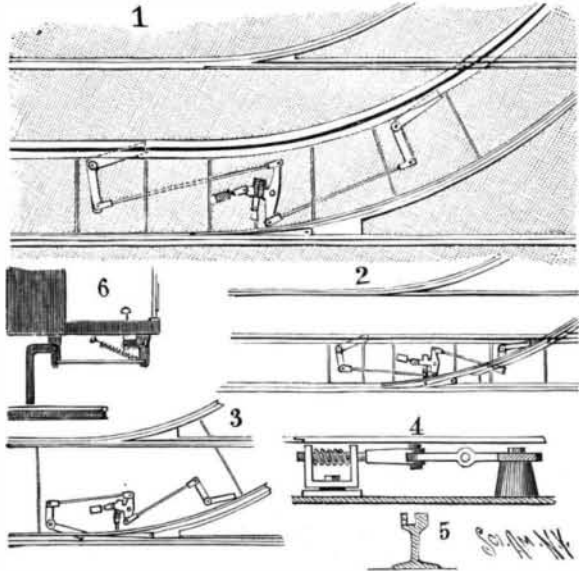


AN AUTOMATIC RAILWAY SWITCH.

A switch more especially designed for use on cable railways, but which may also be used in modified form with other street railways, is represented in the accompanying illustration, and has been patented by William Lickstrom, of No. 5 Manhattan Street, New York City. Figs. 1 and 2 are plan views of the switch



LICKSTROM'S AUTOMATIC RAILWAY SWITCH.

connecting a cable track and a track operated by horses or electricity, and Fig. 3 shows a modification adapted for use with railways of any kind, Fig. 4 representing a pivoted lever for throwing the switch and Fig. 5 a section of a special form of rail to be used, Fig. 6 showing one end of a car and its switch-operating lever. The switch point is connected by a link or rod to a bar movably retained by springs in a recess in a bell crank lever, from opposite arms of which extend rods connected at their other ends with bell crank levers pivoted close to one side of a cable conduit, the length of the rods being such that when an arm of one of the levers projects across the conduit slot the corresponding arm of the other lever lies alongside of the slot. In Fig. 1 the cable line is curved and in Fig. 2 it is straight, and a cable car coming to first the switch would be turned on the curve by the engagement of the grip with the lever arm extending across the conduit. As shown in Fig. 2, where the conditions are reversed, the car would be continued on the straight track. To hold the switch in either position to which it may be set, a rod or link connects one arm of the central bell crank lever to a pivoted guide rod under spring tension, as shown in Fig. 4, the spring resisting the throwing of the lever during the first part of its motion and assisting it during the latter part, thus acting to hold the switch in whatever position it may be placed. In the modified construction, for use with any kind of railway, a grooved guard rail is used, as shown in Fig. 5, the inner wall of the groove having a short longitudinal slot through which project the ends of the levers which in the other case extend over the conduit. The projecting ends of the levers are engaged and forced to one side by a lever extending down from the car platform, and thus made to move the switch point.

THE new mineral roeb-lingite is described by H. W. Foote and S. L. Penfield, in the American Journal of Science. It is a new silicate from Franklin Furnace, N. J. It is remarkable for containing sulphate dioxide and lead.

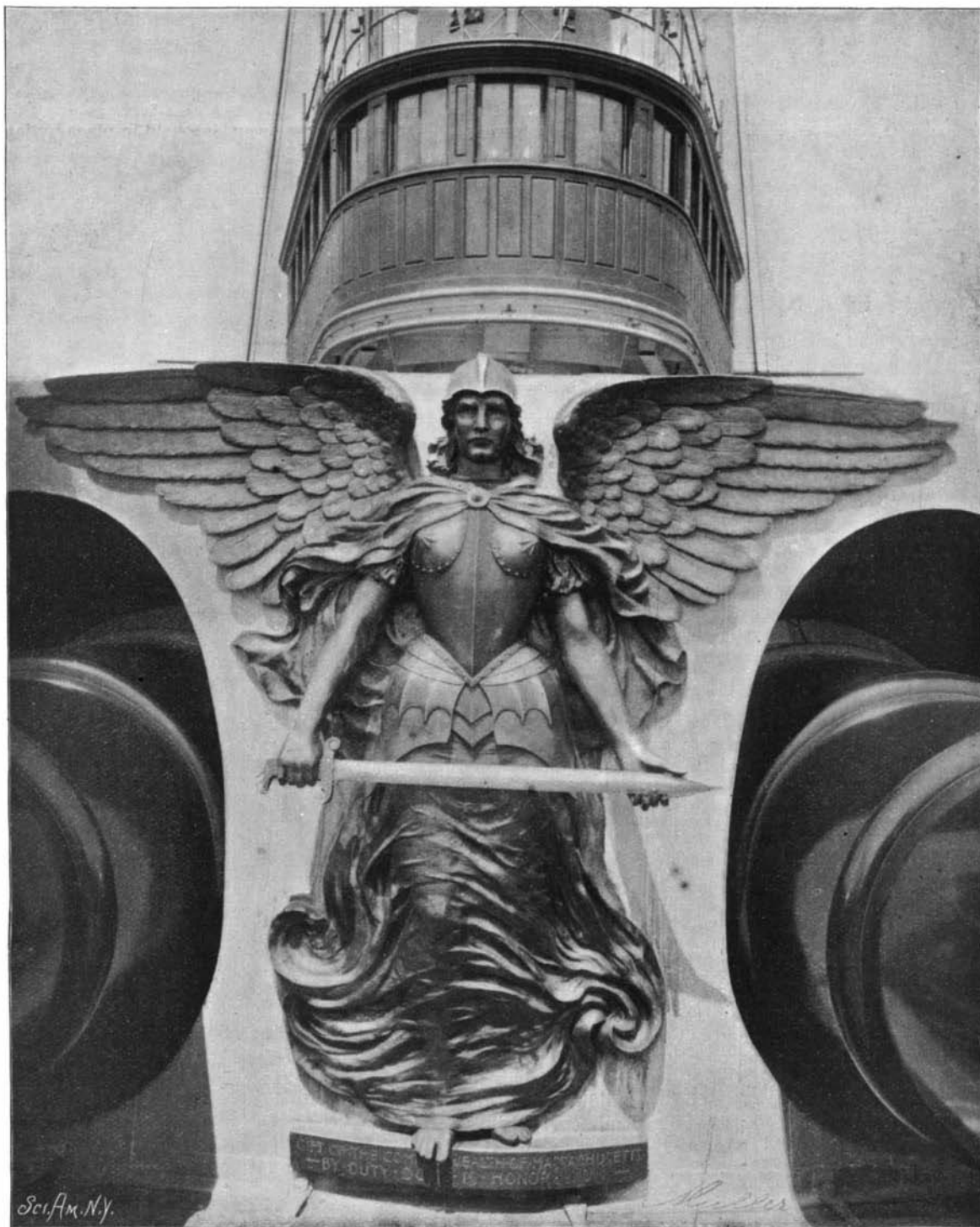
THE "WINGED VICTORY" FOR THE BATTLESHIP MASSACHUSETTS.

We present an illustration of the handsome emblematic figure in bronze, known as "Winged Victory," which is the gift of the State of Massachusetts to the battleship of the same name.

In some respects this handsome present is quite unique. In the case of all the other ships of the new navy, which have received gifts from the cities, towns or States after which they have been named, the event of their going into commission has been signaled by the presentation of handsome services of silver. One of the richest presentations of this kind was that made by the city of San Francisco to the cruiser of that name, when the ship was so overwhelmed with kindness that it has become a problem as to just where the silver shall be stowed—at least so says the New York Sun.

The gift of silver service made to the Brooklyn is valued at \$10,000, and the other ships have received presents of approximately similar value. The Massachusetts Legislature, however, decided to depart from the time honored custom and present its namesake with an emblematic figure in bronze, accompanying the gift with a request that it should be placed in some prominent position on the battleship, and preferably on the forward turret.

The figure is life size and represents a very striking and spirited figure of a woman clad in a helmet and corselet; her wings spread abroad over the port holes of the turret, and with her arms pendent she holds a massive sword, upon which the single word "Victory" is engraved. The base of the figure contains the inscription "Gift of the Commonwealth of Massachusetts." Below this is engraved the motto "By duty done is honor won." The sculptor, Mr. Pratt, who is still a young man, was born in Norwich, Conn., in 1867. He passed through the Yale School of Fine Arts and afterward studied under Augustus St. Gaudens in New York and under Falguière in the Ecole des Beaux Arts, Paris. He designed two of the large groups in the peristyle at the World's Fair, and he has won the approbation of the critics by six seven-foot figures for the front entrance of the new Congressional Library at Washington, the large twelve-foot figure of Philosophy

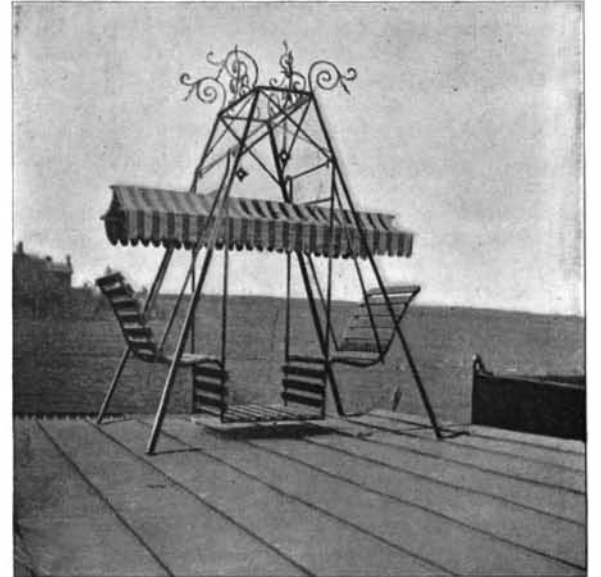


BRONZE FIGURE "WINGED VICTORY" ON FORWARD TURRET OF BATTLESHIP MASSACHUSETTS.

inside of the dome, and a series of massive bass reliefs of the same building.

AN IMPROVED SWING.

The illustration represents a double swing of perfected construction, all steel but the seats, having a large canopy top or adjustable awning, and with mov-



BAUSMAN'S STEEL SWING.

able reclining seats which may be adjusted at any angle. It is one of several varieties of swings, embodying late improvements, manufactured by D. H. Bausman, of Bausman, Pa. The swing shown in the picture occupies a floor space of 7½ by 5½ feet, and is 10 feet high. These swings are painted in lemon and raw sienna tints, and are shipped in parts, adapted to be set up in a few minutes.

Insanity in Animals.

Insanity in the human subject is supposed by some to have no analogue in the lower animals, says Popular Science News. Yet many causes, according to Dr. Snelison, will lead to the permanent loss of self-control. Cattle driven from the country through a crowded town will often work themselves into a frenzy. Horses have gone mad on the battle field. At Balaklava an Arabian horse turned on its attendant as he was drawing water, seized him in his mouth, threw him down, and, kneeling on him, attacked him like an infuriated dog. He bit off another soldier's finger. An instance is related of a docile horse suddenly going mad on a hot day. Everything that came in its way it seized in its teeth and shook as a terrier does a rat. It raided the pigsties and threw the inmates one after another in the air, trampling on the bodies as they fell. Afterward it almost killed its own master, after maiming for life the farrier who was called in. This must have been a case of insanity, the cause of which is often to be found in congenital malformations of the bones of the head. A scientist of authority even goes so far as to prove by what appears to be incontestable evidence that cats, dogs, and monkeys have been observed to have delusions very similar to those of insane people.

A SPECIAL dispatch from Naples, dated June 4, says that Mount Vesuvius is in eruption. An area of 2,000 yards long by 500 wide is covered with lava, and it is dangerous to approach within 400 yards of the principal crater.

The Liquefaction of Fluorine.*

The physical properties of a large number of mineral and organic fluorine compounds led to the theoretical prediction that the liquefaction of fluorine, could only be accomplished at a very low temperature.

While the chlorides of boron and silicon are liquids at the ordinary temperature, the fluorides are gaseous, and well removed from their boiling points. The same difference is noticeable in their organic compounds, ethyl chloride boiling at 12°, ethyl fluoride at -32°, propyl chloride boiling at +45°, ethyl fluoride at -2°.

Similar observations have been previously made by Paterno and Oliveri, and by Vallah and Heusler. These facts can also be connected with the experiments of Gladstone on atomic refraction. Finally, although clearly a member of the chlorine group, fluorine in some of its properties also presents some analogies to oxygen. The whole of these observations appear to clearly establish that fluorine would only with difficulty be reduced to a liquid, and it has already been shown by one of us that at -95°, under ordinary pressure, it does not change its state.

In the new experiments that we now publish the fluorine was prepared by the electrolysis of potassium fluoride in solution in anhydrous hydrofluoric acid. The fluorine gas was freed from the vapors of hydrofluoric acid by passing it through a small platinum spiral cooled by a mixture of solid carbon dioxide and alcohol. Two platinum tubes filled with well dried sodium fluoride completed this purification. The liquefaction apparatus consisted of a small cylinder of thin glass, to the upper part of which was joined a platinum tube. The latter contained another small tube of the same metal. The gas to be liquefied arrived by the annular space, passed into the glass bulb, and passed out again by the inside tube. This apparatus was united to the tube which led in the fluorine.

In these experiments we have used liquid oxygen as the refrigerating substance. This oxygen was prepared by the methods described by one of us, and these researches have necessitated the employment of several liters of this liquid. The apparatus being cooled to the temperature of quietly boiling oxygen (-183°), the current of fluorine gas passed into the glass bulb without liquefying; but at this low temperature the fluorine had lost its chemical activity, and no longer attacked glass.

If now the pressure on the boiling oxygen be reduced, it is seen, as soon as rapid ebullition is produced, that a liquid trickles down the walls of the glass bulb, while no gas issues from the apparatus. At this moment the exit tube is closed with the finger to prevent the entrance of any air. Before long the glass bulb becomes filled with clear yellow liquid possessing great mobility. The color of this liquid recalls the tint of fluorine seen through a layer a meter thick. According to this experiment, fluorine becomes a liquid at about -185°. As soon as the little condensation apparatus is removed from the liquid oxygen, the temperature rises and the yellow liquid begins to boil, furnishing an abundant evolution of a gas which presents all the energetic reactions of fluorine.

We have taken advantage of these experiments to study some of the reactions of fluorine upon bodies maintained at very low temperatures. Silicon, boron, carbon, sulphur, phosphorus, and reduced iron, cooled in liquid oxygen, and then projected into an atmosphere of fluorine, do not become incandescent. At this low temperature, fluorine does not displace iodine from iodides. Its chemical energy, however, is still sufficiently great to decompose turpentine or benzine with production of flame even at -180°. It would seem that the powerful affinity of the fluorine for hydrogen is the last to disappear.

Finally, there is one other experiment that we ought to mention. When a current of fluorine gas is passed into liquid oxygen, there is rapidly produced a white flocculent deposit, which soon settles at the bottom of the vessel. If the mixture is shaken and poured on a filter, this precipitate is separated. It possesses the curious property of deflagrating violently as soon as the temperature rises. We are pursuing the study of this compound, as well as that of the liquefaction and solidification of fluorine, in which further experiments are required.

Have Bacteria Uses?

So much has been said about bacteria as causing and propagating disease that it is difficult to make the public regard these minute organisms as anything but mischief makers. Nevertheless, an American scientist, Prof. Conn, of Wesleyan University, and Simon C. Keith, of Boston, are demonstrating by experiments that they serve a useful purpose in nature, and contribute quite as much to one's pleasure as to one's discomfort. The outcome of their investigations, as stated in the New York Herald, is that it is to the development of bacteria in milk that the delicate flavor of butter and cheese is due, and that the reason some kinds of butter and cheese have better flavors than others is

* "On the Liquefaction of Fluorine," by H. Moissan and J. Dewar. Translated by Nature from Comptes Rendus of the Paris Academy of Sciences.

that different species of bacteria have been developed. They have succeeded in isolating these different species.

In 1891 Prof. Vilhelm Storch, of Copenhagen, succeeded in isolating certain acid bacteria from ripened cream, and was able to cultivate and utilize them in the creameries for accomplishing an artificial ripening in the cream and consequent fermentation, in order that a more uniform and better flavored butter might be produced. But it was not until two years ago, when Prof. Conn discovered a germ for the ripening of cream which was radically different from any heretofore used, that the subject began to be studied in this country with the view of developing its commercial possibilities. Since then a laboratory has been fitted up in Boston by Orrin Douglass for the separation, cultivation and investigation of bacteria from a commercial standpoint. Mr. Douglass has associated with him Mr. Keith, who is a graduate of the Institute of Technology.

The Fastest Steam Yacht Afloat.

The steam yacht Ellide, in the course of her second speed trial over a measured course, has made a new record for the mile, doing the distance in one minute and thirty-eight seconds. This is at the rate of thirty-six and a half miles an hour, or within a mile and a quarter of the speed attained by the torpedo boat Turbinia on her famous trial.

This result in a boat only eighty feet long has been attained by a special design of hull, engines and boilers. The hull is of composite construction, the frames and scantling being of steel and the skin consisting of two thicknesses of mahogany. She is divided into watertight compartments by five steel bulkheads, and stability is further assured by providing a number of copper air tanks.

The boiler is of a special type water tube designed by Mr. Mosher for high speed vessels, and combines a large steam raising capacity with a minimum of weight. Special attention is paid to the draught and to the circulation of the water. The arrangements for the former are such that the gases pass through the length of the boiler twice before entering the uptake. The boiler is arranged in two sections, with a view to enabling one of them to be used if the other should be disabled by the bursting of a tube or other mishap.

If we except the engines which have been put into some of the recent airships, the engines of the Ellide are probably the lightest for their horse power that have ever been built. They are quadruple expansion, the cylinders being 9 inches, 13 inches, 18 inches, and 24 inches in diameter by 10 inches stroke. On the trial in question, with a boiler pressure of 250 pounds to the square inch, they ran at 650 revolutions a minute.

In the official trial which is shortly to be made the Ellide will be lightened by about 3,000 pounds of weight in the shape of the twenty guests which were on board at the time of the last trial. Her engines will also have worn down to a smoother bearing and it is quite possible that the 37½ miles an hour record of the Turbinia will be broken. Below is a list of the fastest yachts and torpedo boats in the world:

Name.	Description.	Miles an hour.
Turbinia* (English)	Torpedo boat	37½
Ellide (American)	Yacht	36½
Star (English)	Torpedo boat	36
Porter (American)	Yacht	34
Peisken (American)	"	31 6 10
Norwood (American)	"	30
Yankee Doodle (American)	"	29 6-10
Vamoose (American)	"	25

* Driven by triple compound steam turbine.

Building Roads Too Fast.

The Canadian Magazine raises the question whether Canada has not gone too far in giving aid to railroad building. It appears that on June 30, last year, there were 16,091 miles of track laid in Canada, and the Dominion government has contributed to this building at the rate of \$9,369 per mile constructed, the Provincial government at the rate of \$1,847, and the municipalities at the rate of \$881 per mile. That is, for the net result of 16,091 miles, Canada has contributed, in round numbers, the very liberal sum of \$195,000,000. In Cape Colony the proportion of net revenue to capital cost of railways is 5.75 per cent; in India, 4.96; in South Australia, 3.13; in New South Wales, 3.46; in New Zealand, 2.73; in Queensland, 2.13; and in Canada, 1.57. In only one British colony is the proportion lower than in Canada, and that is Tasmania. The Magazine thinks that this seems to indicate that Canada is building railroads too fast. It further quotes the Dominion statistician as saying: "The cost of a railway, it has been said, should not be more than ten times its annual traffic—that is, that the annual traffic should be ten per cent of its capital cost. If this standard is applied to Canadian railways, their cost will be found to very far exceed the limit." In 1895 the gross receipts of the Canadian railroads amounted to only \$46,785,487, while the paid-up capital

was \$894,660,559, the percentage of traffic to cost being about five and one-quarter per cent instead of ten per cent.

Recent Patent and Trade Mark Decisions.

Ex parte Messenger (Commissioner's Decision), 78 O. G., 1903.

Time Within Which Reissues Should be Applied For.—Application for the reissue of a patent must be filed within two years or it will be considered abandoned under U. S. Rev. Stat., Sec. 4894.

Ex parte Musgrave & Nye (Commissioner's Decision), 78 O. G., 2046.

Non-patentability of a Process.—A process which employs low heat for a long time is not patentable over another which uses a high heat for a short time when the result is the same in both cases. Here the result was the partial distillation of coal. Therefore, the alleged invention of N. W. Musgrave and H. P. Nye has been held to be not patentable.

Wurts v. Herrington (Commissioner's Decision), 79 O. G., 335.

Proof of Reduction to Practice.—When complete reduction to practice amounts to two years' practical use, the effect of such reduction to practice must be established by evidence of the same degree as that required to establish two years' practical use. The fact that one device was operated only for a short time and then laid aside and not used until others began making and advertising the device raises the presumption that such former alleged use was experimental and that it amounted to nothing more than an abandoned experiment. The fact that the device was exhibited in a room ordinarily used to exhibit complete devices ready for the market is not proof in itself that such device was complete and on sale.

Wurts v. Herrington (Ct. of Ap., D. C.), 79 O. G., 337.

Reduction to Practice.—Reduction to practice by the junior party before the senior party does not require more than a preponderance of evidence. Certainly the evidence need not be so strong as to establish it beyond a reasonable doubt. But where a patent has been regularly issued, a strict rule as to the proof required to overcome the patent should prevail, at least where the evidence is suspicious.

Shelleberger v. Schnabel (Ct. of Ap., D. C.), 79 O. G., 339.

Dissolution of Interference.—When the commissioner in an interference case decides that there is no patentable invention in issue, the interference is thereby dissolved, for there cannot be an interference for a non-patentable thing.

Arnold v. Tyler (Ct. of Ap., D. C.), 79 O. G., 156.

Presumption as to Priority on Appeal.—The decision of the Patent Office as to the priority of invention must stand, unless the evidence shows beyond any reasonable doubt that the appellant was the true inventor.

Advice of Attorney.—The mistaken advice of an attorney, whereby longer delay resulted in the reduction to practice, is immaterial as against those who have been diligent.

Bruel v. Smith (Ct. of Ap., D. C.), 78 O. G., 1906.

Consistency of the Patent Office.—The Patent Office must be consistent and should not give so liberal construction to the terms of the issue as to enable it to include a structure which had previously been held to be patentably distinct therefrom. A device which differs from the terms of the issue in the particular feature which the office held once to have been sufficient to constitute a patentable distinction does not amount to a reduction to practice of the issue.

Duff Manufacturing Company v. Forgie (U. S. C. C., Pa.), 78 Fed., 626.

Infringement of Jacking Apparatus.—The Barrett patent, No. 455,993, for "lifting jacks" adapted to produce also horizontal motion, such improvement being based on the principle of a yielding, as distinguished from a rigid plate, has been construed and held infringed as to claims 1 and 6 by a jacking apparatus designed to produce horizontal circular motion to unscrew oil well tools, for, while they differ in form, the principle, design and functional purposes are substantially the same.

Clinton Wire Cloth Company v. Hendrick Manufacturing Company (U. S. C. C., Pa.), 78 Fed. Rep., 632.

Coal Screens.—The Philipps patent, No. 500,508, for revoluble coal screens providing the woven wire segments with protector plates connecting them together and covering their joints, the plates having inward extending projections to form tumblers, has been held void on the ground of showing mere mechanical skill.

Travers v. Hammock and Fly Net Company (U. S. C. C., Wis.), 78 Fed. Rep., 638.

Mechanical Process for Making Hammocks.—The Rood patent, No. 296,460, which describes a method of forming the ends of hammocks by drawing a cord straight through the end loops of the hammock body to form the converging strands which are gathered in a suspended loop or eye, has been held to cover a mere mechanical operation and, therefore, to be not a patentable process and void on its face.