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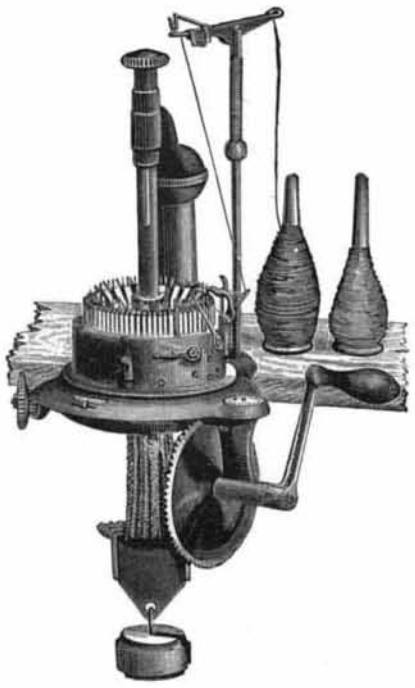
THE TUTTLE FAMILY KNITTER.

We present herewith three illustrations of the new Tuttle family knitting machine which embodies many valuable improvements, which consist mainly in its method and devices for knitting the hand rib stitch, in connection with plain and fancy stitches.

Fig. 1.



The machine as shown in the illustrations is similar to any circular knitter, having one perpendicular needle cylinder, used as a base, into which is introduced a conical needle cylinder held in position, so that by the rotation of the perpendicular cylinder, the needles in the cone cylinder are made to cross these in the straight cylinder while both are knitting, thereby producing a hand-rib stitch. This cone cylinder, when introduced into the perpendicular cylinder, is supplied with needles (being self-operating) taken from the perpendicular cylinder without removing the stitch from the same, thus turning the outside stitch which was knit on the perpendicular cylinder on to the inside of the work, precisely as in hand knitting. The inside or conical cylinder is so arranged that no more rib stitches are made than are desired; for instance, if it is required to knit just a few rib or seam stitches on the instep of the stocking, this can be done and the machine immediately changed back to plain work at the will of the operator.

The usual mode of knitting rib top hosiery on this machine is to remove every other needle (or as many as desired) from the outside or perpendicular cylinder and place them in the conical cylinder and knit as far as may be required for the top of the stocking, and then change or return the needles from the conical to the perpendicular cylinder swing, the cone out of work and go on with the plain stitch for the leg. When the ankle or instep is reached the conical cylinder may be returned to work and the ribbing performed, either upon one side or all the way round at pleasure. It will be readily seen that the ribbing may be continued all the way down the leg or foot. Very unique and fanciful styles can be produced in this method of ribbing by alternating the plain and rib stitches. Mittens can be made with rib on the back of the hand and plain in the palm of the hand, and *vice versa.*

Fig. 3.

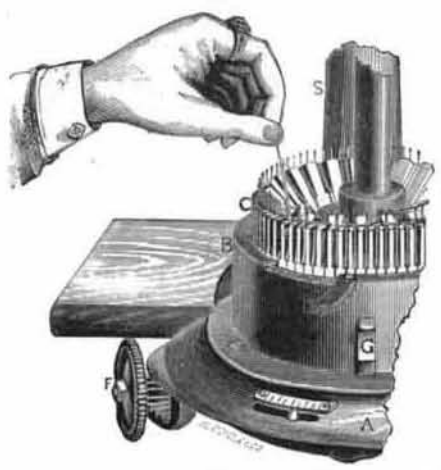
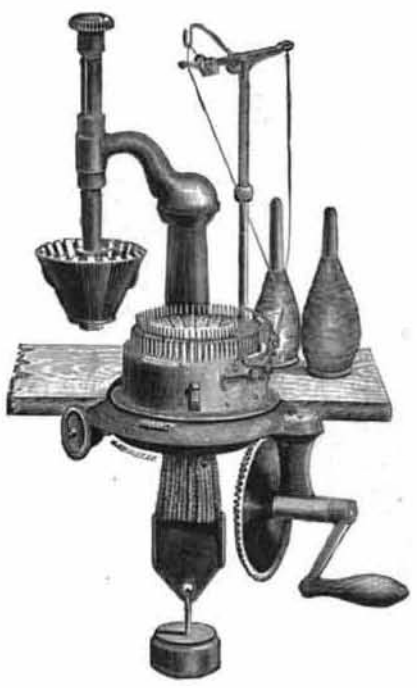


Fig. 2.



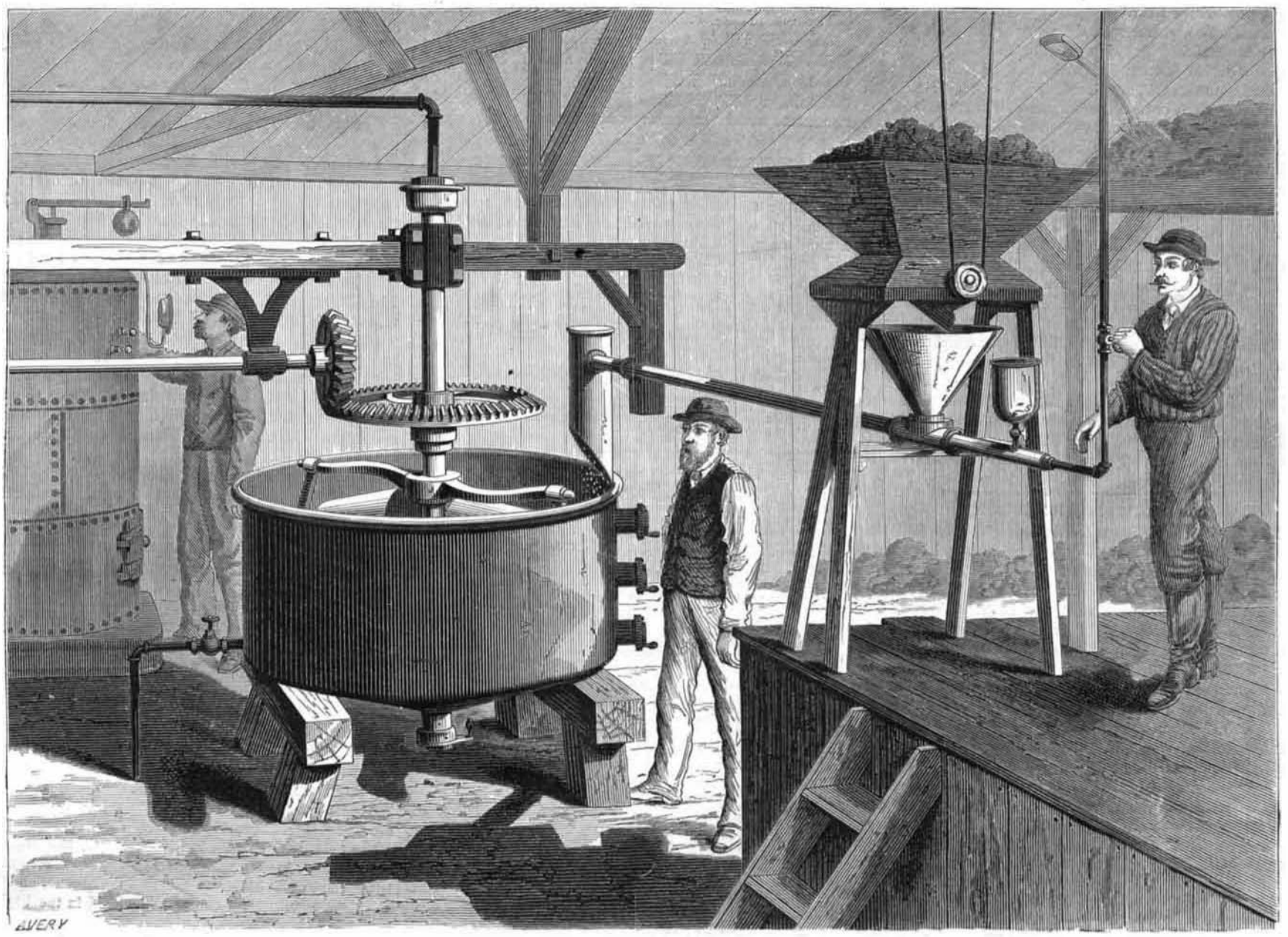
This machine has a compound motion and can be run either way, backwards orforwards. Thus the work may stand still while the cylinders revolve, or the work revolve while the cylinders stand still. Each machine is provided with a register which accurately counts every full revolution of the machine whether turned either way.

Fig. 1 shows the conical cylinder or ribber at work, Fig. 2 the ribber when thrown out of work, and Fig. 3 exhibits the operation of transferring a needle from one cylinder to another. The machine is adapted to the manufacture of all kinds of hosiery and for family use.

Patented April 14, 1874. For further information address the Lamb Knitting Machine Company, Chicopee Falls, Mass.

THE FORSTER-FIRMIN AMALGAMATOR AND ORE WASHER.

The magnitude of the mining interests in this country and the difficulties of treating ores containing the precious metals have resulted in many attempts to produce a machine or



THE FORSTER-FIRMIN AMALGAMATOR AND ORE WASHER.

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system that will shorten the process of extracting the metals and reduce the cost, so as to enable poor ores, which are so abundant, to be worked at a profit. Millions of tons of the material are technically known as "tailings" (that is, ores from which has been taken all the gold and silver that, by present processes, can be profitably extracted, but which still contain an appreciable quantity of the precious metals) exist in all the auriferous districts. For the treatment of these ores various methods have been suggested. The principal difficulty that has been encountered is that of bringing mercury into contact with the gold where the latter exists in only small quantities, or from the flouring of the mercury when vapors of mercury are employed, entailing loss of amalgam and mercury in the subsequent treatment.

Messrs. Forster and Firmin, of Norristown, Pennsylvania, have recently devised a novel method of treating ores with mercury, for which letters patent have been granted them in the United States, Canada, Australia, and other countries. The pulverized ore containing free gold or silver is fed from the hopper, shown in the illustrations, with a horizontal tube, A, Fig. 2. While in the act of falling it is impinged

Fig. 2.

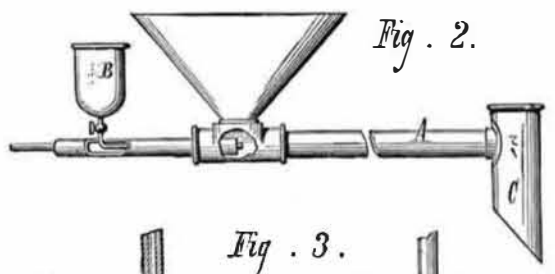
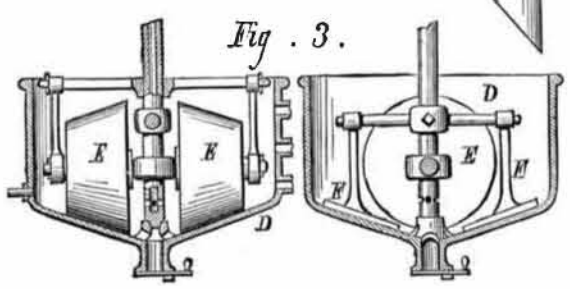


Fig. 3.



upon by a stream of mercury, which escapes from the receptacle, B, through the inner pipe shown. The flow is broken up and carried forward by steam or air pressure, after the manner of the well known principle of the sand blast. The horizontal tube connects with a vertical tube, C, upon which the ore and the atomized mercury are together forcibly projected, grain by grain, in a continuous stream, and fall, by their own gravity, into the washer or receiver, D. It is claimed that an almost unlimited quantity of ore may be treated by this process, as the attendants have only to feed the hoppers and remove the deposit. The inventors state that "with only a three inch tube from three to five tons of ore can be treated per hour."

In connection with this amalgamator an improved washer, shown in detail in Fig. 3, is used. This consists of a vessel, having a conical bottom, in which rollers, E, and also with scrapers or mullers, F, are placed. The feed water is injected through the shaft or near the bottom of the vessel, and the upward current carries off the waste ore, while the amalgam and surplus mercury collect in the dead water space in the conical bottom, whence they are drawn off through the discharge cock.

The advantages claimed for this invention are: 1st. The rapid continuous process of amalgamating, thus treating very large quantities of ore. 2d. The thorough impregnation of the metals with the mercury, giving larger results. 3d. The profitable working of poor ores or tailings, which are now valueless. 4th. The simplicity of the apparatus, having no parts to get out of repair. 5th. The cheapness and portability of the apparatus, and the ease and economy with which it can be operated wherever there is a steam boiler.

In the improved washer the amalgam and mercury are recovered rapidly with a comparatively small flow of water, without the danger of carrying off a portion of either the amalgam or mercury. For further information, address the inventors as above.

CONSTRUCTING ICE HOUSES.

People who do not own ice houses generally find that before the summer is over, they have paid a very high figure for their ice and that the sum so expended would have gone far toward the construction of a suitable storage building. Ice can be gathered near almost any country place, and it can easily be moulded into blocks even if obtained only in the form of a thin layer. The question is how to build a good ice house that will preserve it, and on this point there has been much discussion. Mr. R. G. Hatfield, one of the most prominent architects of this city, points out the best, cheapest and simplest way in SCIENTIFIC AMERICAN SUPPLEMENTS Nos. 55 and 59. There he gives working drawings of an admirable ice house which he has constructed and which has been found to answer its purpose in every particular. If the reader retained an architect to prepare a similar plan the cost would probably be at least fifty dollars; in the SUPPLEMENT, plans, specifications, and descriptions of all the details are given for but twenty cents.

AN OLD SUBSCRIBER.—An esteemed correspondent writes: "I have taken the SCIENTIFIC AMERICAN ever since its first number. I was then under 20 years of age; I am now over 50 years."

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VOL. XXXVII., No. 25. [NEW SERIES.] *Thirty-second Year.*

NEW YORK, SATURDAY, DECEMBER 22, 1877.

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(Illustrated articles are marked with an asterisk.)

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THE SCIENTIFIC AMERICAN SUPPLEMENT
No. 108,
For the Week ending December 22, 1877.

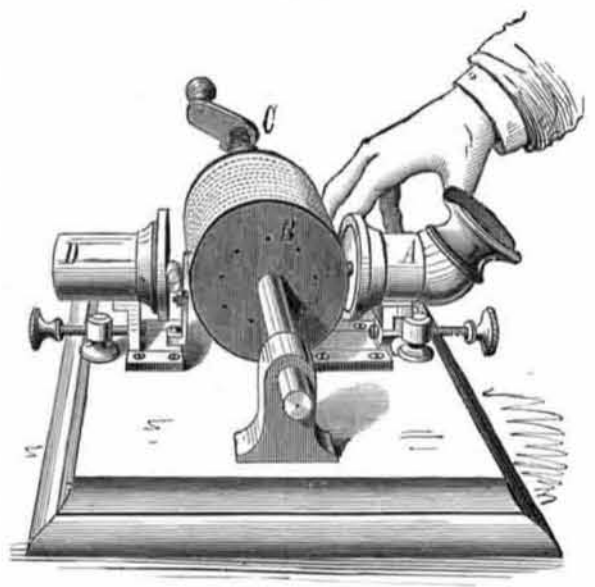
Price 10 cents. To be had at this office and of all newsdealers.

THE TALKING PHONOGRAPH.

Mr. Thomas A. Edison recently came into this office, placed a little machine on our desk, turned a crank, and the machine inquired as to our health, asked how we liked the phonograph, informed us that *it* was very well, and bid us a cordial good night. These remarks were not only perfectly audible to ourselves, but to a dozen or more persons gathered around, and they were produced by the aid of no other mechanism than the simple little contrivance explained and illustrated below.

The principle on which the machine operates we recently explained quite fully in announcing the discovery. There is, first, a mouth piece, A, Fig. 1, across the inner orifice of which is a metal diaphragm, and to the center of this diaphragm is attached a point, also of metal. B is a brass cylinder supported on a shaft which is screw-threaded and turns in a nut for a bearing, so that when the cylinder is caused to revolve by the crank, C, it also has a horizontal travel in front of the mouthpiece, A. It will be clear that the point

Fig. 1.

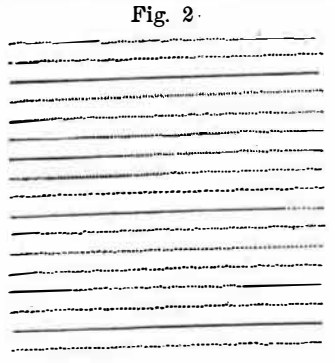


on the metal diaphragm must, therefore, describe a spiral trace over the surface of the cylinder. On the latter is cut a spiral groove of like pitch to that on the shaft, and around the cylinder is attached a strip of tinfoil. When sounds are uttered in the mouthpiece, A, the diaphragm is caused to vibrate and the point thereon is caused to make contacts with the tinfoil at the portion where the latter crosses the spiral groove. Hence, the foil, not being there backed by the solid metal of the cylinder, becomes indented, and these indentations are necessarily an exact record of the sounds which produced them.

It might be said that at this point the machine has already become a complete phonograph or sound writer, but it yet remains to translate the remarks made. It should be remembered that the Marey and Rosapelly, the Scott, or the Barlow apparatus, which we recently described, proceed no further than this. Each has its own system of caligraphy, and after it has inscribed its peculiar sinuous lines it is still necessary to decipher them. Perhaps the best device of this kind ever contrived was the preparation of the human ear made by Dr. Clarence J. Blake, of Boston, for Professor Bell, the inventor of the telephone. This was simply the ear from an actual subject, suitably mounted and having attached to its drum a straw, which made traces on a blackened rotating cylinder. The difference in the traces of the sounds uttered in the ear was very clearly shown. Now there is no doubt that by practice, and the aid of a magnifier, it would be possible to read phonetically Mr. Edison's record of dots and dashes, but he saves us that trouble by literally making it read itself. The distinction is the same as if, instead of perusing a book ourselves, we drop it into a machine, set the latter in motion, and behold! the voice of the author is heard repeating his own composition.

The reading mechanism is nothing but another diaphragm held in the tube, D, on the opposite side of the machine, and a point of metal which is held against the tinfoil on the cylinder by a delicate spring. It makes no difference as to the vibrations produced, whether a nail moves over a file or a file moves over a nail, and in the present instance it is the file or indented foil strip which moves, and the metal point is caused to vibrate as it is affected by the passage of the indentations. The vibrations, however, of this point must be precisely the same as those of the other point which made the indentations, and these vibrations, transmitted to a second membrane, must cause the latter to vibrate similar to the first membrane, and the result is a synthesis of the sounds which, in the beginning, we saw, as it were, analyzed.

Fig. 2.



In order to exhibit to the reader the writing of the ma-

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