

#### MANUFACTURE OF SEWING MACHINES

Were some one to write a new "Song of the Shirt," the theme would not be the "Stitch, stitch, stitch" of needle and thread in the human hand. The song would describe the "Stitch, stitch, stitch" of a machine, hundreds of stitches a minute. In over eight hundred factories, to-day, 33,000 operators are engaged in stitching shirts to the song of the sewing machine. It is not only in the homes of the country that the sewing machine holds sway. It is used in as many as seventeen different industries, by nearly 700,000 operators. In a thousand book binderies, alone, sewing machines are used by at least twenty thousand workers. The sewing machine leads rather than follows the flag, forty establishments employing one thousand hands turning out annually over half a million dollars' worth of American flags and red, white and blue bunting. The sewing machine is used, too, by those who make our pocketbooks, who stitch our saddles, our harness, and our horse's clothing. Sewing machines are used in making the sails of our yachts; the awnings and tents that shade us; our hats, gloves, shoes—nine hundred pairs of shoes a day sewed on one machine. This is not to speak of the machines used by the tailors, dressmakers and milliners. And

the housewife uses as many machines as are used in all these establishments combined.

Sewing machines for household use form a distinct class, in size and general design, varying only in the style of stitch used, and the manner in which it is executed. The lock stitch is the favorite; chain stitch machines, indeed, for household use are no longer manufactured. For factory use, however, the chain stitch machines are most popular, owing to the elasticity of the stitch, which makes it especially desirable for materials that stretch, such as knit goods. The greater number of sewing machines are now made in the Central States, rather than, as formerly, in the Atlantic States. The materials used in sewing machine manufacture are chiefly pig, bar and sheet iron, iron and steel wire, sheet steel, malleable iron, Japan varnish, power and machine supplies and woods for casing. The processes of manufacture include mills for the making of the cabinets and cases, foundries for casting the different iron parts, and machine shops for shaping and assembling the various pieces of mechanism which enter into the finished product. Only a very few establishments extend their operations over the whole range of work. Some are confined to the machine shop work and purchase the cast iron parts and woodwork; others engage only in the process of assembling the various parts, all of which are secured in a finished state from manufacturers.

Numerous new patents are granted every year on inventions covering the sewing machine and its attachments, as well as the machinery used in producing the various interchangeable parts. Every large factory maintains an experimental department, where inventors are given every facility for developing new ideas and putting the results to preliminary tests. With a view to doing away with the labor of operating machines by the ordinary foot treadle, many experiments were tried with water motors, air engines, steam engines, and springs and weights; but no effective motor was produced until the introduction of electricity for power. Electric sewing machine motors can now be used, even in connection with the ordinary household machine.

Certain leading manufacturers of sewing machines have established manufacturing plants abroad. These branch establishments are equipped with American tools and machinery, and frequently are of such a size as to equal the home plants in output. The number of American sewing machines sold abroad each year, including the American machines made in foreign countries, is about equal in number to those sold in the home market by all of the American companies.

Since 1860 the total value of the exports of American sewing machines approaches \$90,000,000. The superiority of the American machine is thus demonstrated. The export trade has not been appreciably affected by the system of foreign manufacture.

## DEVELOPMENT OF SEWING MACHINES

Much is due to Isaac M. Singer's improvement, patented in 1851, introducing the rigid overhanging arm to guide the vertical needle, in combination with a shuttle and a "wheel feed." A straight shaft in the overhanging arm imparted the motion to the needle, and the shuttle was driven by a mechanism deriving its motion from the shaft by means of gearing. The feed consisted of an iron wheel with a corrugated surface, the top of which was slightly elevated above the level surface of the table. By an intermittent motion the feed carried the cloth forward between the stitches, permitting the cloth to be turned in any direction. The material was held in place by a presser foot alongside the needle. This presser foot had a new feature, the yielding spring, permitting passage over seams, and adjusting itself automatically to any thickness of cloth. This machine serves as a model for a large proportion of the sewing machines of the world to-day. Mr. Singer, in addition, produced a sewing machine using the single chain-stitch, and also a double chain-stitch machine for ornamental work and embroidery. The sewing machine was now in perfected form, and its manufacture speedily became a great industry.

Bridgeport, Conn., Boston, and Elizabeth, N. J., hold the lead in the manufacture of sewing machines. Perhaps the development of the industry is more closely associated with Bridgeport than with any other city. New York City has always been the principal sales depot. Machines for stitching with waxed threads are used in the manufacture of boots and shoes, saddlery and harness. Heavy power machines are employed in the manufacture of awnings, tents, sails, and canvas belts. Specially constructed machines are used for stitching gloves, sewing carpets, and embroidering. There are also machines for working button-holes and sewing on buttons, which are very effective and great time savers.