or "braid" tobacco was made in the same manner as the patented article was made—by encircling the sweetened filler with two separate wrappings of unsweetened tobacco—but the twist tobacco was simply braided and subjected to lateral pressure. Each plug was a flat braid, into the interstices of which air freely entered; and having a comparatively thin and flat surface, the plug could not be made compact by endwise pressure.

The important question in the case was as to the patentability of the invention. A rope of strands of sweetened filler, inclosed in a binder, which, in turn, was enveloped in a wrapper, antedated the patent. Plug tobacco had always been coiled and braided in various forms, and had been subjected to pressure. The peculiarity of the invention was, therefore, in the form and shape of the coil.

The argument on behalf of the defendants was that the combination filler, binder, and wrapper was old, which was true; that coiling or twisting a moist rope of tobacco had always been practised, which was true; and that subjecting a coiled rope of sweet tobacco to pressure was old, which was also true; and that the particular form of the coil was a matter of fancy, and that the form of the coil could not involve the exercise of the inventive faculty. This was the precise question at issue. Could any particular method of coiling be the subject of a valid patent?

The court, in sustaining Eppinger's patent, answers this question in the affirmative. It holds that the article of plug tobacco had been long in use, and in constant demand; that, as it had been prepared for market previous to Eppinger's invention, it had been liable to spoil in warm and damp weather, and to grow mouldy in any temperature; that no remedy was found for these evils until Eppinger's invention was made; and that it was manifest from the length of time during which the tobacco had been manufactured, from the constant demand for it, and from the well known evils to overcome, that the inventive faculty must have been brought into exercise, or else that mechanical skill would long since have avoided any danger of fermentation or mould; that, however simple Eppinger's change in the method of manufacture apparently may have been, yet it was a change which required invention for its accomplishment; and that the improvement resulting from the changed method of manufacture had been so great that the article which was produced was, in the meaning of the patent acts, a new and useful article of manufacture.

THE PROPOSED AMENDMENTS TO THE PATENT LAWS.

We give below an abstract of the new patent bill which has been introduced into the Senate by Mr. Wadleigh.

The first section enacts that from and after the passage of the act no profits or damages in any suit for infringement of a patent shall be recovered which shall have accrued more than four years next preceding the commencement of such suit, and that all rights of action at present existing must be sued for within four years thereafter. Under this section, if there are a hundred infringers of a patent, a hundred suits must be brought at once to fully protect it; or if an eastern man has a patent, and some one in the extreme west wishes to manufacture the patented article, he may do so for many years before his operations are discovered, and the owner of the infringed patent has no right to recover any damages accruing to him from the infringement that occurred more than four years before suit is brought.

Under the second section a license fee is to be the measure of damages which a patentee may recover from infringers, provided any such license fee has been established; but if not, where from the nature of the invention it *can be made to appear* to be for the interest of the patentee that other persons should use the same, the court or jury shall determine the damages from the evidence, and in such case no account of profit or savings is to be allowed. Where profits are to be taken into consideration, the defendant is not to be charged with any saving he may have made by infringing a patent, unless it can be shown that he has made money by his business. Where he acknowledges that profits have accrued from his infringement, the court is to determine what proportion of the profit is due to the said invention and what to the other elements from which such profit was derived, and the proportion due to the invention is to be the measure of profit recovered; but if said profits shall be found to be in *excess of the injury* done by the infringement, the court is to diminish the amount to such an extent as may be just and reasonable. This last clause appears to be open to the interpretation that, if the defendant can prove that from want of means or otherwise the patentee was in such a position as to be unable to use his invention, and was not therefore actually *injured* by the infringement, notwithstanding the infringer may have made an immense profit from the use of it, unless it can be shown that the inventor actually suffered great injury, he is to be cut down in the profits to the amount of injury he has suffered.

Section 6 has a clause to the effect that no machine or other article made prior to the surrender and reissue of a patent which did not infringe such surrendered patent, shall be held to be an infringement of the new claims of the reissued patent.

Section 9 allows infringers, where a patentee does not bring suit immediately he has knowledge of infringement, to bring a bill in equity to declare such infringed patent void for any of the causes which by law may render the same invalid. So that in case a patentee is too poor to immediately bring a suit against a wealthy infringer of his patent, said infringer may bring suit to declare it invalid; and in nine cases out of ten where the owners are too poor to employ good counsel to protect their rights, perfectly valid patents would be declared void under such circumstances.

Section 10 is to compel patentees to bring suits to enforce their rights, if an infringer demands that a suit be brought no matter whether the patentees have means to bring such suits or not, under the penalty of being enjoined from ever prosecuting such infringer at any time thereafter.

Section 11 is an imitation of the English law in the matter of fees, as it requires that a patentee shall pay fifty dollars on or before the first day of January after the expiration of four years from the date of the patent, and one hundred dollars on or before the first day of January next after the expiration of the ninth year of the patent. In default of either of these payments, the patent is to expire on the 1st day of April next thereafter, and during that month the Commissioner of Patents is to publish a list of the patents that have expired for the non-payment of these extortionate fees. In view of the fact that there is now in the Treasury of the United States over a million of dollars wrung from poor inventors in the shape of unnecessarily high patent fees, we think comment on this section entirely needless.

HOW TO TRUE UP A CRANK PIN.

A correspondent asks: "How can I true up my crank pin? I do not think it is true, because it appears to pound at two opposite parts of the stroke, and if I tighten up the brasses enough to take the pound out they get hot. I cannot find anything on the subject in the books."

One of the most prevalent faults of construction in stationary engines is a slight want of truth in the crank pin, and the result is just such as our correspondent has described. The cause may lie in either of three things, first, the two holes in the crank not being true, one with the other; second, leaving too much for the shrinkage of the large hole of the crank upon the shaft; and third, not properly fitting the key to its seating. If in boring the holes the same back of the crank, whether planed true or not, and although set as true as practicable the holes will be out of true, one with the other, to twice the amount that the chuck plate of the lathe may be out of true and twice the amount that the casting may alter in form from having its surface skin removed, the crank pin hole should be bored with the face which was turned up when the large hole was bored clamped to the face plate.

We may next consider the amount of shrinkage. If it is excessive, the metal must give way in the cooling process, and will yield the most where the metal is the weakest, throwing the crank pin end out of true. The proper amount to allow upon a crank of any size less than about 7 inches is just such as can plainly be perceived by setting the inside callipers, or a wire gauge, to touch very lightly the bore of the hole. The outside callipers or gauge having a barely perceptible contact, daylight should be just plainly visible between the gauge and the wire or inside callipers. Rules are given in books for the proper amount of allowance, but it is expressed in decimal parts of an inch, running to three places of decimals, and the machinist has neither inside nor outside callipers which will measure determinately such large sizes to such minute fractions. For steel tyres upon locomotives and other wheels, in which the amount allowed for contraction is very important, the heavy duty causing the tyres to break from the strain due to too much contractive tension, the following device has been employed: A piece of steel, say 8 inches long and an inch wide, is filed as thin at one end as the least amount of contraction and a little thicker at the other end than the greatest amount of contraction required upon such sizes of work as the gauge or wedge is intended to be used for. Upon the face of the wedge is marked a series of lines running across it at places where the thickness of the wedge represents the proper amount of contraction for the diameter which is marked upon each line. All, then, that the operator has to do is to find upon the gauge the line which is marked with the diameter of the wheel and to then set his wire gauge to fit the male gage or callipers with the wedge interposed at one end, the wedge having just contact with the two when inserted up to the line. This is a very accurate method, and is to be commended for the ease with which it can be applied. We now come to shrinking the crank on to the shaft. For this purpose care should be taken to heat the crank slightly more on the thick than on the thin side, and to make it to a very low red heat indeed—in fact, a just perceptible red heat is best. The crank should lie, while cooling, with the crank pin end vertically beneath the shaft, so that its weight may not tend to warp the crank in cooling, as it would do if lying horizontally.

In fitting the key it should not be driven in tight, because it is apt to spring and show unnatural bearing marks. Towards the finishing process it should be drawfiled, to ease the bearing marks, lengthwise, as that will make it drive easier and smoother. If the key is not fitted to bear exactly even all over the driving, it may spring the crank out of true.

If these instructions are carefully followed the job will be a true one, and there will be no possibility of the crank pin causing a pound in the engine. To remedy a pound in an engine we may proceed as follows: To test the truth of the crank pin we attach the crank pin end of the connecting rod in its place with the brasses and key properly adjusted. The other end of the connecting rod should have the brasses and key in place but should not be attached to the wrist pin, or gudgeon, as it is more properly termed. We now place the crank pin at one end of its throw and lower the connecting rod at the other end into the wrist pin bearing and note if the faces of the brasses fall, without the rod being sprung sideways, exactly true into the wrist pin flanges. We perform this testing operation with the crank pin at the four quarters of its revolution, moving the crosshead to the necessary position in each case. And it is obvious that if the crank pin is true the other end of the connecting rod will fall exactly true into the wrist pin bearing; but suppose that when the crank pin is on one dead center the connecting rod brass flanges fall outside, and when it is on the other dead center it falls inside of the wrist pin bearing, it proves that the crank pin does not stand true. If when the crank pin is on the dead center nearest to the cylinder the brass flange falls inside the wrist pin, the outer end of the crank pin inclines towards the cylinder, and *vice versa*, if the brass flange falls outside the wrist pin bearing, the outer end of the crank pin must incline away from the cylinder. Here it may be noted that if the main shaft is not at a right angle to the center line of the bore of the cylinder, the connecting rod applied as above will not fall into the wrist pin bearing; but in this case the deviation of the wrist pin brasses from the wrist pin journal will be all inside or outside of the wrist pin journal, hence the operation of testing the truth of the crank pin will at the same time test the lining of the main shaft.

To proceed, then, having gone through the above operation and thus discovered in what direction the crank pin is out of true, we note how much it was out of true, which may be ascertained as follows: When it is found that the flange of the connecting rod brass does not fall into the wrist pin bearing, we mark even with face of that flange a mark upon the crosshead, and moving the crank to the opposite point in its revolution we mark another similar line, and the sum of the two distances is the amount of the want of truth at that end of the rod. To find how much that is in the length of the crank pin, we divide the length of the crank pin journal into the length of the connecting rod, measured from center to center of the bore of the brasses; the sum thus obtained we divide into the amount first obtained, and the result will be the amount the crank pin is out of line. Now, suppose the amount thus obtained is the $\frac{1}{64}$ of an inch, and that the crank pin when on the dead center nearest to the cylinder stands so that the center line of its length points toward the center of the main shaft at the flywheel end. We take a pair of callipers, set them to a diameter $\frac{1}{64}$ inch less than that of the crank pin, and file upon the crank pin journal, at its outer end, a flat place of sufficient depth as to make the callipers just gauge correctly. This flat place must get shallower as it approaches the other end of the journal, until at the extreme of the other end it runs out, leaving the surface intact. We next file a similar flat place upon the inside end of the length of the crank pin journal, but on the opposite side of the diameter of the crank pin, that is at the end of the crank pin journal nearest to the crank and on that part of the perimeter nearest to the crank shaft center; this second flat place must be filed at that end enough to allow the callipers to gauge correctly at that end, and must disappear at the other end of the journal. Thus we have obtained two diametrically opposite flat places that are true with the center line of the length of the main shaft, and we may now file two more flat places on the crank pin journal, the faces of the four forming a square. The last two, however, must be filed to an equal amount from end to end of the journal, and equally deep on each side, until the callipers will gauge them correctly. This being done, we file up the protruding parts of the journal until one of the brasses rubbed upon the journal will mark evenly all round, and the flat places are just brought to a bearing, and the job will be complete. It is necessary to connect the rod again and go through the testing process the same as at first, to be sure that all is right.

J. R.

MORE NEWS FROM THE SUN.

We noted recently the fact of Dr. Janssen having obtained some exceedingly large and fine photographs of the sun, and that it was probable that by means of the facility which these afforded for observing the solar surface, new deductions concerning the nature of the latter would probably be reached. Dr. Janssen's photographs are some 15 inches in diameter, and show details of the mottling or willow leaf on the sun of less than 1 second of arc. By examining these points, Dr. Janssen has recently found that the surface of the photosphere has not a constitution uniform in all its parts, but that it is divided into a series of figures more or less distant from each other and presenting a peculiar constitution. They have contours more or less rounded, often very rectilinear, and resembling polygons. Their dimensions are variable, and they sometimes attain a minute or more in diameter. In describing the figures in *Nature*, Mr. J. Norman Lockyer says, that "while in the intervals between them the grains are clear, though of variable size, in the interior the grains are as if half effaced; for the most part indeed, they have disappeared to make way for trains of matter which have replaced the granulation. Everything indicates that in these spaces, as in the penumbræ of spots, the photospheric matter is submitted to violent movements, which have confused the granular elements.

Mr. Lockyer considers the discovery as confirmatory of his opinion that sun spots are an index and not a measure of solar activity; and that their absence indicates a reduction, not a cessation, of the sun's energy. Dr. Janssen also points out that this fact throws light upon the forms of solar activity, and shows that that activity, in the photosphere, is always very great, although no spot appears on its surface.