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IMPROVED COTTON PICKER.

Cotton picking, as our readers are well aware, is now almost universally done by hand, and, as a matter of course, is a slow, tedious, and expensive operation. A machine which would successfully take the place of hand picking has long been needed, but there have been so many difficulties lying in the way of its construction and perfect operation, the work required of it has been of such a delicate and exacting nature, as to make it, of necessity, a most accurate piece of mechanism. The perfect machine should remove all the fiber from every pod, should leave the plants uninjured, should require a minimum amount of care and attendance, and should be rapid in operation.

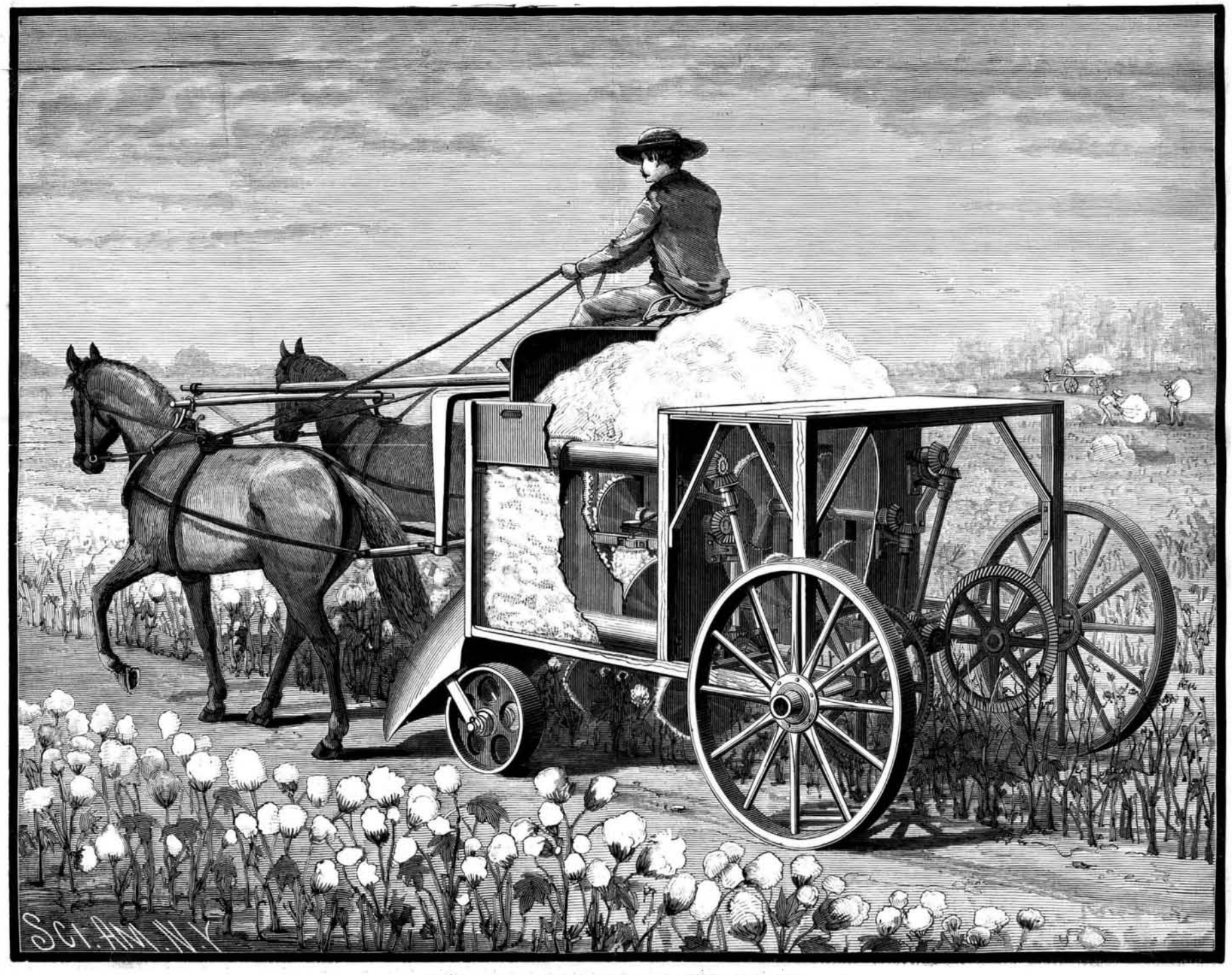
The cotton harvester illustrated upon this page is mounted upon wheels which stride the cotton row, and is designed to gather the cotton from the growing plants with the least possible damage to them, and to automatically deliver the cotton into a receptacle carried on the machine.

The machine is double, there being a right and left portion, each forming a complete self-operating machine, and the two being connected together by the top yoke portion of the frame, so as to run astride the row, each part of the machine reaching in among the branches on its side of the row to pick the seed cotton. This is accomplished by a series of gibbous-shaped plates mounted on a pair of longitudinal shafts journaled in the frame and revolved by the main driving wheels acting through suitable beveled gears; the picker shafts make about five revolutions to one revolution of the driving wheels. The plates are bounded by two convex arcs of a circle, and are rounded at the ends to enable them to part their way among the cotton branches while revolving, and to permit them to crowd any limbs which may chance to lie across the apertures in which they rotate up out of their path. Each of the plates is perforated near one edge to receive the shaft upon which they are fixed to project alternately on opposite sides to balance each other; their motion is across the path of the machine and upward through the cotton. The front face of each plate is armed with a great many picking teeth set like card teeth to hook in the direction of their motion to pick the cotton. By the revolution of the plates or pickers the cotton is carried through the apertures in the wall of the brush box, and is there stripped from the pickers by rapidly revolving vertical brushes. The cotton thus accumulates in the brush box against the foot of a revolving toothed apron, by which it is carried up and thrown into a removable receptacle, where it remains until unloaded by hand. The brushes and apron are revolved by suitable trains of gears connected with the main driving wheels.

The forward end of the machine is supported upon two caster wheels, in front of which are placed sheet iron guards to turn the limbs of the plants out of their paths, the guards converging toward the passage between the two portions of the machine to bring the cotton to the pickers. When the machine is provided with more than one pair of pickers, the second pair is placed above the first so as to adapt the machine to cotton of any height; the plates of the lower pair are intended to approach within about four inches of each other. The plates of the upper pair are intended to touch a central vertical plane, in order that they may reach entirely across through the row of plants. The picker plates of the upper pair in each instance pass between the plates of the next lower pair, to a distance of about four inches, to prevent the branches being drawn in among them.

The tongue of the machine is attached to the frame at the center of the forward crossbar, and extends forward over the tops of the plants and carries a yoke above the necks of the team. The traces are secured to single trees attached to a double tree pivoted to the frame, and which bends down to the proper level for attaching the team. The receptacle is made of wire cloth supported on a frame, to allow sand and dirt to be jarred out of the picked cotton.

The principal point in this machine consists in the use of the gibbous plates, the teeth of which being thickly set—card-like—on the front side at an angle of 30 degrees, and protected on the outer edge by a rim exactly abutting with the plane of the teeth, which are perfectly true, prevents the possibility of the teeth taking anything but lint; a leaf, or limb, or even the hand, will pass freely over the surface of the teeth. The two tiers of plates extend up about five feet, and if desirable to reach higher, other tiers can be added. As the machine passes over the row, the picker plates come in contact with every one-half inch of the entire plants, from top to bottom, and gather every boll of



IMPROVED MECHANICAL COTTON PICKER.

open cotton, which is delivered to the receptacle absolutely free from dirt of every description. The capacity of the machine is measured by the number of acres it can be drawn over in a given time and the amount of open cotton it encounters. For instance, if there were half a bale to the acre, and it were drawn over eight acres a day, this would not be an excessive load for two horses. As the machine weighs about 800 pounds, it would pick out four bales per day, thus doing the work of sixty hands. At this rate this machine could gather cotton at a cost of less than one dollar per bale.

This machine, as will readily be perceived, is simple in construction, the parts are few and not liable to derangement, and it removes the cotton, whether from high or low plants, efficiently and rapidly, and leaves the plants in as uninjured a condition as possible.

Additional particulars regarding this cotton picker can be obtained by addressing the inventor, Mr. R. K. Charles, of Darlington, South Carolina.

The Temple of Baalbec.

Rev. Henry M. Field, D.D., after his return from an extended tour through Eastern countries, has published a book on India and the Holy Land which is both instructive and entertaining. Doctor Field, in a letter to the *Evangelist*, of which he is the editor, thus describes the ruins that mark the place where the grandest of ancient cities is believed to have existed:

The ruins of the ancient city of Baalbec, situated on the plain forty-three miles northwest of Damascus, are the wonder of modern architects.

Everything is colossal. The area is larger than that of the temple at Jerusalem. We may begin with the walls, which are half a mile around, and of such height and depth as are rarely attained in the most tremendous fortress. Where from within I climbed to the top, it made me giddy to look over the perilous edge to the depth below; and when from without the walls I looked up at them, they rose high in the air. Some of the stones seem as if they had been reared in place, not by Titans, but by the gods. There are nine stones 30 feet long and 10 feet thick, which is larger than the foundation stones of the temple at Jerusalem, dating from the time of Solomon, or any blocks in the great Pyramid.

But even these are pygmies compared with the three giants of the western wall, 62 feet, 63½ feet, 64 feet long. These are said to be the largest stones ever used in any construction. They weigh hundreds of tons, and instead of being merely hewn out of a quarry which might have been on the site, and left to lie where they were before, they have been lifted 19 feet from the ground, and there embedded in the wall. Never was there such cyclopean architecture. How such masses could have been moved is a problem with modern engineers.

Sir Charles Wilson, whom I met in Jerusalem, is at this moment in Baalbec. Standing in the grounds of the temple, he tells me that in the British Museum there is an ancient tablet which reveals the way such stones were moved. The mechanics were very simple; rollers were put under them, and they were drawn up inclined planes by sheer human muscle—the united strength of great numbers of men. In the rude design on the tablet the whole scene is pictured to the eye.

There are battalions of men, hundreds to a single roller, with the taskmasters standing over them, lash in hand, which was freely applied to make them pull together, and the king sitting on high to give the signal for this putting forth of human strength *en masse* as if an army were moving to battle. A battle it was in the waste of human life it caused. These temples of Baalbec must have been a whole generation in building, and have consumed the population of a province and the wealth of an empire.

How Disease is Spread.

Every one knows that scarlet fever is infectious, but it is not often one is able to trace the progress of the disease through simple carelessness so easily as in a case which has just come under the notice of the *Sanitary World*. The story is told as follows: A young Scottish lassie, in domestic service not far from the town of Elgin, died from scarlet fever in her "place." Her clothes were carefully packed up, and her "kist" containing them was conscientiously sent home to her native village. On its arrival at the station there was the usual difficulty of getting it conveyed over the hills to the place of its destination, so there it had to remain awaiting a friendly lift. Meanwhile the infected kist formed a happy hunting ground for the station master's children, who, in due time, all fell ill with scarlet fever. At last the friendly lift came, and the box (a large wooden one) was carried home, and the contents generously distributed among the neighbors. Needless to say that an outbreak of scarlet fever in the village was the result; and as to the station, where people do congregate and often have long to wait, it would simply be a center from which many a fever track would radiate, exciting the usual wonder whence and how the fever came.

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(Illustrated articles are marked with an asterisk.)

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THE SCIENTIFIC AMERICAN SUPPLEMENT,

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SQUARE COTTER PINS.

Split pins, or "cotter pins," although not strictly and rigidly mechanical, are useful in many places. They are usually made of half round wire or rod, and doubled together, the flat faces meeting so as to form a cylindrical cross section; and while the two ends are left slightly apart "for spring," the doubled middle that forms the upper or handle end is made into a loop that gives a head and imparts a slight elasticity to the blades. For securing intermediate gears on stationary studs and for similar purposes, where the secured piece may be removed and replaced at pleasure, the cotter pin is very handy. Its philosophy is simply that the compressed halves will pass freely through the drilled hole, but that, when the compression of fingers, or tongs, or pliers is removed, the released halves will be forced against the sides of the hole, preventing removal or relaxation of tension by jarring.

Some machinists are like amateur gardeners, always trying some new plan. So, one has determined that a square cotter pin is better than a round one. He takes flat steel with a thickness as to diameter as one is to two, measures the desired length of shanks, and then forges the center of the piece to a thin blade like that of a pair of spring calipers, which he brings to a spring temper. When uncompressed, the blades or shanks stand wide apart; when compressed, they are passed through a round hole in the stud, and the force of the tempered spring end pushes them against the walls of the hole. The corners of the pin effectually prevent it from turning in the hole by the jar of the machinery in motion, and the elasticity of the spring head holds the jaws or blades out securely against the sides of the hole. The rigidity of the unforged steel makes its own seat by its corners, and the pin may be always put back into place. This prevention of turning in the hole appears to be an advantage.

SPRING GAUGES.

In these times of absolute measurements, exact estimates, and precision tools, it is time for spring gauges to give place to those of absolute movement. There is no spring calipers nor spring dividers that are absolute in both movements; one is a compression and the other a release, but only the compression is absolute, and that only to a limited degree. Our ordinary measurers of diameter should be governed by a screw or some other mechanical device that shall control the movement of the measuring points, whether they be "to or from." It is time that this old-fashioned, inaccurate system of measurement was given an indefinite recess. Exact mechanics and their productions have had enough of its "guess and try again" plan.

The spreading of the legs of a pair of spring dividers and the reach of the jaws of a pair of spring calipers depend wholly on the latent tension of the spring at the head of the instrument. This is a flat steel spring, between the legs or jaws, and is usually of a curvature representing nearly a circle. In not a single instance out of twenty-two tests has it been found that the almost circular curvature of the spring head has been of the slightest use. It appears that this form of end spring to caliper and divider is mainly a mechanical tradition, and that, in use, the curve was of no value; all the spring was close to the apex, just as in the main spring of a gunlock all the spring is in the U bend at the apex of the two arms of the spring. It follows, then, that the curve of the head of spring calipers and dividers might as well be made of the V form as of the circular form; it is certain that with this form they would be more active on demand.

But all this spring business should be taken out of our modern, exact, absolute mechanical work. If it is necessary to have temporarily adjustable gauges (which is doubtful), let them be made on the plan of the screw, which gives and takes exactly the same. Such adjustable measuring machines have been made, and readily usable hand appliances are not impossible.

CUT NAILS AND WIRE NAILS.

When a sliver is cut off the end of a section of thin iron plate, and is formed into a nail by upsetting the larger end for a head, no change in the quality of the iron takes place by the cutting and the upsetting; the fiber is the same, and the material remains of the same strength. If a piece of plate iron is cold short when in a flat plate of one or more inches area, it will not become strong, tough, and fibrous when divided into narrow widths. And yet this is the amount of the claim some cut nail makers make for their goods.

There can be—there is—no question about the economic value of cut nails; their introduction has been of the greatest service possible to all who use nails. But there is a point where their usefulness is superseded by better nails. Cut nails, like pegs, hold together superincumbent substances, but they do not, like rivets, resist transverse strains. If a nail holds the same amount of resistance to blows, the same quality of directing by blows, the same utility of double usage after being bent and crooked, as a rivet does, it is a good nail. Was there ever a cut nail that fulfilled these conditions? Never. But a wire nail does—all of them. On all its sides its fibers are compacted, and in one direc-