have taken the premiums at all the shows, and were soon known and appreciated over the whole civilized world. At the present time improved machines, together with a few original patterns, are manufactured in England, France, Germany, and other countries, some of which are not surpassed by our own, being compact, cheap, and simple, and work rapidly and efficiently, If our manufacturers wish to contribute to the wants of the outer world in sewing machines, they must apply their energies and ingenuity to perfect their machines as some of them appear to be doing.

A good needlewoman with her needle makes from twenty-five to thirty stitches per minute, while a modern sewing machine will make one thousand ; and yet we cannot call this last a *labor-saving* machine, so far as regards the operator on it. As compared with sewing by hand, the sewing with the machine is a really very laborious and fatiguing occupation.

A general law of mechanics is that whatever we gain in speed must be compensated by increase in power. For every extra stitch over the twenty-five or thirty mentioned above, a greater effort will be needed from the operator, until she may occasionally be taxed to her very utmost.

Increased power in this case is increased muscular action ; muscular action needs fuel for combustion in the human machine ; fuel for combustion means increased expense for daily food, a strain on the digestive organs, or a certain and dangerous physical waste of the individual. Our stage and street car horses are changed several times a day, but sewing girls at their machines are expected to work for ten or twelve consecutive hours with intermittent but continually repeated motions of the muscles of the lower limbs. Persons express surprise, if the remark be made that the poor operator is actually wearing herself out, and this much more rapidly than the slight movements she is making would seem to indicate.

We have before us a very interesting report, addressed to the "Société Médicale des Hopitaux," in 1866, by Doctor Guibout, on the sanitary condition of the many sewing machine operators which came under his personal notice in the public hospitals of Paris. Hollow cheeks, pale and discolored faces, arched backs, epigastric pains, predisposition to lung disease, and other special symptoms too numerous to be specified, were found to be the general characteristics of all the patients.

In the public houses of correction, where the female prisoners are obliged to work at sewing machines, in order to contribute toward diminishing the public cost of their detention, it has been found indispensable to issue to them supplementary rations overthe usual diet of the establishments in order to keep them in good health.

These disastrous effects must eventually tend toward the deterioration of our race, and deserve, in a humanitarian point of view, the most serious consideration of all friends of mankind.

The way to remedy these evils is simple enough, viz., to make the sewing machine an automotor. In large establishments, where numbers of them are in daily use, steam has been applied with success, simple contrivances allowing them to be stopped or their speed to be increased at the will of the operator. Steam, however, is unavailable in private dwellings ; and here we meet with a need which American inventors ought long ago to have fully and satisfactorily supplied, that of a "family" automatic machine.

The only really practical device of the kind with which we are acquainted (and this leaves much to be desired), is the electro-magnetic automotor invented in France by H. Cazal, which occupies so little space that it may be hidden under a foot stood. The fact that the cost of combustion of zinc is thirty times higher than if the power had been obtained by the combustion of coal, is to a certain extent compensated by the advantages of absence of boiler, fires, smoke,smell,or dust. Four of Bu sen's elements are sufficient for driving an ordinary sewing machine at a cost of fifteen or sixteen cents per day.

The apparatus itself consists in an iron pulley with an externally toothed rim, which revolves freely within a metallic ring, toothed similarly to the pulley, but on its internal surface, so that the points of the teeth of the pulley, face and approximate to those of the outer circle. An insulated wire runs over the pulley, which thus becomes a magnet whenever an electrical current is run through it, and ceases to be so from the very instant that the current is interrupted.

While the current from the battery is active, each of the teeth of the pulley attracts its opposite on the rim, and if the current were to remain constant, each of these would remain *in situ* and no motion would be imparted to the wheel;to avoid this, a commutator, which is set in motion by the motor itself, regulates the passage of the electrical current through the wire and rendersit intermittent. As soon as the apexes of the teeth have placed themselves into opposition, the current ceases and the teeth on the pulley proceed onward, when a fresh current forces them into a second opposition with the next set on the rim, and so on indefinitely, producing a very satisfactory rotary motion. The power being symmetrically disposed around the axis and in each tooth, there is very little friction on the bearings and no noise produced. The speed can be varied at will, and the simple pressure on a knob or button causes instantaneous stoppage.

It is our conviction that electro-magnetic, or other smallmotors, fit for many domestic uses, could easily be devised, superior to even the simple machine of Cazal. We recommend this subject to the immediate attention of our mechanics and engineers. Should they succeed, they will have found not only a source of wealth for themselves, but they will have contributed their mite towards alleviating some of the thousand hidden miseries incident to our modern civilization, and will thus have acquired a right to the gratitude of their labor ng brothers and sisters.

SHAFTING, PULLEYS, AND BELTS.

Improperly hung shafting, unbalanced pulleys, and crooked and badly constructed belts absorb an amount of the power used for manufacturing purposes that would probably, if known, astonish the most observant. When it is considered that this power is costly—costly not only in the first means for its utilization, as in the construction of a dam, flume, wheel, etc., when natural water power is employed, but eminently costly when the source of power itself is an item of continual expense, as in the employment of steam—it will be conceded that the subject of saving the amount now wasted from imperfection in the means of its transmission, cannot be of merely slight interest. Too many of our shops and manufactories present a spectacle, anything but pleasant to the mechanical eye,in sprung shafting, cut boxes, inefficient belts, unbalanced pulleys, shafts of insufficient size, and a general lack of evidences of intelligent arrangement and proper management. Some, it is pleasant to say, are models in all these respects ; the manager allows no leaks to escape his observation ; from the source of the power to its ultimate delivery, every step and every means are carefully scanned and kept in perfect order. For such, any directions we may give, any advice we may offer, any suggestions we may make, are superfluous. We write the following for others.

Before selecting the iron for a shaft, or for several lines with their counters, the machinist or millwright should take into consideration the weight each section of shaft is to sustain in the size of pulleys and strain of belts, the distance between points of support (boxes), the velocity of the shaft, and the nature of the machinery it is to drive. In all cases the iron for shafting should be chosen for its homogeneousness and perfection of rolling, seen by the finish of its surface. Each section should be handled carefully in transportation. As it comes from the mill it is usually stra ght, or nearly so, but teamsters and dealers in iron bars seem to suppose that no more care is necessary in handling a bar calculated for shafting purposes than in treating so much scrap iron. Frequently the lengths come crooked, bent, and sprung, to the hand of the machinist ; they receive in transit no more consideration than the trunks of passengers on a railroad or steamboat at the hands of baggage smashers. It would be well for manufacturers of rolled iron for shafting, if they would follow the example of steel makers, or of Jones & Laughlins, manufacturers of cold rolled iron at Pittsburgh, Pa., and pack their bars in boxes. It would be well not only for them,but for the workman who is to convert these bars into shafts.

And here let us say a few words in favor of a most meritorious improvement, that just referred to, *en passant*, the cold rolled shafting. Its first cost is greater than that of the best refined iron ordinarily used for shafting, but it comes with a perfect finish, rolled to perfect size, without bend, kink, or spring, is ready at once to receive pulleys, and only requires centering and sufficient turning at the ends to give a shoulder for the couplings ; although if the coupling adapted for it and illustrated in No. 20, Vol. XVII, SCIENTIFIC AMERICAN, be used, the end turning may be dispensed with if not the centering.

But, passing from this style of nearly perfect shafting, let us look at the processes to be employed to produce proper sections where they must be turned. The first process is the straightening. To begin at the beginning, the shaft should be centered at the ends. It is evident this center must be found by the circumference. If the shaft is bent or straight, in either case the center should found and drilled, before any attempt to straighten the shaft is made. For this purpose the ends of the shaft should be squared. This is done preferably by the vise and file ; for if placed on temporary boxes in the lathe in order to use the side, or squaring-up tool, we do not know that the bearings of the shaft are true, and it cannot be placed upon centers until center holes are made, and this is our first object. Let the machinist take the shaft or bar to his vise, resting one end on th e floor, and file by the trysquare until he has the end square with the longitudinal surface ; the center punch and dividers will give him the proper center. This, be it borne in mind, before any attempt at straightening is made. We are aware that a centering lathe is frequently used, and if used judiciously it is a valuable machine, even for crooked or sprung bars, but for those who have not this tool the plan above is sufficient.

The center being found, drill by the hand or breast drill, if a lathe is not convenient, a hole of about one-eighth of an inch diameter at least half an inch deep ; then chamfer or flare the hole with a cone-shaped drill, milled on its face—not a four-sided or three-sided tool, or a flat drill of two sides, but one circular to bear on every point at the same time.

The shaft is now centered, and is to be straightened. To determine how much out of true it is, suspend it between the centers of a lathe and rotate it by hand ; no dog is required. If sprung in a long sweep,put a block of solid wood across the ways of the lathe, with a hook bolt projecting above it at the rear end, and use a wooden bar as lever, placing one end under the hook, and at the other end apply your weight. Any crook not too short can thus be straightened. If short crooks occur, not manageable in th s way, do not strike the iron cold on an anvil, but heat it to a red, or nearly so, and then straighten, not by the direct blow of the sledge, which will indent the iron, but through the medium of a hollow "former," the reverse of the "fuller," so that the iron is not injured.

We place great stress on this method of straightening kinks, as we know that not only is cold hammering injurious in indenting the iron, and injuring its texture, but that after these indentations are removed by the turning tool, if it goes so deep, the crooks sometimes return, like curses, to vex the peace of mind of the ignorant or careless workman. Turning the shafting must be deferred to another time.

BEET ROOT SUGAR IN THE UNITED STATES.

The *Evening Post* (Chicago), in noticing our announcement that we would give a series of practical articles on the manufacture of beet root sugar and expression of our belief that Yankee beet root sugar will, at no distant day, be offered in the markets of the world in successful competition with both colonial and European brands, admits it to be "a very comforting and encouraging fact, if fact it shall prove to be." It, however, throws some doubt upon the probability of successful beet root sugar manufacture here, based upon the very partial success hitherto attained in the attempt at such manufacture up to the present date. It says: "The establishment at Chatsworth, in this State, which was hailed when first begun as a certain triumph of low priced land and a home market over the competition of cane-growing districts, has had anything but an encouraging experience. A very large sum of money, probably not less than $300,000, has been expended by the company, but, thus far, without anything like the expected return. It is said that all the causes of failure are easily explained—that a bad crop of beets in one year, insufficient and defective machinery in another year, a want of water in a third year, will account for the continued inability of the works to pay."

Those acquainted with the history of this establishment, and who have a knowledge respecting the details of the manufacture, will readily admit that the causes assigned are ample to account for the "inability of the works to pay." These works are, however, doing better than the *Post* seems to think. It is stated, that during the last year they made a million pounds of sugar, which ought not to imply anything like imminent bankruptcy.

The *Post* states strongly the difficulties which attend the introduction of new industries, and shakes its head doubtingly thereat. But there are plenty of precedents to reassure it and other doubters. Of these we will instance only one, the silk manufacture, now a profitable and permanently-established industry on this continent. Surely, on the score of failures in the few and imperfect trials hitherto made in the beet root sugar manufacture, we find little to give reason for doubt when we remember the numberless failures and discouragements that obstructed the earliest attempts at spinning and weaving silk. It is hardly fair, however, to consider the only attempts worthy of the name, yet made in this country, as failures until it shall be proved beyond a doubt, that they have not only been doing business at little profit for the limited time they have been in operation, but have lost, and must continue to lose, from the insurmountable obstacles they are forced to encounter.

This has not yet been demonstrated, and the very fact that, notwithstanding the misfortunes of the works alluded to, it has kept its head above water, is, we think, evidence that it will not soon be demonstrated.

In this connection, it may not be amiss to give some figures from the New York *Shipping and Commercial List*, showing the extent of the sugar trade in the United States for 1868. The quanties are given in tuns of 2,240 pounds:

	Tuns.
Received at New York	259,073
Received at Boston	62,237
Received at Philadelphia	66,120
Received at Baltimore	53,458
Received at New Orleans	10,706
Received at other ports	10,380
Total receipts	461,974
Stock, January 1, 1868	45,746
Exports and inland shipments	8,246
Stock, January 1, 1869	41,942
Consumption of foreign in 1868	446,533
Consumption of foreign in 1867	378,068
Crops of Louisiana, Texas, etc	33,000
Total consumption of cane sugar for 1868	479,533

"The crop of Louisiana, now about made, is estimated at 100,000 hogsheads. The season has been unusually favorable—so much so that at one time strong hopes were entertained that the yield would reach 125,000 hogsheads ; but the weather has recently been unpropitious, and the estimates have been reduced to the first mentioned figures.

"The insurrection in Cuba will interfere materially with the supply from that quarter. The crop of maple sugar in the United States the last year will be about 23,000 tuns, though the data is imperfect upon which the estimate is made. The production of sugar throughout the world, including the beet sugar of Europe and the palm and date sugar of the Indies, for the year 1867, is estimated at 1,299,600 tuns, of which Cuba produces nearly one-third ; of this Great Britain and her colonies consumed about 689,000 tuns, and the United States 467,300 tuns—the two nationalities consuming nearly one-half of the world's supply."

It will be seen that the foreign sugar consumed in 1868 in this country exceeds that of 1867 by 68,465 tuns, or more than the increase in home production, although the season has been unusually favorable. We do not believe the American people will content themselves with dependence upon foreign countries for this important staple, when there is no solid reason for so doing. With our fertile soil, and fertile brains, it will go hard if we do not make beet root sugar supply our own consumption, with some to spare for export. Let us not expect too much from the brief experiments yet made ; we have planted only a few small seeds, it is not yet time for the reaping.