

SESSION



1906-1907

Essay on the Engineering Exhibition

BY "VULCAN"

"Mill, forge and foundry tribute pay
To his inventive brain."

THE dazzling brilliance of the moderns' sun illumines the green slopes of the "Mount," and from the ante-chamber of this "throne of the gods" the "fount of life" is visible in the distance, variegating its limpid flood to mystic silvery strains. But even here time is omnipresent, and a clock recorder at the entrance strikes immediate practicality into the veriest layman, as he commences to sum up the wonders of this hive of industry.

Give to the ancients their well earned laurels in the plains of Art, but here is that greatness of the summits of usefulness which far surpasses the beauty of the baubles of an effete civilization, and is the climax of that proverb of all time, "Labor omnia vincit."

Among the machines the miller is pre-eminently the tool of the present, and of the universal type, pride of place lies between the Browne and Sharpe and the Kempsmith. These machines embody the best features of their class, telescopic table spindle, feed and speed change boxes, micrometer adjustments, automatic stops and universal heads, all representative of the most recent practice.

Messrs. Ludw. Loewe show a vertical tool, of the pillar and knee type, of a substantial and compact design, with enclosed gear and the usual stops and movements.

Another, though smaller, vertical miller is put forward by Messrs. Selig, Sonnenthal for light repetition work as its speciality.

A circular miller for gear wheel blanks, pulleys, hand wheels, and similar work which cannot be readily chucked in the lathe, is shown in action on Messrs. Holroyd's stand; the job is revolved between two side cutters and a rim cutter, and can be finished in one operation.

A screw miller also on this stand is operated by the usual change gear system, and will cut any type of screw thread. Several other firms have machines of this class, claiming for special work of repeat nature both the advantage of speed and accuracy over the usual lathe method.

Motor car work has introduced the cam miller, several types of which are shown acting on the form-cam principle, marking out, cutting from the rough and finishing off in three operations.

For light work the grinder is a close rival of the miller, and for accuracy undoubtedly excels the latter in many ways.

A Norton machine is shown producing spindles, shafts and the like from the rough turning, particular stress being laid on the rapidity of output. In this machine the work-table slides longitudinally, the abrasive wheel having only the lateral movement, and although this entails more shop room, the extra rigidity imparted to the wheel more than counter-balances the saving in space by the former belt-drum type.

The most complete and up-to-date stand of grinders is that of the Agenoria Co., the most conspicuous being a large circular saw sharpener of an improved pattern, in which each tooth is ground at a different angle from its neighbour.

Another machine of the same type for small circular and jig saws is shown on the same stand, as also one for band saws. These grinders are fast displacing the old method of filing, and being fully automatic entail the least possible amount of attention.

The twist-drill grinder of this firm is of the same high standard, and more than ordinary interest attaches to it as being the only automatic machine of its class in the Exhibition. The tool and wheel are both power rotated, the former moving across the face of the rim of the latter: by this means the stone is kept truly circular, and, each tip of the drill being touched alternately, a perfectly central point is obtained. Backing-off is also provided for, and the tool is finished complete.

A heavy vertical grinder specially for engine cylinders is

also shown in operation and embraces the usual features of this type.

Several other grinders for various purposes are on view, tool, disc and plug-cock grinders being among the most important; the first class also includes the making of formed milling cutters for screw cutting. A magnetic chuck is shown in conjunction with a disc type of machine for small jobs; the body, of aluminium, holds four permanent magnets, and the work is fed forward by means of a screw. Messrs. Selig, Sonnenthal's method of grinding cocks provides a means of rotating the plug in the cock, abrasive powder being introduced into the barrel.

Grinder wheels, set stones, cloth and paper of the various materials on the market, all have their place in this section.

Among the lathes, those for high-speed work naturally claim first attention, and A.W. steel is well exemplified in turning down a mild steel bar, taking a cut $1\frac{1}{2}$ in. deep by $\frac{1}{4}$ in. traverse at 30 ft. per minute.

The Lodge & Shipley lathe, which is of the all gear head type, is specially adapted to high-speed work, one noticeable feature, to the casual observer, being the gauge glass for oil in the bearings.

The Pitler plain and turret, Bullard turret, Gisholt turret, Springfield, and several others of well known types, embody the very latest practice in this class of machine, but space precludes more than a passing reference to their many excellences.

Messrs. Burton, Griffiths have a semi-automatic lathe with the turret in the form of a ring circled round the bed, and having eight tools, the specific advantage being that more top room is available for long jobs.

The Bogert cranklathe is of special design for its work, and is of most rigid construction: the "centres" are of the clamp type with a graduated throw adjustment; four tools are employed, each one of a pair balancing that on the opposite side.

An automatic screwer by Messrs. Pfeil has all the usual attachments of its class, and also a special means of feeding the bar forward at a higher rate than is generally provided, thus further increasing the output.

The Acme automatic screwer is of a good design, eight tools being operated simultaneously. The tap revolves at a higher

rate than the work, and upon the stop coming into action runs itself out, there being consequently no shock at reversal.

Of the lathe order is the Colburn turret boring and turning mill, which has five tools in the turret and an automatic screw cutting device.

Planer practice is well illustrated by Messrs. Bateman with their 30 in. \times 30 in. \times 8 ft., four tool, motor driven machine; in this the reversing power is conserved by means of fly-wheel belt pulleys. The rack is fixed to the table with powerful springs which absorb the recoil at the end of each stroke.

Two planer specialities are also shown, a dead beat speed meter and an adjustable vice, both of which should find a ready market.

Shaping machines of the crank type, for plain work, have been displaced by the friction driven tool, and Messrs. Ludw. Loewe show a machine of this order in which all the adjustments can be made while running. This is a specially valuable property, as a large amount of time must of necessity run to waste in adjusting the stroke on the older type.

Boring, drilling and slot drilling machines of all forms are to be seen. The A.W. steel again shows its paces in drilling $\frac{3}{4}$ in. holes through cast-iron 2 in. thick in 6 seconds, at 640 R.P.M.; through 2 in. mild steel in 10 seconds at 340 R.P.M. Sensitive drills and a square hole drill also have their special advantages in this class of work.

Automatic gear cutting machines are almost all of them of the hobbing type, only one being of the generating order, viz. the Oêrlickon. The hobbing method from a master tooth has seemingly superseded the formed milling cutter, especially for bevel and spur wheels with involute teeth.

Messrs. Pels have made a speciality of light weight shearing, cropping and notching machines. These are built up of steel plating, and are of a first-rate design typical of the best practice.

A multiple punch appeals to the time and space economizer by the rapidity with which six different sized holes can be obtained from the one machine.

Belt-driven screw presses, for light stampings, are shown as a distinct advance over the steam hammer and hydraulic press. The drive is by means of friction discs brought into action by toggle levers, the steel screw spindle being cut with a triple square thread working vertically in the machined nut of the cast-iron frame.

Pneumatic, electric and hand-power small tools of various makes all have their quota of exhibitors to make known their special and peculiar advantages.

Messrs. Starret and Messrs. Churchill have complete lines of their latest novelties in tools and precision instruments: cutters, rimers, verniers, micrometers, gauges, centre punches, and all the small requirements of the modern machinist. The automatic centre punch is particularly useful in dabbing small work that requires to be supported with one hand, but is easily damaged if used upon rough or unmachined iron parts.

Belting is most widely used by the exhibitors, but direct motor drive, feed and speed change boxes, and the high speed of modern tools has introduced chain drive as being more suitable for short drives, and better adapted to these requirements.

The greater part of all this machinery is driven by a compound, non-condensing, 300 I.H.P. engine and dynamo set, supplied with steam at 160 lb. sq. in. by a Davies' water-tube boiler.

Several other prime movers of reciprocating, turbine and rotary steam, and producer gas reciprocating types are shown, some driving dynamos for light and power purposes.

Steam boilers and their accessories are well represented; besides the Davies' type mentioned, both the Stirling and Cochran boilers are shown in model form.

Superheaters and parts are submitted in several designs, each having its own advantages and distinctive features.

Boiler compounds are also a notable feature of several stands, the Ross, Hotchkiss firm giving practical demonstrations of their specialities, including an automatic circulator, claiming, among other things, the removal of boiler deposits. The present type, however, appears somewhat complicated, especially for marine work.

Feed heaters, which are numerous, include a "Hudson" fitted to the boiler plant, a "Simoon" live steam type, and a Green economizer model.

Rival coverings are shown in the shape of Slag Wool and mica, with various adaptations of the latter to various purposes.

Messrs. Holden & Brooke have a large selection of their well known injectors; the Penberthy injector also is represented.

Boiler mountings receive a fair share of attention, valves,

gauges and steam traps all being on view in a multiplicity of designs ; but there is little need to catalogue all these or describe any of them.

Among the packings both the Beldam, Asbestos, and Dexine Companies' specialities may be mentioned. The latter firm's production is intended to replace rubber and leather, and is specially used for manhole joints, gauge glass rings, as also pump buckets and hydraulic ram cups.

Messrs. Sanders, Rehders & Co. have applied scientific methods to the construction of feed and steam meters, pressure and draught gauges and recorders, softeners, analysers, and especially their "Sarco" CO_2 recorder. This last is an adaptation of the Bunté burette method by caustic potash absorption, which has met with unqualified success in land power stations ; in its present form, however, it is eminently unsuitable for marine purposes, but the day cannot be far distant when it will take its place in the equipment of the ocean greyhounds.

The Cambridge Co. also show recording instruments, thermometers, hygrometers, calorimeters, and other thermal and electrical meters of the newest forms. The temperature of the steam plant of the Exhibition is taken by means of a thermo-electric couple directly heated. The Fery Radiation Pyrometer also uses the couple, but obtains the electro-motive force by the reflected light from the furnace passing through a telescope on a concave mirror ; this is for very high temperatures where a couple placed in the furnace would speedily perish.

The Keith & Blackman purifier in the centre of the hall attracts attention to the fans and blowers exhibited by this and several other firms for every conceivable purpose. Among others, The Sturtevant, and The Alldays & Onions Companies ; the latter firm also include a full line of forging tools, annealing and other furnaces of several types.

Special metals and casting processes are put forward, notably Sceptre Bronze, Eatonia bearings, and Die Metal castings. These castings are made in die moulds, the good surface contact, and high fluidity of the materials employed, giving a very sound and well finished article, which in many cases obviates the necessity for machined work.

Roller bearings are specially recommended as being more suitable for heavy work than the ball type ; in the Hyatt

flexible roller the somewhat novel method of "wrapping" is employed, the roller being thus a spring bearing in one length.

Flexible shafts, particularly the Wicksteed, have apparently a large sphere of usefulness in competition with pneumatic and electric power distribution over small areas. Another method of harnessing power is by means of the Hele-Shaw plain and reversing clutches, and couplings.

A Walker dynamometer, in the form of two flat vanes gripped to the shaft, affords a ready, safe and reliable means of estimating the power of small motors.

Acetylene gas has still its uses in an ever-widening field, although so completely ousted by electricity for large lighting purposes, and a well equipped stand sets forth its advantages for small lamps, portable flares, and welding plant for lighter articles.

Photography, as applied to the production of plans from tracings by means of the electric arc, has been largely adopted, and several outfits are on view to illustrate its signal victory over the daylight process, a much more uniform result being obtained in considerably less time.

The commercial side of manufacturing is well represented by time recorders, letter and card filers, typewriters and duplicators, calculators and all the et cetera of an up-to-date office.

Recorders of various forms are shown, embodying methods of cost keeping, card systems and filers, and embracing all the requirements of methodic time keeping.

The Oliver typewriter has a very compact arrangement of the types, and a small keyboard with two change keys combined with visible writing give a good impression of its capabilities. In conjunction with this machine the Roneo duplicator of the stencil and dry copier type is shown in action, and the two together leave little to be desired in their special sphere.

Of calculators there are many, from the 5 in. slide rule to the most intricate of mechanical novelties. Three new forms of cursors are shown which increase the ease and rapidity of reading, as also special adaptations to various purposes of the rule. The Simplex machine, in form somewhat resembling a typewriter, is of the most complete nature for general office work.

In concluding this brief summary of the principal features of the Exhibition, one cannot but remark the tardiness with

which some firms adopt new methods, preferring to make sure profits on the present stock rather than venture further capital with the possibility of corresponding profit reduction, and possibly having in view the numbers of new concerns that have lavishly speculated in the most expensive specialising machinery only to find that they are over capitalized and have so much lying idle.

Meantime their more go-ahead competitors are driving out of the markets the produce of those manufacturers whose shops have never known a piece of high-speed steel or the card system, whose machinists are required to grind their own tools, and know not the mysteries of speeds and feeds, or whose offices send out hand-written orders and keep time by the old "check" system: these things are far more common than prosperity would desire and competition permit. Of such surely must have been those chemists who so recently were feasting and merry-making because forsooth one of their number had discovered aniline dye, while a rival power was reaping the prodigious benefits from the fruits of his labours, verily "singing while their homes were burning."

But this is a divergence induced by the wondrous display, and it only remains to note the possibilities of obtaining information from such a storehouse are vastly increased by an exercise of this present nature; the necessity for concentrating the attention on individual objects and examining everything in detail, instead of merely giving a cursory glance over the whole in one fleeting visit, constitutes a valuable incentive which cannot be too highly estimated.

Finally, a tribute of praise is due to Messrs. G. D. Smith and F. W. Bridges for their so completely successful organization of the show; the large numbers of illustrious names that are associated with its political, social and technical arrangements place it in the front rank of exhibitions, and no higher appreciation of their efforts can be given than is expressed in its fullest significance by the lines:—

" 'Tis not in mortals to command success
But they have at least deserved it."

(Certified to be the sole work of the writer signed "Vulcan.")
