is the heaviest at C C, and you would put it in standing balance at *a a*, when the pulley is put in motion, the heaviest parts at C C will throw each end of the spindle up and down in their bearings, and if the spindle is not stiff it will spring and make matters worse. This is the case with all cylinders, after they are made you cannot tell where to put the balance, as materials are sometimes heavier at one place than another, even if they are all of a size. The only way is to balance them as you build them. Anything to run with a high speed ought to be thus made. PHILIP STRICKLER.

Timberville, Va.

On the Use of Tin for Fruit and Culinary Purposes.

MESSRS. EDITORS:—If it would not be regarded as saying more upon the subject than its importance demands, I should like, as a tinner of forty years' experience, to say something upon the tin fruit can and kindred subjects, not so much with a view of allaying apprehension as of stating such facts as are within my knowledge; and first I would remark that tin ware, on account of its lightness, durability, and adaptability to almost all culinary purposes, has driven almost everything else out of every well-ordered kitchen, and if there is any danger to health from its use, this danger is greater in any other article than in the fruit can, because all other articles are exposed to the corroding effects of atmospheric influence, while the fruit can, the moment it is sealed, is secure from the influence. Let me here remark that it is the opinion of some very intelligent persons that the thorough amalgamation of lead with tin, as in the manufacture of solder, neutralizes or renders inoperative the power of the lead, and this view receives considerable weight from the fact that the article so extensively used and highly prized by many of our best housekeepers, known under the name of Britannia ware, which is an alloy of tin and lead, has never been known to injure any one. How little do those housekeepers dream, while regarding with pride their well filled cupboards, that there lurks underneath the beautiful polish a poison deadly as the upas. The new article of manufacture, the tin-lined lead pipe, so confidently recommended as free from all danger, is only so in regard to liquids passing through them. In a well or cistern if the outside is not also protected it will oxidize by contact with the atmosphere, and the agitation or vibration from pumping will cause this poison to fall into the water, whence it will occasionally pass up through the pipe and cause mischief.

Many people have in their composition so much of the timid, the suspicious, and the apprehensive that they undergo an amount of imaginary suffering unknown to those of "sterner mold," and it is curious to witness the contradictory and inconsistent conduct of some of these persons. An acquaintance of mine, for instance, suffers an amount of mental laceration that is affecting to behold, from an apprehension that his store rooms produce an atmosphere unfit for breathing purposes; yet he sees nothing at all unhealthy or injurious in the foul stench of a vile cigar, and will absolutely luxuriate in a cloud of tobacco smoke that would stifle any decent being.

Tin cans for family use should be made of the best charcoal tin, the seams of the body locked rather than soldered, and the tops and bottoms well fitted and soldered on the outside. When emptied of their contents they should be thoroughly scalded and carefully dried, and the caps should be replaced upon them. They should then be put away in as dry a place as possible until they are wanted again. If these precautions are observed, their durability will greatly exceed that of most articles of tin ware now in use.

Delphi, Ind. N. SMITH.

Hub Boxes on Railway Cars.

MESSRS. EDITORS:—In your issue of August 20, 1870, I notice an article complaining of hot boxes, and the query, Can the heating of journals be remedied? Please allow me to state what I consider the principal cause on most railroads. Journals and the boxes in which they run are but too often neglected, so long as they run without any apparent trouble. In many shops a pair of wheels will be placed under a car by (often the case) a carpenter of but little railroad experience, and of no practical knowledge of how a brass should be fitted to the journal, and also without knowing for certain that the packing leathers in the back of the boxes fit the shafts and are oil tight. One thing is certain; if good Lightner boxes have good, well-fitted brasses, not Babbitt, done by a skillful machinist, with oil-tight leather washers, and if the centers of shafts in each truck in the train be packed with salt, hay, tallow, and oil, they will run on any road for months without heating, and seldom need oiling. C. STEWART.

Aspinwall.

Rock Asphalte Paving.

MESSRS. EDITORS:—Noticing in your issue of 24th ult. an article from the pen of Dr. Hayes on "Concrete" (or asphalte) paving, I forward an account of the pavement now in well-merited esteem and being largely adopted in the city of London—viz., that of the Val de Travers rock asphalte, which, having proved generally its entire success in Paris, rapidly superseding the plan of macadamizing and stone pitching there, and experimentally tried for the last eighteen months in the former city, has shown clearly its great value, and is now being substituted for the granite pitching for a large portion of Holborn and the entire Cheapside and Poultry, where in either the wear and tear of the traffic exceed that of our busiest streets.

The original asphalte, as adopted by the Continental engineers for paving purposes, was a species of bituminous rock found at Seyssel, on the Rhone, whence its distinctive name, which, however, as we all know, did not prove in every respect satisfactory.

This, however, led to further experiments, and a hard limestone rock was found in the Val de Travers, canton of Neufchatel, Switzerland, containing from twelve to thirteen per cent of bitumen equitably diffused throughout, and consequently allowing a more perfect solving and subsequent hardening process than any of the earlier asphaltes ever could command.

Besides the Val de Travers and the Seyssel there are, strictly speaking, of mines of bituminous materials known, but those of Seyssel Volant, of Auvergne, and of Maestu, near Vittoria (Spain).

The last three are not sufficiently homogeneous in their composition to succeed for paving purposes, while the Seyssel contains but six to eight per cent of bitumen, which is not a sufficient proportion to enable its particles to consolidate quickly and thoroughly under the action of heat and compression. Again, in the Pyrimont Seyssel mine, while the proportion of bitumen is extremely small, the irregularity of its bituminous impregnation, as well as the variety of its associate minerals, rendered its use difficult and unreliable; consequently its endurance was uncertain, and, unless a much more stable material could be adopted, the success of asphalte, once so generally employed by the ancients, was improbable.

Many of the recent compound imitations under the name of asphalte, but consisting of coal tar and such inferior pitch, mixed with lime, chalk, sand, or gravel, have brought into discredit the true material, and it was in the face of great prejudice that the Val de Travers could be even given a fair trial in the crowded streets of England's metropolis. In May, 1869, however, 485 square yards of the Val de Travers compressed asphalte was laid in Threadneedle street, over which passes a traffic of 2,500 vehicles daily. A year and a half afterwards no perceptible wear could be observed, while openings purposely cut in its surface and repaired within fifty minutes were barely visible, and as perfect as the original bed.

The result has been that over 1,000 of the leading firms, banks, and companies, petitioned for its extension on all the city streets, urging that its "freedom from the roar of traffic, and its cleanliness, safety, facility of construction and repair, and less cost, as compared with granite, wood, iron, or any known variety of paving, rendered the desirability of extending its use throughout the city as imperative." And the report of the street committee indorsing the Val de Travers asphalte on all these points, the change is being already effected.

The term "compressed" asphalte is used to distinguish it from those asphaltes where the material is boiled to a liquid, which this is not, being spread upon the surface in the form of a fine powder, and never liquefied.

In its use for paving the natural rock is first ground to a powder and subjected to an intense heat in a revolving boiler near the place of use, then taken and spread over the prepared surface to a depth of but two inches, and compressed with heated irons into a homogeneous mass without joints and entirely impervious to moisture.

As it cools it hardens to the original density of the rock, and for my own satisfaction I tested the fact that in less than one hour from the spreading of the powdered material the vehicles were traversing its surface without causing injury or impression.

The foundation used is Portland cement concrete, say eight inches thick, on which half an inch of thin mastic is run to economize the asphalte, which is then spread and leveled.

The advantages claimed for the Val de Travers are seven-fold:

1. It produces neither dust nor mud.
2. It is perfectly noiseless.
3. It diminishes, by a large percentage, the draft on horses.
4. It reduces the wear and tear of vehicles to one half, the annual saving in Paris being computed at over three million dollars for horses and carriages.
5. It increases the comfort and rapidity of travel.
6. Its economy and durability.
7. It is unaffected by heat or by frost.

In addition to its uses for paving it is in much demand for terraces, conservatories, slaughter houses, court-yards, breweries, fire-proof floors, docks, fortifications, powder magazines, etc.

Now, if this wonderfully valuable material can be readily shipped to England, why not to this country, or, if the increased freight, exchange, etc., render it too expensive for our use, let our numerous inventors follow out the suggestions of Dr. Hayes, which are surely based on correct grounds, and with bitumen, chemically combined with calcareous earths, devise a compact, artificial asphalte, unaffected by alternations of heat or cold, which, hardening readily, shall, by its semi-elasticity, tenacity, and cheapness of production, prove its advantages, reap a fortune for its discoverer, and earn the blessings of all unborn citizens.

New York city. GEO. E. HARDING.

Inventors who are Satisfied.

FREEPORT, ILL., Sept. 21, 1870.

MESSRS. MUNN & CO.:—I thank you for reminding me of the extension of my patents, but I cannot take the oath necessary, believing I have received a reasonable compensation on all my patents, and have sold out my reaper establishment; but I find exercise absolutely as necessary for me as food, and therefore fancy farming, or rather vinyarding, which has not as yet been very successful in this country. I find in it ample exercise and study for the mind in trying to solve the mystery. In trying all sorts of experiments, I may perhaps hit on something useful. It is a very pleasant occupation at all events. Yours, etc., P. MANNY.

RIGGSVILLE, PA., Sept. 22, 1870.

MESSRS. MUNN & CO.:—I take much pleasure in informing you that I have received my letters patent, all in good order, and I am a thousand times obliged to you for your honest, upright, and eareful attention to my business. I praise the bridge that carries me safe over. I would sooner pay your fees all down, without a receipt, than to trust my business in other hands. I shall recommend your Agency and paper without your request, for I think it my duty to do so.

JAS. K. B. SOLOMON.

CHESTER, PA., Sept. 15, 1870.

MESSRS. MUNN & CO.:—Please accept my thanks for the very efficient manner in which you have transacted the business intrusted to you, namely, procuring patent for steam piston packing. If my experiments prove successful, I will require your assistance again.

Respectfully, JOHN KEESEY.

DESIGN PATENTS.

DECISION BY JUDGE BLATCHFORD.

The bearing and scope of design patents have, in a recent suit of the Gorham Manufacturing Company *vs.* George C. White, selling agent of Rogers & Bro., for the infringement of a design patent, been more clearly defined than on any previous occasion.

The letters patent in question cover the invention of a design for a spoon and fork handle, not only as far as the configuration or mere outline, or the ornamentation on the face of the same is concerned, but as a "unit," which was in this case construed to be the combination of configuration and ornamentation.

The defendant has sold spoons and forks whose handles were, in outline, more or less similar to, but in ornamentation entirely different from the design represented in complainant's patent. And although the complainants sought to prove by witnesses that the respective articles or designs resembled each other in *general* appearance, such testimony was held to be ineffective, as long as persons in the trade will not be deceived by the resemblance into taking an article of the one design for an article of the other. The letters patent in question, covering, by the claim, the design as represented, were held to protect, not the result or appearance of such design, but the *means* of producing the result or appearance, so that even if the same appearance is produced by another design, if the means used to produce it are different from the means used in the prior patented design to produce such appearance, the latter design is not an infringement of the patented one. The suit was consequently dismissed.

The chief point settled by this decision, is that design patents must be construed, as to their scope, in the same manner as mechanical patents—that is to say, if a patented design consists of a new addition to an old form, and is so claimed, the patent will cover the addition only, and not its connection with the old form; if the design, however, is patented as a *unity*, it is for a *combination* of *all of* its parts, and any other person may use any of its parts, less than the whole, and not be an infringer.

The same rule, as applied to the matter of infringements will, of necessity be and has in fact always been, a guide to the Commissioner of Patents in determining the question of interference between different designs. He examines not the effect produced by a design, but the means used for producing the same, and if the means employed to the same end differ, they entitle each applicant to a patent, provided that the stated novelty is not disproved.

A KANSAS SILK FACTORY.—According to the Detroit *Tribune*, the first velvet factory in the United States has been started by a French colony in Kansas, at the town of Franklin, eighteen miles southwest of Ottawa. The colony began operations last summer on the co-operative plan, and have already, besides their manufactory, comfortable dwellings, stores, and shops, and farms under full cultivation. The pioneer in this enterprise, M. Veleton de Boissiere, contemplates supplying his community with other looms, not only to increase the manufacture of ribbons, but also to enlarge the products of his community by including sewing silks, tassels, trimmings, and other dress materials, which are fast becoming indispensable even beyond the Mississippi.