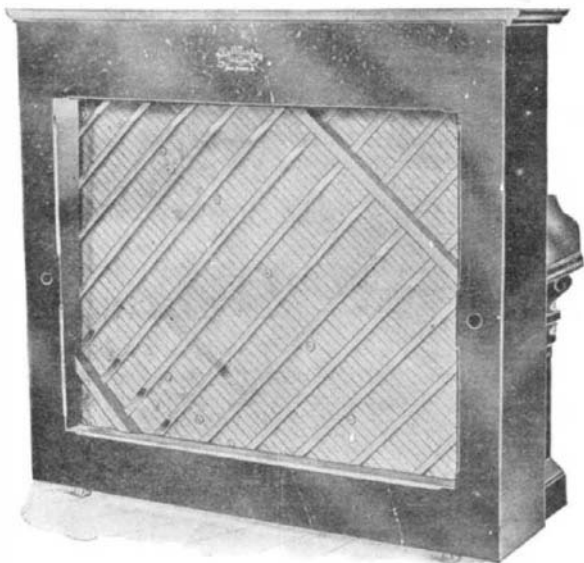


**THE MATHUSHEK PIANO.**

The remarkable resonant quality, the easy and responsive action, and the ability to remain at pitch for an unusual period of time without retuning, which are distinguishing characteristics of the Mathushek piano, have been obtained partly as the result of forty years of scientific design and careful workmanship, and partly because every part of the piano is made at the factory of the company. The building of a first-class piano that will remain first-class for decade after decade of use is by no means a simple proposition,



Back of Piano, Showing Absence of Heavy Vertical Posts.

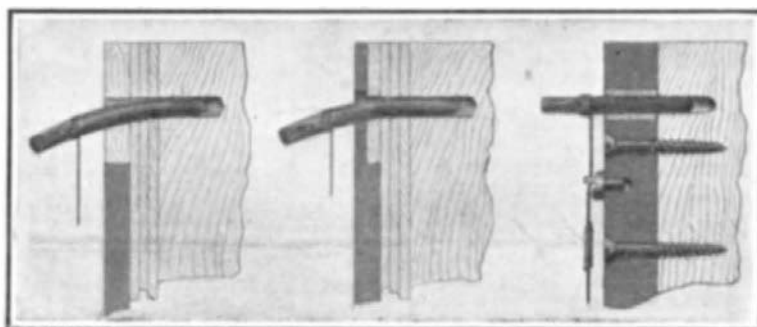
and one of the facts which complicate the problem is that a piano must be prepared to withstand the most severe and widely-diverse climatic conditions. Any given piano is liable to be shipped either to the extremely humid climate of Cuba, where the humidity may range for weeks together anywhere from 75 to 100 per cent; or to the elevated plateaus of western America, where the atmosphere is extraordinarily dry. Seeing that the piano is made up so largely of wood, and that wood, like all fibrous materials, will expand and contract according to the degree of saturation of the atmosphere, the piano manufacturer is confronted, at the very outset, with an exceedingly difficult problem; for unless the frame of the piano, the delicate sounding board, and the many fragile parts of the action are so constructed that they will remain absolutely true to their original lengths, surfaces, and clearances, there will be endless trouble. Under the combined tension or pull of the strings, which may aggregate in the total from 25 to 35 tons, the frame may give ever so little, or the tuning pins may begin to tear through the pinblocks, allowing the strings to slacken and lose their proper pitch. Moreover, the sounding board, which is the very life of the piano, if it be not properly designed, and its materials carefully selected, is liable to lose its proper contour, flattening out and permitting the piano to become "tinny" in tone. Now, the Mathushek Piano Company, during the forty years of their operations, have been giving particular attention to these points, with the result that they have produced an instrument which they claim will keep its tone and pitch longer than any other.

The elements of the Mathushek piano which are distinctive of the instrument, and to which it owes its fine quality of tone and durability, are the special construction of the frame; the use of a full-length, extra heavy iron plate, in combination with a special tuning-pin bushing, and a special design of sounding board whose materials are selected and assembled with a view to securing fine singing quality and permanence of form in the sounding board.

Of the features mentioned above the most important is the full iron plate in combination with the tuning pin bushing, as shown in one of the accompanying illustrations. In the earlier pianos, and in many of the cheaper pianos of the day, the metal plate extended only to the under side of the pinblock. The pins were driven directly into the block, and under the pull of the wires there was a tendency for the pinblock to crush down through the fibers of the wood, enlarging its hole and failing to keep the strings up to pitch. Another method is to carry the plate at a reduced thickness over the face of the tuning block, so as to allow the outermost bearing point of the pin on the wood to be brought a little closer to the point of attachment of the strings. In this case also there is a ten-

dency for the tuning pin to sag until it bears upon the lower edge of the thin iron plate covering. The first scientific attempt to investigate the pinblock problem and provide a thoroughly mechanical means for holding the tuning pins up to their work was made about a third of a century ago, when the Mathushek Company adopted the excellent construction shown in the third of our figures. They realized that the only satisfactory way to take the combined pull of all the strings was to transmit it as quickly as possible to a metal frame or plate of specially stiff construction. Accordingly they designed the plate shown in the accompanying illustration, which is not only of extra thickness throughout, but is stiffened by deep ribs, so disposed as best to meet the heavy strains imposed. The plate was carried clear over the face of the block, and its thickness at the face increased to about 1 inch. The holes are drilled directly through the plate and they are made sufficiently larger than the pin to allow of the insertion of a bushing of hard maple. This bushing is driven into the hole in the plate with its grain transverse to the axis of the hole. When the holes are bored, they are made slightly smaller than the pins, which are driven in to an exceedingly tight fit. Now, by studying the sectional view of this device, shown in the accompanying drawing, it will be seen that the pull of the string upon the tuning pin is applied at a point, less than the diameter of the pin distant from the point at which the pin bears on the hardwood bushing in the plate. Consequently, it is impossible for the pin to be bent down, and the hardwood bushing being confined in the metal plate cannot crush, but must hold the pin well up to its work.

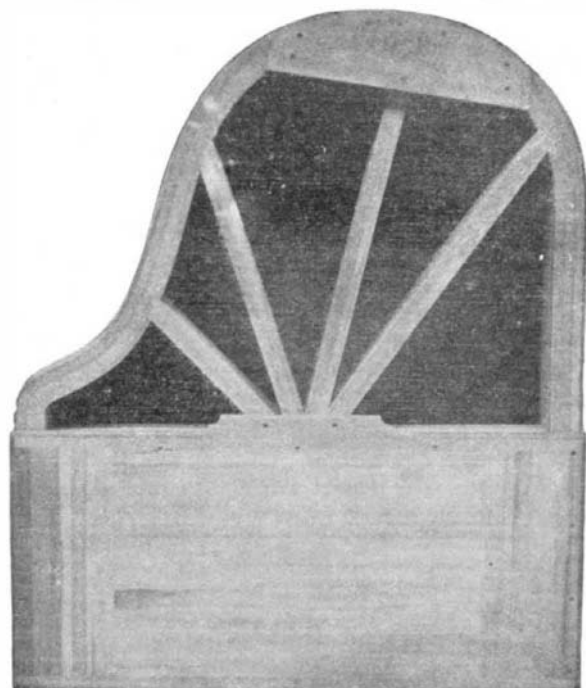
The Mathushek Piano Manufacturing Company was the originator of this method of construction. They have used it continuously for a period of thirty-five years, and they consider that the fact that, after the expiration of the patents, this principle was embodied in some of the best-known makes of pianos of their competitors, is exceedingly valuable testimony to the value of this construction. The use of a full plate has enabled the Mathushek Company to dispense with a large amount of heavy timber which enters into the other makes of pianos, and adds no little to their weight. In the ordinary make of piano, where the



Showing Faulty Method of Adjusting Tuning Pins and the Improved Method Used in the Mathushek Piano, with Full Metal Plate and Hardwood Bushing.

full plate and the tuning pin bushing are not used, the "pinblock" has to be mounted upon a series of heavy vertical wooden posts, which serve to keep the block in position when the strings are being tightened under the process of tuning. In the Mathushek piano, however, there is no such thing as a pinblock, its place

being taken by the metal plate and the tuning pin bushing. Consequently, the back of a Mathushek piano shows simply a rectangular frame of moderate thickness and weight, whose function it is to serve as a backing upon which to assemble the main parts of the

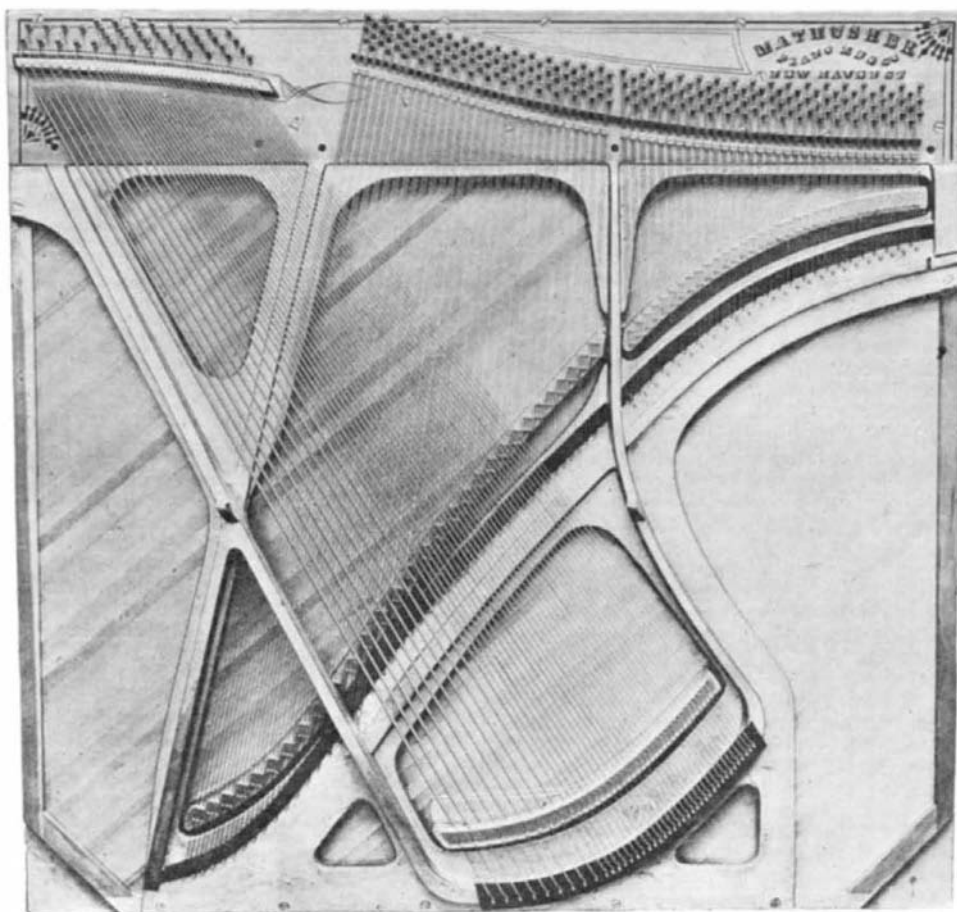


The Frame of a Mathushek Grand Piano, Showing Method of Bracing to Keep the Frame to Its Proper Curve.

piano. In the construction of the Mathushek sounding board the company justly claim that they expend an amount of care in the selection of the wood and of labor in building it into the finished board which is not equaled by any other concern. They point to the fact that the board is built up of selected pieces of spruce, none of which is more than one inch in width, as compared with widths of from 4 to 6 inches which obtain in other sounding boards. It is absolutely essential that the sounding board should be at once highly elastic or resilient, and at the same time be free from any tendency to warp and lose its proper curve. These qualities are obtained by assembling the strips with the grain running perpendicularly to the face of the board. Where there is any dip or inclination of the grain from the vertical, the adjoining pieces are assembled so that their grain diverges in opposite directions. The result is that the tendency to warp out of shape is entirely neutralized. The arrangement of the strips is shown clearly in the accompanying photographs.

Almost all piano manufacturers have trouble, during the winter season, from the cracking of the varnish, a defect which is chiefly due to the several coats of varnish not being thoroughly dry. The upper surface of each coat crusts over, but it does not dry entirely through, and it requires but a slight expansion or contraction to break these thin coats, with the result that the upper surface frequently shows innumerable hair-lines and even distinct cracks. The company has recently put in an extensive plant which is designed to dry each coat of varnish thoroughly by circulating continuous currents of warm air through the room in which the varnished material has been placed and by exhausting the fumes of the turpentine that evaporate from the varnish in the process of drying. The atmosphere of the room is kept absolutely dry and in continual circulation. The advantage of this system is that the varnishing can be done during the moist atmosphere of the summer (the period in which pianos that are sold chiefly in the fall and winter months are made) with the same certainty of securing a durable surface as in the drier months of the year.

The plant of the Mathushek Piano Manufacturing Company is located in West Haven, a suburb of New Haven, where it has had its home for thirty years past. The buildings are all of brick and are uniformly one story in height. The main building is 416 feet long by 120 feet wide, with a wing 380 feet by 50 feet adjoining. Particularly fine is the new dry house for the drying of the lumber, which has a capacity of 220,000 feet of lumber. It is heated by a large steam fan and much of the excellent quality of the woodwork is due to this feature of the establishment. The buildings are so arranged that the handling of the material during construction is reduced to a minimum.



Front View, Showing the Special Design of Full Plate, the Method of Stringing, and the Sounding Board Made up of Carefully-selected One-Inch Strips.

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