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Paint for Floors.

A paint for floors, which economizes the use of oil colors and varnish, is described in the German technical press as having been composed by Herr Mareck. It is remarked that this paint can also be used on wood, stone, etc. For flooring, the following mixture has been found applicable: 2⅛ ounces of good, clear joiner's glue is soaked over night in cold water. It is dissolved, and then is added (being constantly stirred) to thickish milk of lime heated to boiling point, and prepared from one pound quick lime. Into boiling lime is poured (the stirring being continued) as much linseed oil as becomes united by means of saponification with the lime, and when the oil no longer mixes here is no more poured in.

If there happens to be too much oil added, it must be combined by the addition of some fresh lime paste. For the quantity of lime previously indicated, about half a pound of oil is required. After this white, thickish foundation paint has cooled, a color is added which is not affected by lime, and in case of need the paint is diluted with water, or by the addition of a mixture of lime water with some linseed oil. For yellowish-brown or brownish-red shades about a fourth part of the entire bulk is added of a brown solution obtained by boiling shellac and borax with water. This mixture is specially adapted for painting floors. The paint should be applied uniformly, and is described as covering the floor most effectually, and uniting with it in a durable manner. But it is remarked that it is not suitable for being used in cases where a room is in constant use, as under such circumstances it would probably have to be renewed in some places every three months. The most durable floor paint is said to be that composed of linseed oil varnish, which only requires to be renewed every six or twelve months. It penetrates into the wood and makes it water resisting; its properties being thus of a nature to compensate for its higher cost in proportion to other compositions used for a similar purpose. Its use is particularly recommended in schools and workrooms, as it lessens dust and facilitates the cleaning of the boards.—*The Builder.*

FRANCIS LANA, in 1670, proposed a boat raised by four hollow copper balls, exhausted of air, for navigating the air.

A Good Old Miller.

A New Jersey miller, who had become old and rheumatic, one day called his sons about him, and said: "Boys, I am growing stiff in the knees and faint at heart. My liver is out of order, and I can no longer distinguish between a peck and a half bushel when taking toll. This mill is worth ten thousand dollars. In order to form a stock company, and render my own burdens the lighter, I shall give Reuben two-tenths, Samuel the same, and Henry, who is my first-born, three-tenths. Bless you, my children, bless you. You may now go fishing for half a day." The three sons took the papers which the old man had made out, and instead of going fishing, they went down to a lawyer's office, called a meeting of stockholders, and proceeded to business. The first-born was elected president, Reuben treasurer, and Samuel secretary, and the following resolution was passed: "*Resolved*, That we bounce the old man, and run the mill after our own ideas!"

The above, from the *Millers' Review* (Philadelphia), illustrates substantially the experience of a good many indulgent, confiding fathers. Some that read this will be reminded of like cases that have come under their own notice.—ED.

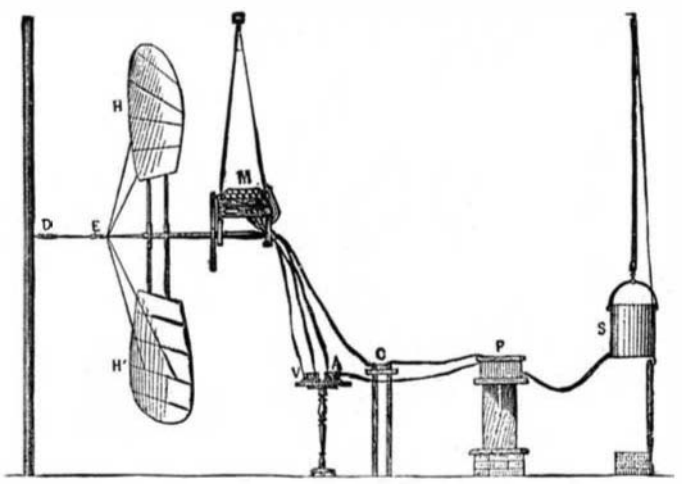

Fig. 1.—APPARATUS FOR EXPERIMENTS OF M. TISSANDIER.

PROPULSION OF BALLOONS BY ELECTRICITY.

Attracted by the difficulties of the problem, M. Gaston Tissandier, of Paris, has undertaken to solve it, taking advantage of the recent progress of science. The interest and the novelty of these experiments consist chiefly in the choice of the motive power destined to actuate the propeller. These electrical motors have the following advantages for aerial navigation: Absence of fire, constancy of weight, and incomparable facility for putting in motion and arresting the mechanism. The lightness of the motor was obtained by the aid of a Siemens machine of special construction, and that of the source of electricity by the aid of bichromate of potash batteries.

The Motor (Fig. 2).—The motor is a Siemens continuous current dynamo, of a new design, constructed from the plans of M. George Boistel, Engineer of the Maison Siemens of Paris. It is characterized by the lightness of its component parts and the very elongated form of the armature, which has the effect of diminishing the relative value of the resistance of the wires which pass over each end of the drum. The position of the brushes is variable, and the inductors are included in the general circuit. The armature transmits its motion to the screw by means of a pinion and wheel; the relation of the velocities is as 1 to 10; therefore, when the motor makes 1,200 revolutions the screw makes 120. Experiments made upon this machine at different velocities and with various current intensities showed that the machine can furnish as much as 100 kilogrammeters per second (1½ horse power), measured at the brake, with a current of 45 amperes and a difference of potential of 40 volts at the terminals. Under these conditions a very simple calculation shows that the machine only transforms into work about 55 per cent of the electrical energy which is actually supplied to it. The lowness of this return is due to several causes, and a remedy has been devised, so that the return may easily attain 70 to 75 per cent, which is very satisfactory when we have to deal with an effective return resulting from *direct measurements* and not theoretical considerations, whose accuracy is often more than disputable.

The mode of measurement adopted consisted of measuring

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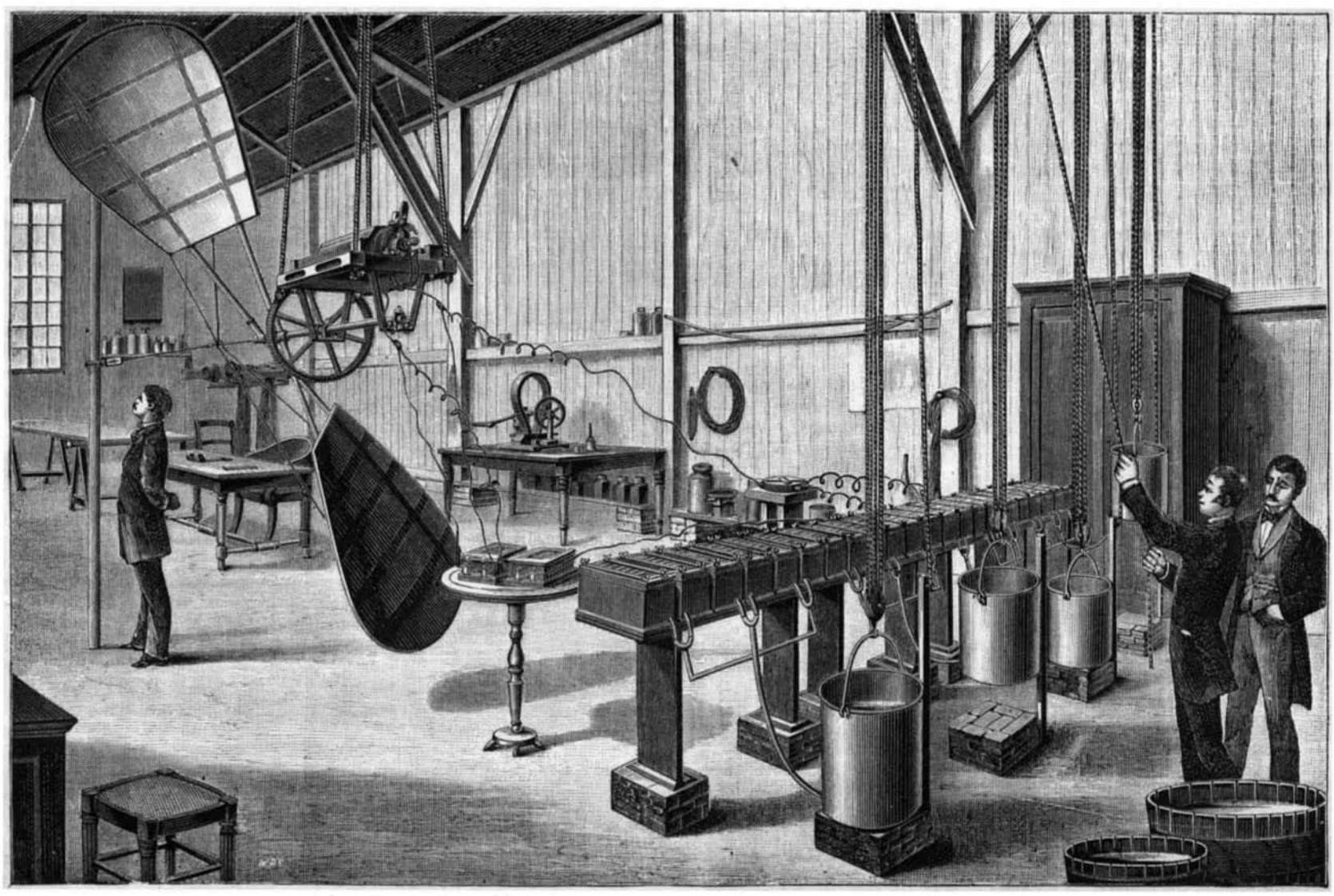


EXPERIMENTAL APPLICATIONS OF ELECTRICITY FOR BALLOON PROPULSION.

PROPULSION OF BALLOONS BY ELECTRICITY.

(*Continued from first page.*)

the electrical energy supplied to the machine by the formula—

$$W = \frac{E\,I}{9{\cdot}81}$$

(W representing the work in kilogrammeters; E, the difference of potential at the terminals of the machine in volts; I, the intensity of the current in amperes) and in the determination of the mechanical work produced by the motor by making it absorb this work by the dynamometrical balance of M. Raffard. The electrical energy was measured by the aid of an ampere meter and a volt meter of M. Marcel Deprez.

Comparative measurements made by means of the volt and ampere meters of Messrs. Ayrton and Perry, constructed and graduated in England, gave results which agree perfectly with those given by the apparatus of M. Deprez, constructed in France by the Maison Breguet.

The experiments showed that, when the machine works with a current of 45 amperes and 40 volts at the terminals, *thirty per cent* of the total energy supplied was absorbed for the maintenance of the magnetic field in the inductors. By exciting the inductors separately it was found that 32 amperes sufficed to saturate them. There was therefore a real *waste* of energy for the production of the magnetic field, which was diminished by omitting one layer of wire on the inductors. This modification allowed of working under the same conditions of work and velocity with fewer elements, and consequently with a better return.

The Source of Electricity.—M. Tissandier thought, in his first experiments, of using electrical accumulators, but this source presents, at least for this particular application, the inconvenience of not discharging itself rapidly enough—that is to say, of only furnishing a weak delivery. It is necessary, in fact, that in a period varying between two and three hours, the source of electricity should furnish all of which it is capable, and from this point of view accumulators are found inferior to bichromate batteries. After a minute investigation, and a long series of experiments upon the nature of the liquid, the form and nature of the cells, the size and thickness of the plates of zinc and carbon, their number, etc., M. Tissandier devised a type of bichromate batteries with concentrated liquid, which, with a weight of seven kilograms per element, can furnish a current of 50 amperes for two hours, the electromotive force being about two volts, and the internal resistance not exceeding 0·01 of an ohm. The elements established in the aerostatic laboratory of M. Tissandier at Point du Jour are 24 in number, and arranged in four series of six elements each (Fig. 3). We are indebted to *La Nature* for our engravings. The liquid required to fill each series is placed in a copper tank coated with lead communicating, by means of a ramified tube, with the ebonite boxes which serve for receptacles. By raising one of the tanks by the aid of small pulleys, we can fill the corresponding series, and put it in action immediately; on lowering it the liquid runs off, and the series is emptied.

A commutator varies the number of series which actuate the motor, and a volt and ampere meter show at every moment the electrical energy supplied. The machine is suspended to a longitudinal beam by cords; the screw is fixed upon the lower axis; the static effort exerted by the rotation of the screw is measured by the aid of a spring balance attached at one end to a fixed point, and at the other, by a thin metallic wire and a swivel, to the extremity of the revolving arbor of the screw. Precautions are taken that the center of gravity of the machine may remain always in the vertical plane passing through the points of suspension, in order that the horizontal component due to the inclination which it might take without these precautions may not influence the indications of the balance. In Fig. 1, S is a tank containing solution of bichromate of potash; P, batteries; C, commutator; A, ampere meter; V, volt meter; M, dynamo: H H', screw; E, swivel; D, balance.

The screw constructed from the plans of M. Tatin is 2·85 meters (9½ feet) in diameter, and has a pitch equal to its external diameter; it is formed of two blades made of silk varnished with gum lac, stretched upon a frame furnished with two spokes of pine, with laths of the same wood, and an axle box fixed upon these laths. With 12 elements in series the screw turns at the rate of 80 revolutions per minute and exerts upon the balance a pull of five kilograms; with 18 elements the speed is 120 revolutions and the pull seven kilograms; with 24 elements in series the speed of rotation reaches 150 revolutions and the pull nine kilograms.

It results from the experiments that the motor, without exceeding, with the generator, a total weight of three men, is capable of furnishing regularly during a period of three consecutive hours the work of 12 to 15 men, that is to say, 75 to 100 kilogrammeters. This motor only requires, for raising it in the air with two or three travelers, a balloon of the small capacity of about 900 cubic meters. An elongated balloon of about nine meters diameter in the center, and 27 meters length, constructed of silk, inflated with pure hydrogen, is amply sufficient. Under the action of the propeller such a balloon would have in calm air a velocity of about four meters per second, or 15 kilometers per hour in round numbers. Very often the speed of the wind in calm weather is below this figure; in this particular condition of the atmosphere, this balloon could deviate sensibly from the line of the wind, go backward or forward, and perhaps return to the place of its departure.

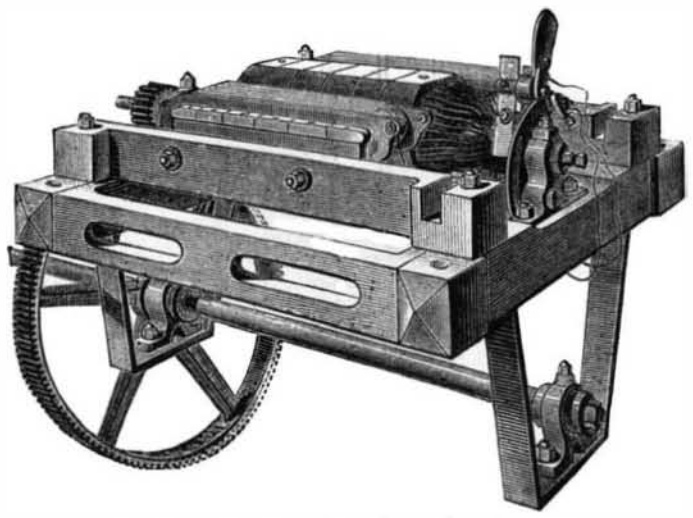
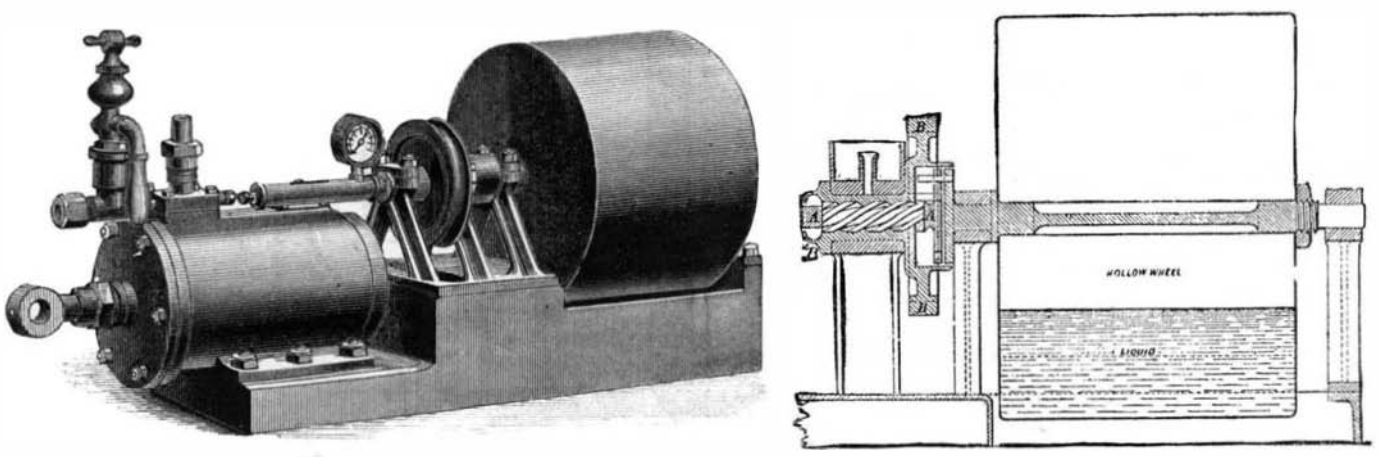


Fig. 2.—SIEMENS DYNAMO-ELECTRIC MACHINE.

M. Tissandier, satisfied with the results furnished by the batteries and motor, which present all the desired lightness (of course the system disposed under the balloon would be arranged quite differently to the battery in the experiments which we have just described), is busy with the construction of a pure hydrogen gas apparatus capable of furnishing 1,000 cubic meters in a few hours; he will then construct an elongated balloon to receive the screw and its electromotor.

THE ISOMETRIC GOVERNOR.

We annex engravings of a governor devised by Mr. Girdwood, and to which the name of isochronometer has been given. Its action, like that of some previous governors, is based upon the use of an appliance that offers a resistance to rotation that is a function of the speed, and increases with the velocity. This appliance consists in this case of a hollow drum or cylinder partly filled with fluid and rotating on a horizontal axis. When the cylinder is put in motion, the liquid is carried up one side to a height that is determined by the speed, and, if the motion be uniform, it will remain at that point, and will offer a resistance to the rotation which increases in proportion to the lateral displacement of its center of gravity. Should the speed increase, the liquid will be raised still higher, its center of gravity will be carried further to one side, and it will offer an increased resistance. These varying resistances are balanced by a spring which responds to them by contracting and expanding, and in so doing gives the motion for operating the governing mechanism. As will be seen from the illustrations, which we find in *Engineering*, the cylinder spindle ends in a crank disk provided with a driving pin, which engages with a similar disk at the end of a screwed or rifle spindle, A. This spindle fits in a corresponding nut formed in the boss of a driving pulley or wheel, B, and abuts at its other end against a spring arranged in a case, and provided with an index and scale. When the wheel, B, is turned, its first tendency is to force the screw, A, endwise to the left, compressing the spring, but the moment that the latter opposes a sensible resistance to its motion, the screw begins to rotate with the wheel and to carry the hollow cylinder round with it. As the speed increases, the resistance of the wheel likewise increases, and the spring is more strongly compressed, there being a certain definite pressure upon it for every velocity. A rod connected to the spring is attached to the slide valve of a small steam cylinder, the piston of which works the throttle valve of the engine that is to be regulated. The valve is designed so that an extremely small motion opens the cylinder either to the steam or the exhaust, and thus comparatively minute changes of engine speed are sufficient to cut off the steam.



THE ISOMETRIC GOVERNOR.

The Inventor.

Now we do not for a moment expect to revolutionize the world, or to be successful in eliminating selfishness from the catalogue of shortcomings which afflict the human race, says the *Manufacturers' Gazette*, but we do desire to put in a plea for the inventor, the man of genius, the man to whom we are so largely indebted for the great progress made in nearly every department of human affairs, and to urge a more liberal and generous recognition of his merits. It is no new or uncommon thing for some men to ride to fortune on the brains and genius of others, and, where the arrangement is mutual, we do not object; but when, in good faith, the man who has given ceaseless study and thought to perfect and make practical an idea which will simplify some process, increase the quantity and improve the quality of some article of manufacture, unites his fortunes with the man or men of means in order to bring such improvement before the public, and is mercilessly "swallowed up," "bought off" with a pittance, or "cleaned out" by false representations, it is time at least to enter a protest and to ask men to apply the golden rule in these cases.

We are not quite sure but that most of the blame belongs to the inventor himself, for if a man possesses the genius and brains to do something that no other man has done, solving problems which start the world ahead a point, and thus becomes a benefactor, he has no excuse for being swindled with his eyes open, save the excuse of poverty, and even then, if his invention bears unmistakable evidence of merit, poverty need not be a stumbling block, for good goods always sell at a fair market price, and there are always purchasers. There are tempting allurements certainly, and it is not infrequently the case that to a poor inventor a dollar (and much more so a hundred or a thousand) looks as "big as a cart wheel," and throws him unsuspectingly off his guard, and before he knows it he is "gone." Don't be too quick or anxious to give up a good thing for a song, and thus have cause to repent at leisure. We earnestly hope, adds the *Gazette*, for a reform in this matter, that this class of benefactors may have their just deserts.

Lime Juice in the Treatment of Diphtheria.

M. Czartoryski, M.D, of Stockton, California, writes as follows to the London *Lancet:*

During a prolonged residence in the interior of China, I became acquainted with the fact that the Chinese place great reliance during epidemics of diphtheria on the internal use of the fresh juice of limes, and of the fruit itself, which they consume in enormous quantities, in every conceivable form—as lemonade, with native spirits, cut in slices, etc.—during attacks of this dreadful disease, with apparently most successful results, it hardly ever failing to effect a cure. The Chinese consider it a specific, and will, in case of need, do anything to obtain a supply.

Since I have come back to California, as also in Louisiana, I have used limes and their juices in my practice as a physician with most successful results in cases of diphtheria, even in the most desperate cases. As soon as I take charge of a case of diphtheria, I order limes to be administered as freely as possible, in any manner the patient can be prevailed upon to take them, especially in the form of hot lemonade, sweetened with white sugar or honey, or cut in slices with powdered white sugar. Besides lime juice (which I suppose acts by imparting an excess of oxygen to the circulation, and thereby prevents formation of vibriones, etc., and so has almost a specific effect on disease), I prescribe whatever drug may be indicated to relieve symptoms as they develop, and impart strength by appropriate stimulants and nourishment.

RECENT tests of yarn made from different hemps gives the following relative strengths: Manila, 245; Italian, 221; New Zealand, 143; Russian, 128. Manila is evidently the yarn to be hanged with.