

MANUFACTURE OF WAGON SPRINGS.

Wagon, coach and truck springs are manufactured from high grade bars of spring steel. The bars range from 1 to 3½ inches in width and from ¼ to ⅜ of an inch in thickness and are about 25 feet in length.

The material is first cut up into plates or leaves, then heated and passed through a number of processes called forging, ribbing, slotting, heading, eyeing, etc., after which they are tempered and polished and then bolted together. The bars of steel are cut up cold, the shears of the machine with a pressure of 2½ tons making about 70 clean cuts per minute. The plates or leaves are then placed into a blast furnace and heated. The furnaces are about 2 feet in length, 1½ feet in width, 2 feet in height and lined inside with firebrick. The plates are taken out of the furnace when at a white heat and squeezed by a ram connected to the forging machine, it being

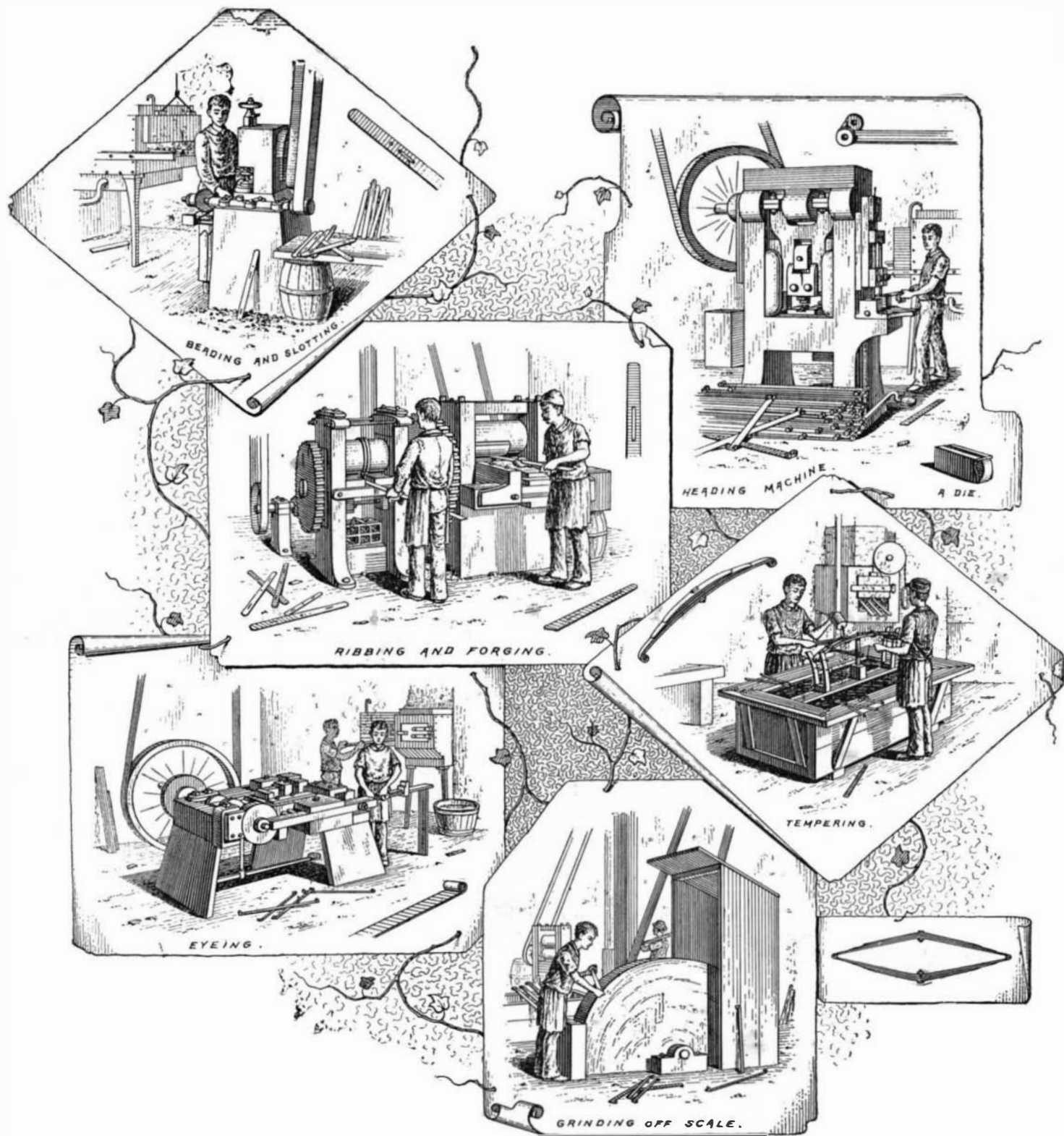
the end of the heated plate is placed into the machine, the blade presses the material into the slot, the plate when taken out having a rib formed into it about 6 inches in length, about ⅜ of an inch in depth and about ¼ inch in width. The depth of the ribs varies according to the thickness of the plate. The rolls travel at the rate of about 100 revolutions per minute. The operation of beading and slotting a spring is done by means of a punch and a circular saw. The plate is first brought up to a white heat in the furnace, the attendant then placing the material in position in the machine, then by means of a lever the saw is set in motion, which cuts out a slot in the hot plate about ⅜ of an inch in depth, about 2 inches in length and about ¼ inch in width. The saw is about 6 inches in diameter, ¼ of an inch in thickness, with teeth about ⅜ of an inch in length, and travels at the rate of 3,500 revolutions per minute.

heads is about 4 tons. The machine makes about 75 strokes per hour.

The eyes are formed by means of dies, it taking five movements to perform the operation. The plate is heated as before and placed into the machine, the dies being formed in such a manner that with every stroke of the machine a part of the eye is formed. The attendant, as soon as each stroke is made, lifts out the plate and places it in position for another, the shifting of the plate being continued until the eye is completed, the whole operation taking about one minute. The plates are then tempered.

This operation requires an experienced person, who must understand thoroughly about the expansion and contraction of steel, and be able to tell at a glance whether the plates are straight.

The plates are first heated to a bright cherry color, the attendants then placing them on a sort of frame



THE WAGON SPRING INDUSTRY.

necessary to thicken and narrow the ends of the plates so that when they pass between the forging rolls of the machine they are pressed back into just the proper width. Connected to each forging roll is a cam about 1 foot in length and about 8 inches in width. They are fastened securely one above the other in the center of the roll, each projecting out from the surface about ½ of an inch. The ends of the hot plate after being squeezed are placed between the cams, which, revolving at the rate of 100 revolutions per minute, presses or flattens out the material to the length of about 6 inches, the operation thinning and giving spring to the ends. About 100 double ends or leaves can be forged per hour.

If the spring is to be ribbed the plate or leaf is passed to another machine which presses or forms a rib into the material, so that in placing one plate over another the projecting side fits into the other, making it impossible to shift. The upper roll of the ribbing machine is slotted in the center. Connected to the under roll is a steel blade or gouge, which when in motion passes into the slot of the upper roll. When

The burr is then milled off and the plate beaded. The beading is done by means of a circular punch which forces the hot metal into a die. The hole is forced partly through, leaving a circular projection on the under side. The punch forms a hole about ⅜ of an inch in depth. The machine beads and slots about 100 double ends per hour. The ends are then trimmed off in different shapes, such as oval, round, diamond and square. The plates are trimmed cold, the knives making about 100 strokes per minute.

The plates are then punched through the center, the holes ranging from ⅜ to ½ inch in diameter. The heading machine welds two pieces called the head to the ends of the plate at one blow. The attendant first fits the pieces, which are slotted on the sides, to the end of the plate. They are then put into the furnace and brought up to a white heat. The hot steel head is then placed in position on the bottom die in the machine. By means of a lever the attendant drops an upper die, which welds the material together, forming the head of the spring. The ends are then trimmed and punched. The pressure required for welding the

and pinching them one on top of the other into the proper shape with instruments made for that purpose. Water is then poured on as soon as the plates turn a dull cherry color, the attendant pouring on just enough to properly temper them. Two men temper about 40 springs per day.

The spring plates are then taken to a 6 foot grindstone, where the scale is taken off and the plates polished. This stone travels at the rate of 250 revolutions per minute, and is 14 inches in width and 3 tons in weight. After the grinding operation, the heads are rounded off on an emery wheel. They are then put together and bolted. The springs range from 32 inches to 48 inches in length, and from 1½ inches to 3½ inches in width. The plates on each spring range in number from 2 to 30. Fifteen hands turn out about 80 ordinary springs per day. The sketches were taken from Merrill's Spring Works, Jersey City, N. J.

THE brain of a woman is smaller than that of a man, but it is stated to be somewhat larger in proportion to the weight of the body.