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THE DECADENCE OF THE APPRENTICESHIP SYSTEM.

We, who are privileged to live in the closing years of the nineteenth century, are for ever telling ourselves what a magnificent age it is; and we never weary of hearing and repeating the count of our numbers, our wealth, and our wisdom. More often than not, this self-satisfied recital is rounded off with a contrast between what our forefathers were and what we have grown to be. In the main, the comparison is a just one, for as a matter of fact man, individually and collectively, is to-day better clothed, better fed, has more money in his pocket, and is cleaner in morals and person than he was fifty or one hundred years ago. In the midst of this general advance, and in some measure as the result of it, the student of social economics can detect here and there the signs of a decided retrogression. Happily such cases are few; but they exist, and no amount of material prosperity should be allowed to blind us to the fact. Among the many customs of our forefathers that have fallen into disuse, there are some whose lapse can only be regarded as a misfortune, and whose revival would prove to us that these customs were the outcome of experience, and that they were prompted by solid wisdom.

There was a time in this country when the entrance door into every trade was strictly guarded, and the boy who aspired to the dignity of being ranked as a journeyman carpenter, machinist, or builder could only hope to do so by becoming bound in an apprenticeship of greater or less duration. His instruction, which was carried out with the characteristic thoroughness of former days, commenced with the very alphabet of his trade; and each department was fully mastered before he was passed to the next. He attained at once manual dexterity and a knowledge of detail; and incidentally he acquired also a thorough respect for his trade, efficiency in which could only be gained after so many long years of training. At the close of his apprenticeship he was entitled to be called a skilled workman, and could command a journeyman's wages.

But to-day as the French would say, "we have changed all that." Apprenticeship is no longer the invariable rule—it is the rare exception. The careful, detailed instruction of the apprentice by the master mechanic has given place to a "hit-or-miss," "get-there" system, or, rather, lack of system, in which the boy's instruction is dependent upon the caprice of the journeymen whom he is told off to assist. In place of the regular day-by day instruction of the apprentice, who, by virtue of his articles of agreement, was entitled to continuous employment, the boys of to-day have to take their chance of picking up knowledge and acquiring manual skill at the odd times when they may be so fortunate as to secure employment.

Under the old arrangement, the boy was sure of receiving instruction—his master was pledged to give it him; and, moreover, he would be at times intrusted with a job which was a little beyond his powers. It was taken for granted that he would spoil some of his work; and to a certain extent he in this way offset the profit accruing to the master from his unremunerated labor.

Under the present system there is no obligation, and certainly no disposition, to give the boy helpers any work which they are likely to spoil. They are engaged to do menial labor, and it is only in rare cases of emergency that they get an opportunity to try their hand at a more important class of work. A "green" hand in a machine shop is never regarded as a pupil. He is judged from the standpoint of profit making, and the tendency is to keep him at work indefinitely at the machine with which he is familiar. The apprentice was moved from drilling machine to shaper; from shaper to lathe; from lathe to vise; and by this varied experience he acquired an all round knowledge and efficiency. But the specialization of work in these days has limited the range of a boy's opportunities to such an extent that he can never hope to gain much knowledge or execution outside the particular class of work to which he is assigned.

It must be admitted, however, that excellent as were the results under the old apprenticeship system, it would be impossible to carry it out under the present industrial conditions. The apprentice was "bound" to his master, lived under his roof, and ate at his board. Modern social conditions and the modern temperament would not lend themselves to a compact in which the position of the boy was one of very pronounced servitude; and the keen competition in the various industries, the close margin upon which the master mechanic has to figure in competing for a share of the trade, the speed and thorough system which are necessary in a modern workshop, all render the careful training of green hands in the shops a practical impossibility. Neither the master mechanic nor the journeymen can spare the time for such personal oversight; and work which has been contracted for upon the smallest margin of profit cannot be trusted to the clumsy, if willing, hands of a beginner.

But if the old system, good as it was, is impracticable to-day, and the methods of to-day are so faulty, what, it will be asked, is to be the remedy? We think that it will be found in an arrangement which shall embody the best features of both systems, and which shall be supplemented by that admirable institution known as the trade school.

The idea of oversight was an excellent one; and, so far as it can be exercised without interference with shop routine, it should be encouraged—at the same time the term of service should be very much reduced, and the relation of the boys to the master mechanic rendered more elastic.

The National Association of Builders has recommended that a lad who wished to enter a trade should go first to a trade school, and discover in which direction his tastes and aptitude lay. After passing an examination by a committee of master mechanics at the close of his course, he should enter the workshop as a junior. Here he would acquire speed and execution, and by the time he was capable of doing a "full day's work" be would be subjected to a second examination, the passing of which entitled him to be ranked as a journeyman. "Proof of ability, not length of service, is the test of what constitutes a mechanic in this system."

These suggestions are excellent, and they are thoroughly practical. The hope for the future of the American workman lies in the hearty co-operation of the master mechanics and the journeymen with the trade school system. If the American boy is to have any chance of holding his own against the incoming tide of skilled foreign labor, some radical change must be made in existing conditions. As we have shown, it is now well nigh impossible for him to attain the all round efficiency which marks the foreign journeyman, and enables him to secure work almost at the first application. If the master mechanics would follow some such scheme as was outlined by the national association, the inefficient, or, as he is expressively known, the "botch" workman, would cease to exist.

THE SPEED TRIALS OF THE BROOKLYN AND THE OREGON.

During the past week two notable ships of the new navy have had their speed trials, and in each case the contract requirements have been exceeded by over a knot an hour. On May 11. the Brooklyn, an improved and enlarged New York, during a builders' trial of three hours duration, using forced draught, maintained an average speed of 21·07 knots an hour, which is 1·07 knots above the contract speed. The average revolutions of the screws were 132, and the steam pressure averaged 155 pounds. It is gratifying to learn that there were no signs of distress either in engines or boilers. As compared with the New York, the Brooklyn is of 670 tons greater displacement, measuring 9,150 tons against the New York's 8,480 tons. She is 400 ft. long, has 64 ft. 8 in. beam, and 24 ft. mean draught. She is armed with eight 8 in. guns—two more than carried by the New York—ten 5 in. guns, and sixteen 6 pounder rapid-fire and machine guns. She is protected by a complete steel deck, 3 in. thick on the flat, and 6 in. on the slope, and by a water-line belt of 3 in. steel plate backed by a double thickness of hull plating over the whole length of the "vitals." Moreover, the 8 in. guns are protected by 10 in. and the 5 in. guns by 4 in. of steel.

The performance of the Brooklyn on the Atlantic was excelled, relatively speaking, by that of the first-class battle ship Oregon, in Pacific waters, a few days later. The Oregon is a sister ship to the Massachusetts, which we illustrated in a recent number. The latter ship, it will be remembered, broke the record for her class by steaming 16·15 knots for four hours; but on Thursday, May 14. the Oregon exceeded this speed by $\frac{63}{100}$ of a knot, maintaining the high rate of 16·78 knots on a four hours' continuous trial. This is more than 1¾ knots above the contract requirements, and unless there are tidal deductions to be made from her speed, she will earn a bonus of $175,000 for her builders, the Union Iron Works, of San Francisco.

Platino-Cyanids.

Arnulf Schertel describes, in the last Berichte, a new method of preparing platino-cyanids. Platinum chlorid is precipitated by hydrogen sulfid at 60° to 70° and the well washed platinum sulfid is dissolved in a warm solution of potassium cyanid. On evaporation the potassium platino-cyanid, $K_2Pt(CN)_4 \cdot 3H_2O$, crystallizes out, and equal parts of potassium sulfid and potassium thiocyanate remain in the mother liquor. If a solution of barium cyanid is used, the barium platino-cyanid is obtained. With commercial potassium cyanid containing large quantities of sodium cyanid, Schertel obtained the beautiful double salt $KNaPt(CN)_4 \cdot 3H_2O$, described by Martius. In view of the fluorescence of the barium and other salts of the platino-cyanids under the Roentgen rays, this simple method of preparation is of considerable interest.—Science.

AT a recent meeting of the Paris Academy of Sciences M. Balland presented a memoir describing an analysis of a sample of rice over a century old. He found the rice only slightly deficient in fat.

Intensifying Platinotype Prints.

BY E. J. WALL, F.R.P.S.

The following notes upon this subject are written in response to a question addressed to the "Consulting Room," but to answer thoroughly there would take up too much space.

Platinum is one of the most intractable of metals, and cannot, therefore, be converted into any form suitable for redevelopment without partially or entirely destroying the paper support. There are three distinct methods of intensification, not counting the so-called toning processes with uranium and iron and Packham's organic solutions, all of which, though described as toning, are really intensification processes.

Silver Intensification.—The most satisfactory formula for this is an acid hydroquinone solution:

1. Hydroquinone	2 grains.
Citric acid	20 "
Distilled water	1 ounce.
2. Silver nitrate	48 grains.
Distilled water	1 ounce.

The prints, after development and clearing, must be thoroughly freed from acid and placed in a clean dish, a porcelain or glass dish for preference. Add 10 drops of No. 2 to 1 ounce of No. 1, and the solution, which immediately turns white and cloudy, should be well stirred and immediately applied to the wetted print and the dish rocked. Gradually the solution will begin to turn dark and dirty, but before this stage is reached the print will be seen to gain considerably in depth, and, when the desired intensity is reached, the solution should be poured off, the print thoroughly washed and fixed in hypo, and again well washed and dried. The image now consists partly of platinum and partly of silver. By treatment with a platinum toning bath such as—

Chloro-platinite of potash	1 grain.
Citric acid	20 grains.
Salt	10 "
Water	2 ounces.

the silver may be replaced by platinum, the result being almost a pure platinum image. Or, if slightly bluish tones are preferred, then the ordinary sulphocyanide gold bath may be used instead of the above platinum bath.

Platinum Intensification.—Dr. E. Vogel suggested the use of a very weak ferrous-oxalate developer, to which some platinum salt was added, but in my hands this is comparatively a failure. Miethe's process is rather more satisfactory, but is liable to give coarse granular images, and it is somewhat difficult to keep the whites pure. The print, after development and before clearing, is placed in a clean dish, and flooded with as little of the following as will cover it:

Solution of neutral oxalate of potash	1 ounce.
" sulphate of iron	90 minims.
" potassium bromide (10 per cent)	90 minims.

The first two solutions are those used for ordinary ferrous-oxalate development. When sufficiently intensified it must be treated with acid as usual.

A much more satisfactory intensifier is that suggested by Hubl:

1. Sodium formate	48 grains.
Distilled water	1 ounce.
2. Platinum perchloride	10 grains.
Distilled water	1 ounce.

For use add to 1 ounce of water 15 drops of No. 1 and 15 drops of No. 2. The well washed print should be placed in a clean dish and flooded with this solution, and intensification will be complete in about fifteen minutes, when the print should be well washed and dried. Prints which have been dried take much longer to intensify by this method than those just developed.

Sodium formate is not in general use, but can be obtained by any dealer to order, as it is a well known salt. It must be noted that platinum perchloride—known also as platinum bichloride or platinic chloride, not the potassium chloro-platinite—must be used.

Gold Intensification.—The following process suggested by Dollond is very satisfactory. The well-washed print should be soaked in water, laid on a sheet of glass face upward, and excess of water removed by clean blotting paper. Pure glycerine should now be spread all over the print with the finger or a soft camel-hair brush. Now take a solution of chloride of gold one grain to the half drachm of water; add chalk to neutralize; filter, and then add one drop of strong hydrochloric acid. Drop about ten drops of this on to the print, and distribute at once all over with a camel-hair brush, and keep on brushing the print, which will gradually intensify. When sufficiently strong, rinse quickly and well, and sponge back and front of print with equal parts of the following:

1. Metol	50 grains.
Sodium sulphite	1 ounce.
Water	10 ounces.
2. Potassium carbonate	1 ounce.
Distilled water to	10 ounces.

Then wash the print for half an hour and dry.

The rationale of all these processes is very simple. The intensifying metal, silver, gold, or platinum, is mixed with a reducing agent which gradually reduces the salt to the metallic state; but before there is any actual separation the metallic platinum of the image attracts the intensifying metal while it is in statu nascendi—that is, in the process of formation. This is entirely analogous to the development of a wet collodion plate, and is called physical intensification.—Photographic News.

Artificial Flight Successfully Achieved by Prof. Langley's Aerodrome.

Artificial flight, corresponding very closely to the soaring of birds, has been at last successfully accomplished, and this, not merely for a short spurt down a hillside or along the level, but for a distance of half a mile, during a part of which distance the machine was actually soaring upward against the pull of gravitation.

The aeronautical world in general will be gratified that the first really practical solution of the problem should have been made by Prof. Langley. There is no experimentalist in this field of science who has labored harder to solve its problems than the secretary of the Smithsonian Institution; and it is noteworthy that the solution of mechanical flight should have been found in the direction in which his efforts have been persistently applied.

Prof. Alexander Bell, who was associated with Prof. Langley in the test recently made public, describes the successful experiments, which were carried out near Occoquan, Va., on May 6, as follows:

"Last Wednesday, May 6, I witnessed a very remarkable experiment with Prof. Langley's aerodrome on the Potomac River. Indeed, it seemed to me that the experiment was of such historical importance that it should be made public.

"I should not feel at liberty to give an account of all the details, but the main facts I have Prof. Langley's consent for giving you, and they are as follows:

"The aerodrome, or 'flying machine,' in question was of steel, driven by a steam engine. It resembled an enormous bird, soaring in the air with extreme regularity in large curves, sweeping steadily upward in a spiral path, the spirals with a diameter of perhaps 100 yards, until it reached a height of about 100 feet in the air, at the end of a course of about a half mile, when the steam gave out and the propellers which had moved it stopped.

"Then, to my further surprise, the whole, instead of tumbling down, settled as slowly and gracefully as it is possible for any bird to do, touched the water without any damage and was immediately picked out and ready to be tried again.

"A second trial was like the first, except that the machine went in a different direction, moving in one continuous gentle ascent as it swung around in circles like a great soaring bird. At one time it seemed to be in danger, as its course carried it over a neighboring wooded promontory, but apprehension was immediately allayed as it passed twenty-five or thirty feet above the tops of the highest trees there, and, ascending still further, its steam finally gave out again, and it settled into the waters of the river, not quite a quarter of a mile from the point at which it arose.

"No one could have witnessed these experiments without being convinced that the practicability of mechanical flight had been demonstrated.

"ALEXANDER GRAHAM BELL."

PROF. LANGLEY'S EXPLANATION.

Prof. Langley also made public a supplemental statement, giving some important data regarding recent experiments. It is as follows:

"The aerodrome, or flying machine, has no gas to lift it, as in the case of a balloon, but, on the contrary, is about 1,000 times heavier, bulk for bulk, than the air on which it is made to run and which sustains it somewhat in the way in which thin ice supports a swift skater.

"The power is derived from a steam engine through the means of propellers, but owing to the scale on which the actual aerodrome is built, there has been no condensing apparatus to use the water over and over. Enough can be carried for only a very brief flight, a difficulty which does not belong to larger machines than the present example, in which the supporting surfaces are but about fourteen feet from tip to tip.

"The distance flown each time was about one-half mile. The rate of speed depends (as in the case of any vehicle on land) on whether it is going on a level or uphill. In the case of this last trial of May 6 the machine was ascending, that is to say, it was going uphill all the time, and went through a distance of one-half mile or more in one and one-half minutes, or at the rate of a little more than twenty miles an hour."

AT the last session of the Illinois legislature an appropriation was made for the erection and equipment of an observatory for the State University at Champaign. The contract for the instrument equipment includes a 12 inch equatorial, a 3 inch combined transit and zenith telescope and a chronograph. The optical parts by Brashear, the fittings, etc., by Warner & Swasey. Prof. Ira O. Baker will be in charge of the observatory.

Science Notes.

Acetylene gas is attracting considerable attention in the north of Italy and we have received a copy of a new journal devoted to it, L'Acetilene e le sue Applicazioni, published in Milan. So far as we know this is the only paper given up to the new illuminant. One of the illustrations, which is credited as an American invention, is a lamp post in the base of which is a cylinder of liquefied acetylene gas. When the cost of the gas shall be materially lessened, some such scheme would furnish an ideal light for the grounds of country residences.

At a recent meeting of the Meteorological Society, Mr. W. Ellis, F.R.S., read a paper on the "Mean Amount of Cloud on Each Day of the Year at Greenwich for Fifty Years, up to 1890," from which it appeared that a principal maximum occurs in winter and a principal minimum in autumn, with a secondary much less pronounced maximum in summer, and a secondary minimum in spring. Cloudless days are most numerous in spring and autumn, and least numerous in winter and summer. Days of "much cloud" are nearly equal in amount in all parts of the year.

Lecturing at the Institution of Civil Engineers on atmospheric dust, Mr. Fridlander said that observations show that at an elevation of 6,700 feet there are 950 dust particles in a cubic centimeter, while at 8,400 feet there are only 513, and at 13,600 only 157 dust particles. Over the Indian Ocean the average number of dust particles a cubic centimeter was less than 500 for seven out of nine days, and on five days was less than 400. During a thick fog in the Atlantic, the air contained 3,120 dust particles a cubic centimeter, while in the clear region just beyond the fog there were only 280 dust particles.

As to the nature of the poison engendered by fatigue, some recent experiments have been made that are replete with interest. Maggiori and Mosso, as well as Wedensky and others, find that if the blood of a fatigued animal be injected into another animal that is fresh and unfatigued, all the phenomena of fatigue will be produced. Wedensky has made a chemical analysis, and finds the poison to be similar to the vegetable poison curare, into which the Indians used to dip their arrows, and a most deadly poison it proved to be. The poison engendered by fatigue is of the same chemical nature, and is as truly a deadly poison. In case it is created more rapidly than can be carried off by the blood, the organism suffers seriously.

A new prize has just been added to the long list of those awarded by the Paris Academy of Medicine. The prize is of the value of 24,000 francs ($4,800), the interest on a capital sum of 800.000 francs ($160,000), bequeathed by Mdme. Audiffred for the purpose. It is to be called the "Francois Joseph Audiffred Prize," and is to be awarded to any person, of whatever nationality and of whatever profession, who shall within twenty-five years from January, 28, 1896, discover a remedy, curative or preventive, recognized by the Academy as efficacious and specific for tuberculosis. In the meantime, the interest accruing from the bequest is to belong to the Academy, and can be applied in any way which that body may think proper.

As the result of his prolonged study of those striking phenomena, the thunder storms of Madras, Prof. Smith informs the Scottish Meteorological Society that the first remarkable fact observed by him was that of certain seasons of the year when sheet lightning appeared almost every night, always in a west or southwesterly direction, and invariably near the horizon; it may be, therefore, he remarks, that these discharges occur in the region where the moist and dustless sea winds meet the dry and dusty land wind, one being, perhaps, positively electrified and the other negatively. In these lightning displays, as many as three hundred flashes per minute have been counted, this rate being kept up for an hour or an hour and a half. Another notable peculiarity remarked of this region is that the heaviest rains are unaccompanied by thunder, while the displays of lightning are not accompanied by any rain.

H. M. Bernard has been engaged for the past ten years in endeavoring to find an explanation of light sensations, and has at last worked out a theory which he considers capable of connecting and explaining most of the phenomena. He hopes also to prove that it is capable of demonstration, and is now engaged in arranging the evidence. Meanwhile, a short abstract is published of the conclusions arrived at, the development of visual organs in the animal kingdom being briefly described as follows: Under the influence of light certain organisms traveling toward the light seek either to leave the Metazoan body altogether or else to discharge their contents at the surface. Such emigration cannot take place without the cognizance of the nervous system, and in the most frequently illuminated parts of the body complications arise between the fugitives and the other tissues, notably the peripheral nerves. Bernard's suggestion, says the Magazine of Natural History, is that out of these complications all the known eyes of the animal kingdom, the most complicated as well as the most simple, have arisen in one way or another.