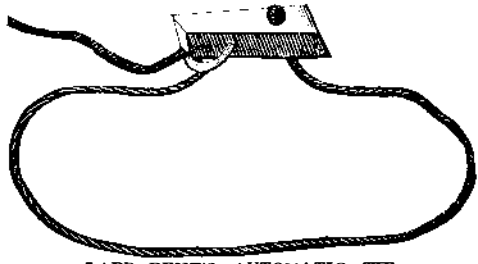


a statement that it saves in the neighborhood of 80 per cent of the labor involved, and more than 200 per cent of the cost of the ordinary bands (*plus de 200% sur le prix*, etc.) It is surely worth examination, for this is actually money in the pocket. The band is composed of two cords knotted together, forming loops. The point of the tool (Fig. 3) is introduced through a loop at or near one end, and is thrust as far as the handle permits. The band being placed around the sheaf, the point of the tool is thrust through such one of



LAPPARENT'S AUTOMATIC TIE.

the other loops as will give the tightness to the band, and the handle end of the tool is then carried over, describing an arc upon the point which is in the sheaf; the loop slips down from the handle to the point end, and the loop caught in the notch is then drawn through the loop on the loop, and the latter is withdrawn, allowing the knot drawn through to catch in the loop, where it is held by the expansion of the sheaf. They are five feet long, and the price is, according to size, from \$5.32 to \$7.60 per 1,000. *Violè tout!*

EDWARD H. KNIGHT.

GANG PLOW TRIALS.—PARIS EXHIBITION.

The following report of the dynamometric trials of the best American and French gang plows was received too late for insertion with the detailed account of the competition printed in the SCIENTIFIC AMERICAN last week. Our correspondent observes that no table of equal fullness and value has ever before been published in this country.

Dynamometric Trials of Gang Plows at Petit-Bourg (Seine et Oise), France, August 6th, 1878.

Reported for the SCIENTIFIC AMERICAN, by Dr. Edward H. Knight, U. S. Commissioner, etc.

NAMES OF EXHIBITORS.	TRIALS. (1)	Surface Measure by Dynamometer.		Length of trace. (2)	Mean ordinate. (3)	Corresponding effort.	Mean depth of furrow.	Mean width of furrow slice of the gang plow.	Section of land turned.	Power necessary to displace one cubic cube of earth. (4)	Mean of two trials.	Length of furrow.	Time of travel.	Weight of Plow.
		Square Meters.	Milli-meters.											
Meixmoron de Dombasle, Nancy (Meurthe et Moselle), France.	1. Going.	115,160	2 430	49 39	497 31	151 1	678 1	0 102664	4814 1	4899 2	160	4 8	247	
	2. Return'g.	112,735	2 365	47 67	500 25	161 3	626 0	0 100974	4856 2	160	4 12			
Deere & Company, Moline, Illinois, United States.	1. Going.	120,870	2 512	48 12	504 97	163 0	695 6	0 113283	4453 7	4566 9	160	4 12	260	
	2. Return'g.	125,970	2 377	52 995	556 13	167 3	709 0	0 118616	4680 0	160	4 22			

(1) The ground was slightly inclined.
 (2) The base line on the paper ribbon of the dynamometer.
 (3) Mean distance between the base and profile lines on paper ribbon.
 (4) Kilogrammeter, the French dynamic unit. The power required to lift 1 kilogramme to a height of one meter. One *cheval-vapeur* (horse power) is the power required to lift 75 kilos, a distance of 1 meter (i. e. 75 kilogrammeters) in a second. 1 kilogramme=2.2046 pounds avoirdupois. 1 meter=39.37079 inches.

President White on the Paris Exhibition.

In a private letter to a friend in Brooklyn, President White, of Cornell University, speaks of American success at Paris in the following terms:

"The Exhibition is really a vast success from every point of view save the financial. You will be glad to learn that our Americans are carrying off much more than their share of the great awards. Only yesterday, in sitting on the Jury of Appeals, I was greatly interested in seeing how, in one department after another, our people have made their mark. In regard to several exhibits, while the presidents of the class juries presented their reports, they went into exclamations of surprise over the recent revelations of American energy and industry. One of them especially declared that if America went on as she at present is going, in regard to the paper manufacture, she would soon have control of the European markets, instancing more particularly the new applications of this industry in the United States. I only wish we could have had one of those paper boats present, such as that in which our Cornell boys beat Harvard the other day. That would have completed the tableau.

"Perhaps the most striking thing has been the taking of the Great Prize for artistic gold and silver work by Tiffany. Splendid as the Exhibition was in this respect, Tiffany stood above all his rivals. In agricultural implements and in machinery of a certain class we lead everything. But this does not surprise me so much as to find that in various points where we did not expect much there are important recompenses for skill and ability. With all the ingenuity which the French have given to surgical instruments and instruments of precision, I was especially glad to see the United States stand at the side of France in such recognition."

Running the Fast Train.

The train leaving this city at 7:35 in the morning for New York over the Pennsylvania Railroad is among the fastest in the world. Indeed, a portion of the distance is made at a rate scarcely obtained by any other road in Europe or America. The distance between West Philadelphia and Jersey City is 89 miles, accomplished in one hour and 54 minutes,

with a single stop, while the return is six minutes less, including two stops. This gives a rate, in going, of nearly 50 miles, and in returning of slightly more than 50 miles an hour, surpassing that of the celebrated Queen's mail between London and Holyhead, where the run of 264 miles occupies seven hours. At half past seven o'clock Friday morning, when a *Times* man, by permission, boarded the engine at the West Philadelphia depot the steam gauge marked 120 pounds and "still rising." Precisely five minutes later the bell clinked over the engineer's head, and almost simultaneously he gave a slight clutch of the lever and the train of four cars was off. It stopped at Germantown Junction 13 minutes later. As soon as the engine got clear of the suburbs she shrieked and bounded away at greater speed. About 20 minutes after it wound its way through Bristol, and in still less time the iron bridge over the Delaware was sighted and Trenton was bisected at the same moderate speed which had been adhered to through Philadelphia. But it was necessary to do better in order to reach Jersey City, nearly 60 miles away, at the appointed time. Trenton was scarcely passed when the engineer touched up his steel. Between the first two mile posts noted, the distance was passed in 63 seconds; the next in a little less, and a third in precisely 60. Hurrah! The train was spinning along at the rate of a mile a minute. And yet everything proceeded with so much smoothness that it was impossible to appreciate the amazing swiftness. There was no unusual jolting, and in the cars the passengers were smoking, dozing or reading, just as though it was an ordinary train in which they were riding. Just beyond Princeton the speed rose to the rate of a mile in 58 seconds and continued it without diminution, except a slight "slowing up" at Monmouth Junction, until New Brunswick was in view. As soon as the town was left behind the engine was at it again, and in the neighborhood of Menlo Park the speed became prodigious, as if the locomotive was snorting defiance to the wonderful Edison in his laboratory under the hill.

day the passengers began stepping off just a minute and a half before the train was due. Of the 29 trips from West Philadelphia to New York, 25 were made on time connection. The train has been missed only twice. Once was on account of the accident mentioned, and the other was a twelve minute detention caused by an excursion train getting in the way. The other delays were just two minutes apiece, occasioned by the draw in the river. The return trip fails oftener, it being difficult to get away from Jersey City at the exact moment, while the run is harder, including more up grade.

The train generally consists of four or five cars, including a palace one, and averages about 300 passengers a day. It is under the charge of Louis Silance, an experienced conductor, while the two engines, which alternately do the work, are run by the veterans Edward Osmond, who has been on the road 21 years and has handled a locomotive 16 years, and Frank Peacock, equally skilled and careful. The register shows that many a mile has been made in 48 seconds, which is at the rate of 75 miles an hour. Going eastward the train makes one and in returning two stops. The driving wheels of the engine are only five feet in diameter, but this will probably be increased to five and a half feet. —*Philadelphia Times*.

The Population of Europe.

Correcting Behm and Wagner's tables of 1878, for the changes just made in Turkey, the population of the several states of Europe is now as follows, the total being in round numbers 312,400,000:

Germany, 1875.....	42,727,360	Iceland, 1876.....	71,300
Austro-Hungary, 1876..	37,350,000	Spain (without Cana-	
Liechtenste.n., 1876....	8,664	rias), 1871.....	16,526,511
Switzerland, 1876.....	2,759,854	Andorra.....	12,000
Netherlands, 1876.....	3,865,456	Gibraltar, 1873.....	25,143
Luxembourg, 1875.....	205,158	Portugal (with Azores),	
European Russia, 1872..	72,392,770	1875.....	4,319,284
Finland, 1875.....	1,912,647	Italy, 1876.....	27,769,475
Sweden, 1876.....	4,429,713	European Turkey.....	8,359,000
Norway, 1875.....	1,807,555	Roumania, 1878.....	5,149,000
Denmark, 1876.....	1,903,000	Servia, 1878.....	1,642,000
Belgium, 1876.....	5,336,185	Montenegro.....	210,000
France, 1876.....	36,905,788	Greece, 1878.....	2,200,000
Great Britain, 1873.....	34,242,966	Malta, 1878.....	145,000
Faroes, 1876.....	10,600		

The cession of Bosnia to Austria increases the population of the Austro-Hungarian empire something over 1,000,000. If Turkey is further reduced by the populations of the practically independent principalities of Bulgaria (1,773,000 inhabitants) and Eastern Roumelia (746,000), there will remain to that empire considerably less than five millions, about two and a half millions being Mohammedans.

The Shoe and Leather Trade.

The testimony of actual workmen before the Congressional Labor Committee is invariably full of interest and encouragement. Markedly of this nature was that of Mr. J. H. Walker, a manufacturer of boots and shoes at Worcester, Mass., and of leather at Chicago—a typical American working man, who has won success by diligence and thrift. He said:

"I employ 497 men, and do a business of about \$2,000,000 a year. I began life working at the bench, and have built up my own business, and made all the money I possess. The boot and shoe business is considered next in importance to that of agriculture in the United States. I have before me the statistics of the shipment of cases of boots, shoes, and rubbers from Boston. In 1872 the shipments were 1,452,000 cases; in 1874 there was a decrease of 115,000 cases; in 1875, an increase of 59,000 over 1874; in 1876, an increase of 72,000 over 1875; in 1877, an increase of 237,000 over 1876; in 1878, thus far, a decrease of 156,400 from the same period last year, which is partly owing to the facts that the large sales of rubbers in New York have not been made, and that jobbers are not carrying large stocks, but are buying from time to time. The volume of business has increased since 1874, but there have been small profits, and the business has been carried on rather for the benefit of the workmen than of the capitalists. Machinery is used in our business, but in a less degree than in the manufacture of cotton and woolen goods. Wages in 1840 were \$1 a day for thirteen hours' work; in 1860 they had doubled, and in 1865 were nearly \$4; now wages have fallen to about \$2, the same as in 1860, with ten hours' work a day. The effect of the introduction of machinery upon the trade has been to improve the shoes, and to increase the working capacity of a laborer about 15 per cent. The effect upon the workmen has been to improve them intellectually. The question to-day is the kind of work and the wages to be paid rather than the want of work. If the people of Massachusetts were driven to it, the soil of that State would amply support its entire population; it has ceased to be an agricultural State because manufacturing has become more profitable than tilling the soil."

Mr. Hewitt—Is there any difficulty in men rising from the rank of employé to that of employer? A. "In 1840 there were in Worcester four firms of shoe manufacturers, consisting of seven persons. Of these only one died in comfortable circumstances. In 1850 there were sixteen firms, consisting of eighteen men; only two of these retired with capital, four have failed, and only two are engaged in the business now. In 1860 there were twenty-one firms, consisting of twenty-nine men; two have gone out of the business with capital, twelve have failed, and only five are now manufacturers. To-day there are twenty-one firms, consisting of forty men; of these only five are the sons of manufacturers, and only one has not been a worker for wages. There never was a time when it was more easy for a journey-

man to rise to the rank of manufacturer than now; a workman of established character and known ability has no difficulty in obtaining credit. The failures have been caused chiefly by investing money outside the business, and then drawing money out of the business to protect the investments. Two thirds of the workmen I have known have saved money, and a large proportion of those living in the country own their houses and some land. A larger proportion of the workingmen than of the manufacturers, since 1840, have ended their days in or are now living in competence. I have never known an industrious temperate workman, except in the case of some calamity like sickness, who was not in comfortable circumstances."

"I venture to say," Mr. Walker continued further on, "that in one year there will be very few willing to work and unable to do so. I think there are not so many men looking for work in this August, 1878, as in any August from 1840 to 1850."

[The Textile Manufacturer.]

Marvelous Inventions in America.

SIR: "John Bull" will, no doubt, be pleased to learn that there is supposed to be in existence a far greater invention than the Clements card attachment. I will, therefore, endeavor to give him a short history of this wonderful machine.

Some two or three years ago there was down in the State of Connecticut an antiquated specimen of a Dutch American, who had been hard at work for some time on this to be wonderful contrivance. No one seemed to divine its object, but finally a Yankee, more curious than the rest, accosted the inventor one day in this wise: "I say, friend, that is a mighty kind of a curious machine you are building up. I guess and calculate from its appearance it must be destined to produce wonderful things. Now, friend, just tell me what it is for?" The directness of the question caused the inventor to put down his hammer and chisel. He lifted his spectacles on to his forehead, and looking at the inquiring Yankee for a few moments replied, "Ha! yes, sir, this is to be one mighty machine. I have no time to tell you all it is designed for, but among other things it is intended for the production of sausages and scrubbing brushes." The inventor then pointed out two set screws and a peculiar hopper, explaining that by the combination of that peculiar hopper and the two set screws, sausages or scrubbing brushes could be produced at will by simply driving live pigs into the hopper, its capacity being only limited by the number of pigs operated upon.

Now, it is just possible that this machine, besides sausages and scrubbing brushes, is intended to produce checks, gingham, etc., by feeding cotton seed; all wools thoroughly shrunk by feeding turnips and grass; silks and satins of every description by feeding silkworms, caterpillars, or mulberry leaves; and finally to produce power to turn itself, the bottled sunshine in coal will not be required; but merely a casual glance from the glorious sun which rules our system.

If all the above should be realized the pride of "John Bull" at the smartness of his American brother will be great indeed; but pride leaves little cash, and riding on a horse's tail is not very edifying.

Now, sir, I have had long experience on both sides of the Atlantic, and have concluded there is just as much smartness in the English workman as there is in the States; for are not English workmen sought after in America in preference to other nationalities? Why? Because he is generally a thoroughly good workman.

My impression is that in England the artisan is treated too much like a machine. Hence, England, with her vast wealth and ingenuity, begins to feel and fear outside competition. To win you must run. The British Isles ought to be the very hotbed of fostered ingenuity. It is all very well to provide free libraries, comfortable coffee houses, etc., for the artisan, but man is but man, in whatever stage we find him; he loves money, and if you desire to hold the lead in the race that is being run between nations, you must offer something more than libraries, coffee houses, etc., to your toiling artisan. Nothing is more conducive to follow the intellect than working without stimulation. What makes Americans, native or adopted, so full of restless ingenuity, and constantly on the look out for improvement? It is an efficient patent law—a law made to meet the position of the artisan.

The English artisan has ceased to compete in a race in which he can only win weekly wages. The sooner he is given a title to his birthright (the production of his brain) the better. Where is the justice of a cheap and long term of copyright to a party who can write fiction, very often trash, while the artisan, to secure his ideas, is taxed by an unjust and expensive patent law? The law as it stands I consider the cankerworm of British industries. Nine tenths of inventors spring from the practical workingmen; if so, why not make the patent law simple and cheap? Is it the true policy for a manufacturing nation like Great Britain to tax her toiling sons to such an extent that there is an accumulated surplus fund of £1,250,000 credited to the Patent Office Department? What do those figures mean? So much paid over and above the working expenses of that department. It seems to me simply preposterous for any Government to derive a revenue from a tax upon the inventive genius of the people.

England has held her position by the genius of such men as Watt, Crompton, and Westwood. Yes, and other nations

see it. Therefore America extends the utmost facilities to her inventors to secure their rights. Certainly this facility has caused numberless useless patents to be taken out; but what of that if it has fostered good ones?

Can "John Bull" wonder if a workman who earns, say, 32s. a week, should keep his ideas to himself? I say, give your artisans the same chance as they get in America, and you will find them holding their own. Yes! even in the production of card machine attachments, Dutch-American sausage and scrubbing brush machines, or for anything else.

I am, sir, yours truly,
BROTHER JONATHAN.
Manchester, June, 1878.

A NEW CAMERA LUCIDA.

The various kinds of camera lucida hitherto used have always possessed many inconveniences, none of them allowing to be seen upon the paper with sufficient precision, and simultaneously, the image of the object and the point of the pencil. For the purpose of remedying this inconvenience, Dr. J. G. Hofmann, of the Rue Bertrand, Paris, has had recourse to an arrangement by which he believes he has obtained the most satisfactory results. The illustration, which we take from *Nature*, will give some idea of this arrangement.

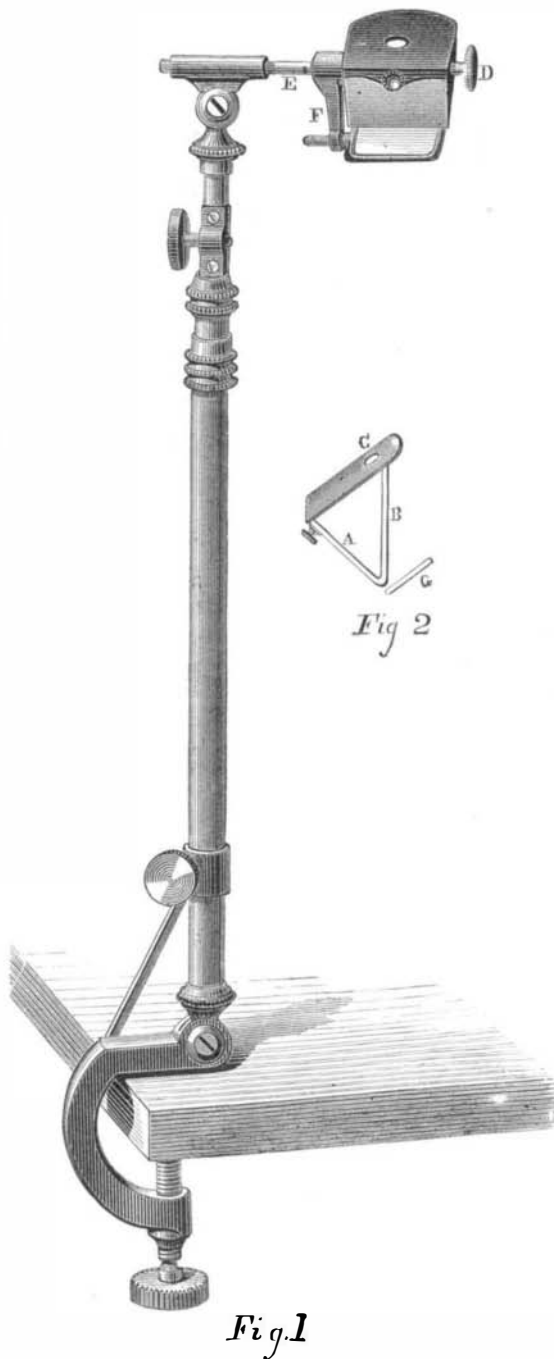


Fig. 1 represents the general elevation, in half size, of Hofmann's camera lucida. Fig. 2 is a transverse section of the optical part, composed, at A, of a metallized mirror, or other metallic surface, polished and rigorously plane; at B, of a small plane mirror of parallel glass, forming, with the metallized mirror, a fixed angle. The function of the latter is to let pass a part of the luminous rays coming from the object to be drawn, and to show at the same time the point of the pencil alongside the image upon the paper. At G may be placed, in a movable frame, either a plate with parallel surfaces, or lenses of neutral glass of various foci, the principal object of which is to enable a satisfactory drawing to be made of the objects placed inside, when using white paper; for the outside, this glass serves to temper the brightness of the sun.

At C is the eye-hole or opening before which the eye is placed. The knob, D, serves to place the chamber in a convenient position, which sometimes depends on that of the artist with respect to the object, but generally it is convenient to place the mirror, D, vertically. With the same pieces of the optical part, with the addition of a concentrating lens, Dr. Hofmann has been able to construct a second model applicable to microscopes, for which, as well as for telescopes, all previous forms of camera have given only very mediocre results.

NOTES OF PATENT LAW.

DECISIONS OF THE COURTS.

In *Herring vs. Gas Consumers' Association*, the complainant alleged that he was the owner of an undivided two-thirds interest in the patent described, and that the defendant was the owner of the other undivided one-third interest; that the defendant was using a device which was an infringement upon their common patent, and that he was so doing under cover of their common patent. The complainant claimed damages for said infringement; not for the entire amount, but for his proportion, to wit, two thirds.

The defendant demurred to the bill of complaint, on the ground that, being a joint owner of the patent, he could not be treated as an infringer. The direct question thus presented was whether an infringer of a patent could escape liability for his infringement on account of being a joint owner of the original patent so infringed. Now it is evident that if a stranger was guilty of the infringement he could be compelled to respond in damages; but could a part owner infringe the common patent and escape all liability? If so, then, however small his aliquot part, he could make the enjoyment of the patent valueless to his joint owners. He has, by virtue of the joint ownership, a right to use the patent, but he has no right more than a stranger to infringe the same.

The court, therefore, looking at the question from this standpoint, overrules the demurrer, holding that the infringer could not escape the consequences of his own wrong to the other joint owners of the patent, by averring that he was by his infringement injuring not the other joint owners alone, but himself also. In other words, he could not, under cover of his interest in the common patent, shield every wrong doer who might infringe the patent. He would, by so infringing, become liable to the other part owners for the wrong done, and the amount of the recovery would be proportionate to their respective interests.

TRADE MARK CASES.—DECISIONS OF THE PATENT OFFICE.

The Commissioner of Patents has affirmed the action of the Examiner of Trade Marks in refusing to Rader & Co. the registration of a trade mark for drain and water pipes, consisting of the word symbol "iron stone" in connection with an oval figure. No trade mark for the words "iron stone" could be granted, as it has been repeatedly decided that a generic name, or a name simply descriptive of an article of trade, of its qualities, ingredients, or characteristics, could not be entitled to protection as a trade mark. But the question in the present case was, whether such words, when associated with the oval figure exhibited by the applicants, would constitute a registrable trade mark. Simple circles, ellipses, scrolls, borders, and the like, marked in plain outline, are commonly employed in business as inclosures for trade or descriptive names, and for terms designating quality, place of manufacture, and other information appropriate to particular classes of goods. The outline figure in such case serves more to direct the eye to the lettering or symbols they inclose than to suggest of themselves or by association any idea of individual origin or ownership. While it is true that plain outlines, such as the lozenge figure, etc., have been registered, yet such registration has only occurred in those cases where the characters inclosed were proper trade marks of themselves. The applicants not being able to bring themselves under such cases, their application was refused, the Commissioner holding that a proposed trade mark in which words descriptive of quality, characteristics, etc., were inclosed in a simple outline border—as was the case with the application under consideration—was not sufficiently distinctive from the descriptive-words used alone to entitle the mark to registration.

An Economical Locomotive.

A new anthracite coal burning locomotive has lately been tried on the Old Colony (Mass.) Railway with very promising results. It is said that it is constructed with a largely increased fire surface in order to remove the difficulties arising from the consumption of coal in the ordinary locomotive. Rating the consumption of fuel in the ordinary locomotive at forty to fifty pounds per hour per square foot of grate surface, in this engine when doing its hardest work the consumption is said to be only sixteen pounds per hour. The fire box is behind and on a line with, instead of under, the boiler, and while in the common locomotive the dimensions are 60 and 66 by 32 inches, the new design is 8 feet 6 inches long by 7 feet 6½ inches wide. The heating surface of the fire box is 103 square feet; of the combustion chamber, 26 feet. The grate rest is between water bars, which prevent them from burning out, and the area is 64 feet. The diameter of the six driving wheels is 54 inches, and above them are placed the boiler and fire box. The cab is over the rear end of the boiler, while on top of the fire box are seats, protected from the sun by an awning. The weight of the engine is 86,150. At the front end of the boiler is a revolving register, which, when open, has an area of six hundred square inches. On account of the free steaming qualities of the engine, it becomes necessary to open this register in order that the steam may pass directly to the stack without passing through the fire. The fuel used by this engine can be delivered in Boston at \$2.25 per ton, or \$1.50 less than the cost of fuel which is now used. As the fuel remains perfectly quiet in the fire box, the consumption is slow, and although the engine has no spark arrester, not a spark escapes from the stack; neither is there any annoyance from smoke and gas, which are consumed.