themselves, the following directions may be useful: Procure a pulley of any convenient size with sufficient width of face to accommodate two belts. It should be perfectly flat on the face and smooth, and mounted upon a shaft perfectly round and smooth, which may rest upon a pair of balancing bars or centers, so that it will be free to move in any direction. Next procure a good average belt one inch wide and fasten one end to the floor, and pass the other end over the pulley, and to this end suspend a weight of 100 pounds. The belt should be so attached to the floor that when the weight is suspended the belt will embrace just one-half the circumference of the pulley. Now, the power of a belt is simply the friction between the under side of the belt and the face of the pulley, governed by the stress to which the belt is submitted, for, according to the established laws of friction, the frictional resistance between any two bodies in intimate contact increases as the weight. Therefore, as we have submitted the belt in question to a stress of 100 pounds, and that being the weight pressing against the face of the pulley, it only remains to find the power necessary to overcome this frictional resistance and cause it to slip. For this purpose one end of a strap, about the same thickness as the belt, should be attached to the face of the pulley and passed over it, so as to draw in the opposite direction to the weight. Now, if sufficient weight be attached to the strap to overcome the friction of the belt and cause it to slip under this pressure of 100 pounds, that weight will represent the frictional power of the belt. With a smooth-faced iron pulley and a belt of average thickness, that weight will not vary materially from forty pounds. The writer has tested this at different times and under different conditions, and while belts that were strictly new have in most cases fallen a little short, old belts that were worn and greasy gave a trifle more, but the average belt that had been used but a short time gave near enough to forty to say that the frictional power of a leather belt is forty per cent of the stress. Tests were also made in the same manner with belts two, three and four inches wide, with the same results, so that it is also quite safe to say that the frictional power of a belt is as the stress, regardless of width. That is to say, that with the same stress of 100 pounds, the four-inch belt slipped with the same force or weight of forty pounds; but with a stress of 400 pounds upon the four-inch belt it required a weight of 160 pounds upon the strap to cause it to slip, thus proving what has already been stated, that the frictional power of a leather belt under ordinary circumstances is equal to forty per cent. of its stress, regardless of width. That, consequently the frictional power of a belt twelve inches wide under a standing stress of 1,200 pounds, would be no more than a six-inch belt under the same stress. But while the twelve-inch belt would only be required to stand a stress of 100 pounds to the inch in width, the six-inch belt would necessarily be subjected to a stress of 200 pounds to the inch. Therefore, it will be seen that if a stress of 1,200 pounds be required to transmit a given power, it will be more economical to use a belt twelve inches wide than one of six.

The following rule may be deduced from the foregoing tests: To find the power that may be safely transmitted by a leather belt, when the speed and stress are given, multiply the speed of the belt in feet per minute by forty per cent. of the whole stress and divide by 33,000. Assume the twelve-inch belt first referred to at a tension of 1,200 pounds to move at a velocity equal to 2,000 feet per minute. First, forty per cent. of 1,200 is $12 \times 40 = 480 \times 2,000 = 960,000 \div 33,000 = 29$ horse-power.

The foregoing rule is based upon the supposition that the belt embraces just one-half the circumference of the pulley, but where it embraces more or less it has been found that the frictional power increases or decreases nearly in proportion to the square root of arc of contact.

THE AGE OF TREES.

RECENT information gathered by the German forestry commission assigns to the pine tree 500 and 700 years as the maximum of life, 425 years to the silver fir, 275 years to the larch, 245 years to the red beech, 200 years to the birch, 170 years to the ash, 145 years to the alder and 130 years to the elm.

VIEWS AND INTERVIEWS.

Historical Trees.

On the road from Therapia to Buyukdere, on the Bosphorus, there stand in a beautiful meadow several splendid plantains of immense size. They have been several times struck by lightning, split down the middle, and in some cases part of the trunk has been consumed by fire. Nevertheless, they are still fresh and vigorous, putting forth fresh leaves and branches every year. Under their shade Geoffrey de Bouillion, Duke of Lorraine, encamped in the year 1096, with a portion of his suite, when on his way to rescue the holy places from the thraldom of the Saracen; and popular belief attributes to this circumstance the wonderful vitality of these trees.

Age of the Oak.

We learn of the "early ripe" and what is sometimes the corollary of this, the "soon rotten." There is none of the latter element in the composition of the sturdy oak, which woodmen are proud to refer to as the monarch of the forest. Prof. Marshall tells us that the oak in a general way requires to grow from 120 to 200 years before it is fit to cut for large timber. Left alone, it may live for 1,000 years, but the proportion of good timber in trees after a certain age rapidly diminishes. There are many trees still standing in this country which are from 800 to 1,000 years of age. The oak rarely bears fruit at all before it is fifty to sixty years old, and seventy to eighty years is a more general age. When the fruiting season has once been reached, the tree goes on producing acorns every year; but it is noteworthy that heavy crops of good seeds only recur every five years or so, the yield in the interval being inconsiderable. This is in accordance with Hartig's discovery that in the beech, for instance, the tree goes on storing up nitrogenous materials and salts of phosphorous and potassium during the first seventy or eighty years of its life, and then suddenly yields these stores to seeds.

Not all Gain.

The age belongs to the specialists. An all-round man in any calling, and especially in mechanical lines, will look far afield to find his proper niche in this day. The place is not easy to find, nor is it easy to find the man, when the place and work are waiting. This point is nicely illustrated by a writer in the Industrial World, who, entering somewhat philosophically into his subject, gives expression to thoughts that are practical and suggestive. Recently this writer needed some sheet metal work done in accordance with drawings prepared by him. "Forty years ago there could have been found in any American village of two thousand population a tin shop wherein this job would have been done at once and well done. After a long search a good general worker of sheet metals was found who was willing to undertake the job. He was not found in a sheet-metal-working establishment, but in a shop where model machinery is a specialty. Such shops as these cull out from numerous applicants such as can demonstrate all-round skill in their respective trades. They are usually men well advanced in life. As they drop away, one after another, it becomes more and more difficult to supply their places. The decrease of manual skill and of artistic sense among mechanical workmen results not merely from want of such all-round practice as they got half a century ago, but from a want of that sort of loving interest in their work which the old-timers used to feel, when they could put something of their individuality into everything that they made. Nowadays the workman has simply to work out a design—or rather, to run a machine to work out some part of a design—prepared by some artist whom he does not know and never has seen. The general result may be beautiful when the different parts are assembled, but the workman feels that he has no personal share in the production of its beauty. He has become a regulator of a machine; he simply sharpens tools, adjusts them, keeps his machine oiled, and puts into it the material to be worked upon. All the precision, the nicety of operation are due to the mammate rather than the living tool. What interest can such work beget? What lofty ambition can it stimulate? What workman when the bell rings the time to quit work feels reluctant to leave his task or lingers over it to bring out some beautiful effect or interesting combination that he feels he must see before he can depart contentedly? If machines were invented to play billiards, and only by their use could this king of games be played, how long would the game be a favorite? If violins could be performed upon only by automatic mechanism, or pictures painted only by machine-actuated, self-charging brushes, who would be charmed any longer by art? Neither the artist nor the dilettante; the artist and the dilettante would cease to exist. So, while we have gained much from the enormous increase in labor-saving machinery that has characterized the latter half of the present century, we have lost what probably will not soon be restored, the love of work and pride in work for its own sake, the love and pride that were the parents of mechanical skill; skill which, now they are dead, is itself decaying. The loss appears inevitable to those who scan the social horizon philosophically; it is, however, no less to be regretted because unavoidable. This tendency of labor-saving machines was many years ago pointed out by Ruskin, who, in the light of the fulfillment of his prediction, proved only too true a prophet. It is this effect upon the masses, more than unequal distribution of wealth, that is separating society into distinct classes." The wonderful progress of the nineteenth century is not all gain.

A Bit Of Advice.

An axiom that found place in the copy-book head-lines of our school days read: "Whatever is worth doing is worth doing well." It was not always adhered to then, nor is it to day. This is the view, apparently, of our contemporary, Hardwood, who talks as follows of one of the sins of the lumber trade: "When times are a little dull, prices a little off and sales anything but brisk, the temptation comes to the average manufacturer to try to even up things by working in a few boards a little off grade which he has heretofore been in the habit of throwing down a grade or two, thus making the grade enough poorer to correspond with lowered prices. There is also a disposition to slight the various stages of manufacture, such as careful turning of the log, edging, trimming, etc., with a view to crowding the output to the maximum limit, thus increasing quantity and decreasing cost at the expense of quality of manufacture. This is the very poorest policy a manufacturer can possibly adopt. Under the conditions named is the time, if ever, when he should look closely after the manufacture of his stock; see that the best is got out of every log; that it is sawed smoothly and evenly; that it is edged carefully and trimmed to a nicety; that it is sorted with discrimination and piled with the utmost care, even to the mill culls, and when ready to ship see that the sorting is kept fully up to grade. Now is the time to gain a reputation for perfect manufacture and good grades. The manufacturer who maintains his reputation on these points during times of slow sale and weak prices will always have the best of whatever trade there is going, and will be sure to feel the first effects of a revival when it does come and he can take his pick of customers. When times are dull, instead of yielding to the temptation suggested to keep up profits, let the manufacturer look about for leaks in the business itself. See that no one is shirking, that there are no deadheads on the pay-roll, that every man is doing a full day's work; look closely after the work in the woods and see that every tree is cut to the best advantage and that teams and men are kept on the move all the time; see that everything is snug and trim and in good repair in the mill, that there are no stoppages on account of broken or weak belts and toggled up machinery; look after the furnace grates and the fuel and the entire steam-making apparatus. In short, when times are dull, the way to meet them is to follow up the business so closely as to make the very best quality of lumber at the lowest possible cost consistent with fair wages to employes. In lieu of this it were better to shut down and wait for better times, for any attempt to get even by any methods at all questionable will inevitably result in making matters worse in the long run."

A tree was cut in the Puget Sound forest recently from which seven cuts were taken without a knot, their combined length being 179 feet. The tree scaled 48,000 feet.