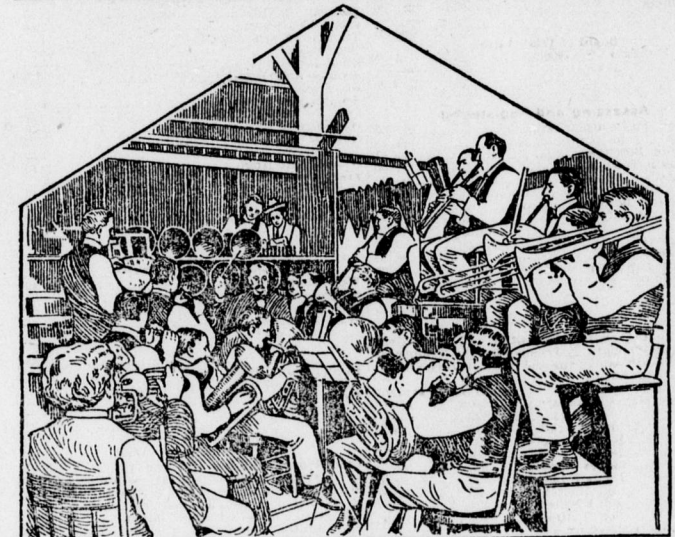


Manufacturing Phonograph Records.

THE phonograph has become such a familiar object in our modern home life, and its mechanism, in spite of its marvelous ingenuity, is so straightforward and easily understood, that it is difficult, in giving a description of this prince of toys, to tell the multitudinous possessors of them anything that they did not know before. If one were asked to name the particular part of the phonograph which possesses the greatest interest and which is the most essential to its success, he would have

The cylinders are cast with an interior spiral thread, which adds some what to the strength of the cylinder and forms the bearing surface when the wax cylinder is placed on the mandrel of the phonograph. After they have cooled, the cylinders are first reamed out to gage, then edged and rough-turned, and finally given a finishing cut, the finish turning being done with a fine sapphire knife.

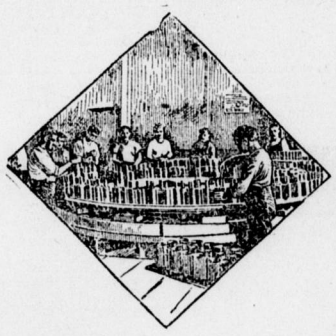
One of the upper floors of a large building in the record department is divided into a number of rooms, in which the specialists are kept steadily at work speaking, playing or singing into the recording machines. One of our illustrations shows the methods adopted in producing solo records, whether instrumental or vocal. In this case the violinist stands with his instrument immediately and closely in front of three converging horns, each of which connects with a recording phonograph. The only difference be-



MAKING BAND RECORDS.

to mention the cylinder of wax upon which the waves of sound are cut by the dainty little sapphire turning-tool known as the stylus.

The great growth in popularity of the phonograph, and the necessity for keeping the owners supplied with fresh "literature," has caused the mere work of manufacturing the records to assume truly enormous proportions.



CASTING BLANK RECORDS.

The first process in the manufacture of records takes place in the melting room, where the proper constituents to form the special grade of wax employed in making the records are brought together and melted in several large vats, each of which contains about 1000 pounds. There are three meltings in all, and between each the fluid is carefully strained to remove any hard or gritty impurities which it might contain; for it is evident that the presence of foreign substances, even a few particles of fine dust, might easily produce fatal irregularities in the grooves of the record. The first two meltings take place in the melting room. On entering this room the most conspicuous feature is several large, circular, rotating tables, set around the periphery of which is a number of round, iron pins which form the core of the mold. Concentrically around each of these pins is placed a brass sleeve. The wax is taken from the melting vats in a can and poured into the molds in the manner shown in our illustration. The tables are constantly rotated, thus

tween a recording and a producing phonograph is in the nature of the little sapphire tool by which the diaphragm rests upon the wax record. In making the record, the "recording stylus" is used, and in reproducing the record the "reproducing ball" is substituted. The difference between the stylus and the ball is that the point of the stylus is cup-shaped and ground to a fine cutting edge, which, as it travels over the surface of the wax cylinder, is driven more or less deeply into the material, and turns off a shaving which varies in thickness, according to the quality of the sound waves which fall upon the diaphragm. One of the first things that strikes a visitor to the record room is the rapidity with which the artists sing, the speed being much greater than that to which one is accustomed in a music hall or opera house. Moreover, the songs are sung with the full power which would be used before a public audience. As soon as the record is made, it is taken off the mandrel and placed in a phonograph and reproduced to test its quality. If there is the slightest defect, it is, of course, rejected.

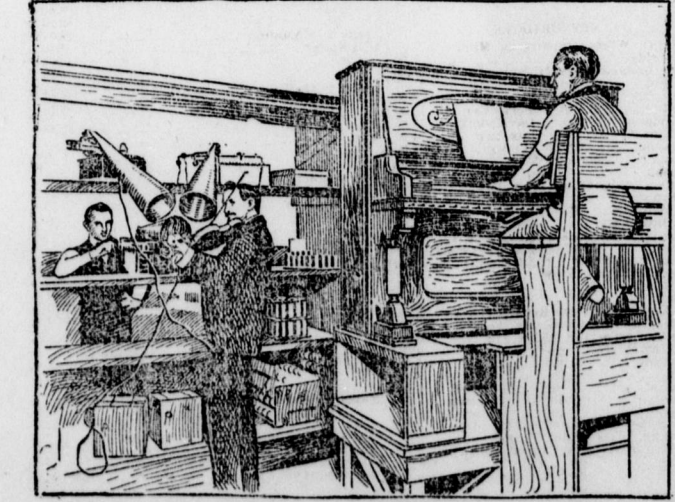
Among the most popular records are



TESTING THE RECORDS.

those of band music, and for making these the company maintains a full instrumental band, which is occupied steadily, under the baton of a conductor, in playing popular airs, marches, waltzes, etc.

The testing of the phonograph records is done in a separate room by a corps of experts, who are careful to



MAKING VIOLIN SOLO RECORDS

bringing the molds, which cool very rapidly, round to the workers on the opposite side of the table, where the wax cylinders are removed. The moving table brings the empty molds back to the starting point, where they are again filled from the pouring can.

throw out every record that gives the slightest suggestion of a defect. Long training in this work has made them sensitive to irregularities in tone and quality which would scarcely be noticed by the average listener.—Scientific American.

Germany's New Rifle Finest Ever Made

Formidable as the Emperor William's army is as a fighting machine, it will be even more formidable when equipped with its new magazine rifle, which in many respects is doubtless the finest ever made. In a recent number, the London Daily Graphic, which has several naval and military experts among its contributors, gave an interesting description of the new weapon, the product of three years' work by an imperial commission, and known as Model '98. The writer says:

"There is about the new model nothing that clumsy appearance so characteristic of earlier magazine rifles. It is as neat and as compact as a single loader. The projecting magazine of the model of 1888 has gone, and its place has been taken by a much handier contrivance, in which the cartridges are packed zig-zag fashion, three on the left and two on the right. The clip or box formerly used to carry the cartridges has been replaced by a "charger," consisting of a strip of thin steel, the edges of which fit into the extractor groove at the base of the cartridge. In loading the magazine a slight pressure of the thumb is all that is necessary to force the cartridge into the desired position, and as the bolt is pushed forward the empty charger is dropped.

"The extractor is larger and more powerful than the one formerly used, and, like other parts of the rifle, has been designed to save the soldier from the consequence of his mistakes, or, rather, to put it absolutely out of his power to make a mistake. The German experts declare that a man laboring under excitement cannot be safely

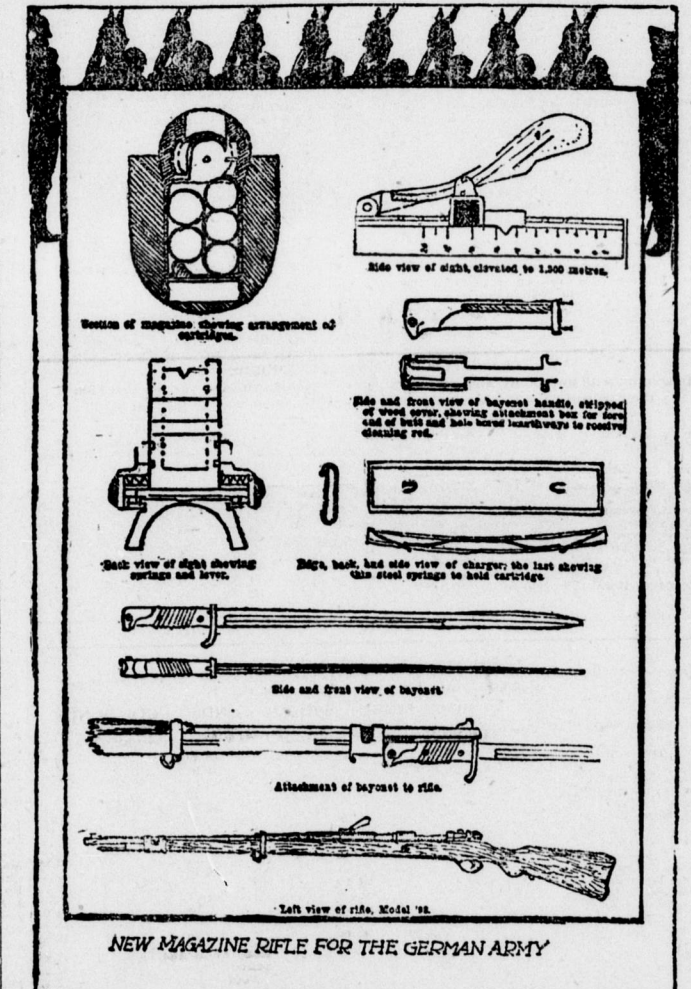
The King and Queen of Sarawak, Borneo



A certain adventurous Englishman about sixty-two years ago procured a yacht and sailed for Borneo, where he ingratiated himself into the favor of the Sultan to such an extent that the latter made him a present of the entire province of Sarawak, some 3000 miles in extent, with the sole proviso that he should conquer the people. They were such troublesome subjects that the Sultan could do nothing with them at all, but Mr. Charles Johnson Brooke not only brought them under subjection, but set up a little kingdom for himself, over which he reigned during the rest of his natural life, and after him his nephew, the present monarch of Sarawak.

The kingdom of Sarawak now comprises about 50,000 miles of territory, with a coast line of 400 miles, rich coal mines, vast resources and an annual income of several million dollars. Its king is Sir Charles Johnson Brooke, nephew and successor of the original rajah, and its Queen is Lady Brooke, who together rule this semi-cannibal country of 300,000 Asian subjects and are the nearest civilized neighbors to the south of the Philippines.

Liquid Insect Catcher and Tree Guard.—The increased destruction of city trees by insects during the past few



NEW MAGAZINE RIFLE FOR THE GERMAN ARMY

years has caused the inventor to design a number of devices to prevent the pests from crawling up the tree trunk and depositing eggs in the branches as well as eating the leaves. Hitherto the guards have consisted of bands of loose fabric, cotton wadding, etc., being generally treated with a chemical and bound tightly on the tree trunk. His invention, which we show herewith, however, is a radical departure from former ideas, inasmuch as

trusted to perform any complex action calling for coolness and discretion. The commonest blunder is to double load a rifle—that is, to attempt to convey a cartridge into the firing chamber before its predecessor has been got rid of. With the new extractor this will be impossible. The cartridge in the firing chamber, whether fired or unfired, gripped by the claws of the extractor, moves backward with it. Thus it is impossible to double load.

"As far as actual shooting goes, the new model does not differ much from the model it supersedes. The range is about the same, and the weight and composition of the bullet and charge are almost identical. But in the sighting a great change for the better has been made.

"In view of the opinions expressed in some quarters in disparagement of the bayonet as an effective weapon, it is interesting to note that the German army administrators have restored this arm to its former imposing dimensions. In place of the exaggerated knife that the German soldier has carried since 1871, he will in future have a handsome and truly formidable looking sword bayonet, twenty-six inches in length.

"Taking the new model as a whole, it cannot be denied that those responsible for its production have done their work thoroughly and well. Its authors claim—and apparently with a fair amount of justification—that by its introduction the German soldier has been armed with the best military rifle that modern science has as yet produced."

holders of the property, let us spend our time in fishing instead of fighting. But if I angrily jerk my net across your net, you jerk your net angrily across mine, we will soon have two broken nets and no fish. The French revolution nearly destroyed the French fisheries, and ecclesiastical wars is the worst thing possible while hauling souls into the kingdom. My friends, I notice in the text that James, the son of Zebedee, and John, his brother, were busy mending somebody else's nets, but mending their own nets, and rather than that we who are engaged in Christian work in

DR. TALMAGE'S SERMON

SUNDAY'S DISCOURSE BY THE NOTED DIVINE.

Subject: With Silken Cords—So Should the Fishers of Men Mend Their Nets.—Christians Warned Against Harsh Criticism—Gospel Strife Deplored.

(Copyright 1901.)
WASHINGTON, D. C.—In this discourse Dr. Talmage describes the gospel net and how it is to be repaired after being damaged; text, Matthew iv, 21. "James, the son of Zebedee, and John, his brother, in a ship with Zebedee, their father, mending their nets."

"I go a-fishing!" cried Simon Peter to his comrades, and the most of the apostles had hard work from fishing tackle. The fisheries of the world have always attracted attention. In the thirteenth century the Queen of Egypt had for pin money \$470,000 received from the fisheries of Lake Moeris. And if the time should ever come when the immensity of the world's population could not be fed by the vegetables and meats of the land, the sea has an amount of animal life that would feed all the populations of the earth and fatten them with a food that by its phosphorus would make a generation brainy and intellectual. Beyond anything that the world has ever imagined. My text takes us among the Galilean fishermen. One day Walter Scott, while hunting in an old drawer, found among some old fishing tackle the manuscript of his immortal book, "Waverley" which he had put away there as of no worth, and who knows but that to-day we may find some unknown wealth of thought while looking at the fishing tackle in the text.

It is not a good day for fishing, and three men are in the boat repairing the broken fishing nets. You are fishing with a hook and line, and the fish will bite, it is a good time to put the apparatus into better condition. Perhaps the last fish you hauled in was so large that something snapped. Or, if you were fishing with a net there was a mighty floundering of the scales or an exposed nail on the side of the boat which broke some of the threads and let part or all of the captives of the deep escape into their natural element. And hardly anything is more provoking than to see a fisherman land a score or a hundred of trophies from the deep, and when you are in the full glee of hauling in the spotted treasures, through some imperfection of the net they splash back into the waves. That is too much of a trial of patience for most fishermen to endure, and many a man ordinarily correct of speech in such circumstances comes to an intensity of utterance unjustifiable. Therefore no good fisherman considers the time wasted that is spent in mending his net. Now, the Bible again and again represents Christians workers as fishers of men, and we are all sweeping through the sea of humanity some kind of net. Indeed there have been enough nets out and enough fishermen busy to have landed the whole human race in the kingdom of God, long before this. What is the matter? The gospel is all right, and it has been a good time for catching souls for thousands of years. Why, then, the failures? The trouble is with the nets, and most of them need to be mended. I propose to show you what is the matter with your nets and how to mend them. In the text old Zebedee and his two boys, James and John, were doing a good thing when they sat in their boats mending their nets.

The trouble with many of our nets is that the meshes are too large. If a fish can get his gills and half his body through the network, he tears and rends and works his way out, and leaves the place through which he squirmed a tangle of broken threads. In our desire to make everything so easy we relax, we loosen, we widen. We let men after the manner of the gospel net escape into the world, and go into indulgences and swim all around Gallilee, from north side to south side, and from east side to west side, expecting that they will come back again. We ought to make it easy for them to get into the kingdom of God, and as easy as we can, make it impossible for them to get out. The poor advice nowadays to many is: "Go and do just as you did before you were captured for God and heaven. The net was not intended to be any resistant or any hindrance. What you did before you were a Christian do now. Go to all styles of amusement, read all the styles of books, engage in all the styles of behavior as before you were converted." And so, through these meshes of permission and laxity they wriggle out, through this opening and that opening, tearing the net as they go, and soon all the souls that we expected to land in heaven before we know it are back in the deep sea of the world. Oh, when we go a-gospel fishing, let us make it as easy as possible for souls to get in and as hard as possible to get out.

Is the Bible language an unmeaning verbiage when it talks about self denial, and keeping the body under, and about walking the straight gate, and about carrying the cross? Is there no way of telling whether a man is a Christian except by his taking the communion chalice on sacramental day? May a man be as reckless about his thoughts, about his words, about his temper, about his amusements, after conversion as before? Alas, the words of Christ are so little heeded when He said: "Whoever doth not bear his cross and come after Me cannot be My disciple." The church is fast becoming as bad as the world, and when it gets as bad as the world it will be worse than the world by as much, as it will add to the world a most appalling kind to its other defects.

Furthermore, many of our nets are torn to pieces by being entangled with other nets. It is a sad sight to see fishermen fighting about sea room, and pulling in opposite directions each to get his net, but nets damaged by the struggle and losing all the fish. In this land, where there are more than 70,000,000 people, there are at least 30,000,000 not in the Sunday-schools and churches. In such an Atlantic Ocean of opportunity there is room for all the nets and all the boats and all the fishermen and for millions more. There should be no rivalry between churches. Each one does a work peculiar to itself. But there are cities in this country where there is now going on an awful ripping and rending and tearing of fishing nets, indeed, all over Christendom at this time there is a great war going on between fishermen, ministers against ministers.

Now, I have noticed a man cannot fish and fight at the same time. He either neglects his net or his market. It is amazing how much time some of the fishermen have to look after other fishermen. It is more than I can do to take care of my own net. You see the wind is just right, and it is such a good time for fishing, and the fish are coming in so rapidly, that I have to keep my eye and hand busy. There are about 200,000,000 souls wanting to get into the kingdom of God, and it will require all the nets and all the fishermen of Christendom to safely land them. Oh, brethren of the ministry, let us spend our time in fishing instead of fighting. But if I angrily jerk my net across your net, you jerk your net angrily across mine, we will soon have two broken nets and no fish. The French revolution nearly destroyed the French fisheries, and ecclesiastical wars is the worst thing possible while hauling souls into the kingdom. My friends, I notice in the text that James, the son of Zebedee, and John, his brother, were busy mending somebody else's nets, but mending their own nets, and rather than that we who are engaged in Christian work in

this opening century will require all our spare time to mend our own nets. God help us in the important duty!

In this work of repair we need to put into the nets more threads of common sense. When we are preaching religion as a great practicality we will catch one hundred souls where we now catch one. Present religion as an intellectuality, and we will fail. Out in the fisheries there are set across the waters what are called gill nets, and the fish poke their heads through the meshes and they cannot withdraw them, because they are caught by the gills. But gill nets cannot be of any service in religious work. Men are never caught for the truth by their heads; it is by the heart or not at all. No argument ever saved a man, and no keen analysis ever brought a man into the kingdom of God. Heart work, not head work. Away with your gill nets! Sympathy, helpfulness, consolation, love, are the names of some of the threads that we need to weave in our gospel nets when we are mending them.

Do you know that the world's heart is bursting with trouble, and if you could make that world believe that the religion of Jesus Christ is something omnipotent the whole world would surrender tomorrow—yes, would surrender this hour. The day before James A. Garfield was inaugurated as President I was in the cars going from Richmond to Washington. A gentleman seated near to me in the cars knew me, and we were soon in familiar conversation. It was just after a bereavement, and I was speaking to him from an overburdened heart about the sorrow I was suffering. Looking at his cheerful face I said: "I guess you have escaped all trouble. I should judge from your countenance that you have come through free from all misfortune." Then he looked at me with a look I shall never forget and whispered in my ear: "Sir, you know nothing about trouble. My wife has been in an insane asylum for fifteen years. And then he turned and looked out of the window and into the night with a silence I was too overpowered to break. That was another illustration of the fact that no one escapes trouble.

Why, that man seated next to you in church has on his soul a weight as great as that which a mountain is a feather. That woman seated next to you in church has a grief the recital of which would make your body, mind and soul shudder.

When you are mending your net for this wide, deep sea of humanity, take out the wire thread of criticism that is horsehair thread of harshness and put in a soft silken thread of Christian sympathy. Yea, when you are mending your nets tear out those old threads of gruffness and weave in a few threads of politeness and gentleness. In the house of God let all Christian faces beam with a look that means welcome. Say "Good morning" to the stranger as he enters your pew, and at the close shake hands with him and say, "How did you like the music?" Why, you would be to that man as a panel of the door of heaven; you would be to him a note of the doxology that seraphs sing when a new soul enters heaven. I have in other days entered a pew in church and the woman at the other end of the pew looked at me as much as to say, "How dare you! This is my pew and I pay the rent for it!" Well, I crouched in the outer corner and made myself as small as possible and felt as though I had been stealing something.

So there are people who have a sharp edge to their religion, and they are thought by those who are not people had been elected to be damned and they were glad of it. Oh, let us brighten up our manner and appear in gentleness and ladyhood.

The object in fly fishing is to throw the fly far out, and then let it drift gently down and keep it gently rising and falling with the waters, and not plunge it like a man-of-war's anchor, and abruptly and harshness of manner must be avoided in our attempt at usefulness.

I know a man in New York who is more sunny and genial when he has dyspepsia than when he is not suffering from that depressing trouble. I have found out his secret. When he starts out in the morning with such depression he asks for special grace to keep from snipping up anybody that is not of the orth additional determination to be kindly and genial, and by the help of God he accomplishes it.

Many of our nets need to be mended in these respects, the black threads and the rough threads taken out, and the bright threads and the golden threads of Christian gentleness woven in.

In addition to this we need to mend our nets with more threads of patience. It is no rare thing for a fisherman to spend one whole day before he can take a St. Lawrence pike, or an Ohio salmon, or a Long Island pickerel, or a Cayuga black bass, or a Delaware catfish, and he does that day after day without any particular discouragement. But what a lack of patience if we do not immediately succeed in soul catching. We are apt to give it up and say, "I will never try again."

These dear brethren of all denominations, afflicted with theological fidgets, had better get to mending nets instead of breaking them. Before they break up the old religions let them go through some great sacrifice for God that will prove them worthy of such a work, taking the advice of Talleyrand to a man who wanted to upset the religion of Jesus Christ and start a new one, when he said, "Go and be crucified and then raise yourself from the grave the third day!"

Those who propose to mend their nets by secular and skeptical books are like a man who has just one week for fishing and six of the days he spends in reading Izaak Walton's "Complete Angler," and Wheatley's "Rod and Line," and Scott's "Fishing in Northern Waters," and Putnam's "Made Men of Fly Fishing for Trout," and then on Saturday morning, his last day out, goes to the river to ply his art; and that day the fish will not bite, and late on Saturday night he goes to his home with empty basket!

Alas! alas! when the Saturday night of our life drops on us, it shall be found that we have spent our time in the libraries of worldly philosophy trying to mend our nets, and we have only a few souls to report as brought to God through our instrumentality, while some humble gospel fisherman, his library made up of a Bible and an almanac, shall come home laden with the results, his trophies all the souls within fifteen miles of his log cabin meeting-house.

In the time of the great disturbance in Naples in 1649, Massanello, a barefooted fisher boy, dropped his fishing rod, and by strange magnetism took command of that city of 600,000 souls. He took off his fishing jacket and put on a robe of gold in the presence of howling mobs. He put his hand on his lips as a signal and they were silent. He waved his hand away from him and they retired to their homes. Armies passed in review before him. He became the nation's idol. The rapid rise and complete supremacy of that young fisherman, Massanello, have no parallel in all history. But something equal to that and better than that is an everyday occurrence in heaven. God takes some of those who in this world were fishers of men and who toiled very humbly, but because of the way they mended their nets and employed their nets after they were mended. He suddenly hoists them and robes them, and seizes them and crowns them and makes them rulers over many cities, and He marches armies of saved ones before them in review—Massanello's momentary rule is imitated in heaven. The fisher boy of Naples soon lost his power, but those people of God who have kept their nets mended and rightly swung them shall never lose their exalted place, but shall reign forever and ever. Keep that reward in sight.