

# The Inventions of Camille Contal

## Evolution of a curious four-speed breast drill

By Sean McConnell, member New Zealand Vintage Tool Collectors Club (NZVTCC), and Hand Tool Preservation Association of Australia (HTPAA)

Manufactured in the early decades of the twentieth century, this curious four-speed breast drill was designed by a prolific French inventor named Camille Contal (1868-1960). Between 1900 and 1930, he successfully registered multiple patents in France, the USA, and Germany. His interest in a wide range of mechanical and electrical devices is reflected in these varied patents, which in addition to this breast drill included a ratcheting socket wrench, gearing for a hand-powered vacuum cleaner, an electric horn, a motorcycle chain tensioning device, a refinement of a mechanical piano, an automobile suspension, a variable speed electric drill, and an unoxidizable nickel-copper alloy.

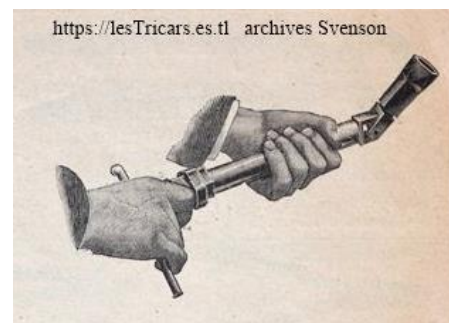
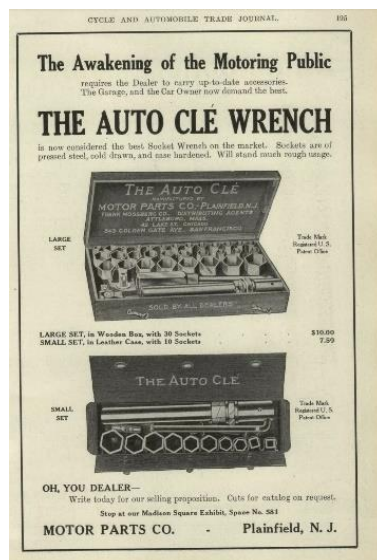


*Camille Contal, his four-speed breast drill, and his early electric motorcar.*

The information currently available online about Contal's inventions is focused primarily on his contributions to the nascent automotive industry. The French-language website "Lestricars" (the three-wheeled cars) is dedicated to the history of the early motor-tricycles that grappled for market share alongside motorcars and motorcycles in the early years of the twentieth century. A detailed description of Camille Contal's Mototri is available in French, and thanks to the marvels of Google, the website can be automatically translated to a very readable English version via the Google Chrome browser.

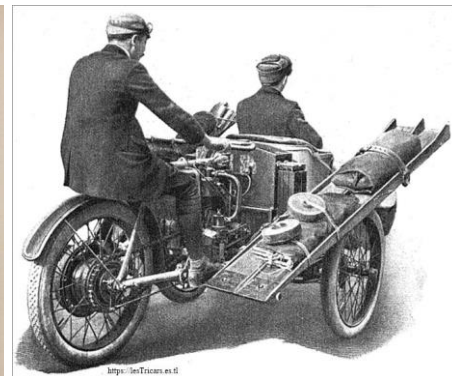
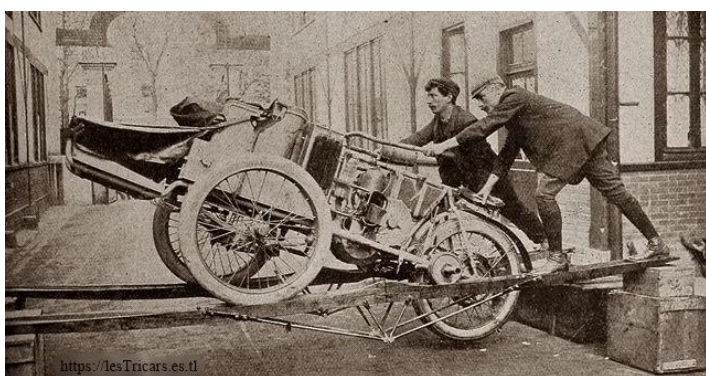
In 1901 Contal designed and built an electric car called the Electrica. Capable of generating approximately 8 horsepower, its speed averaged 17 km/hr and it could cover a range of over 100 kilometres. Three years later he sold his interest in the company and moved on to other projects. This appears to have set the trend for the remainder of his working career, whereby he collaborated on projects ranging from airplanes and airships to petrol vehicles and hand tools, ever moving from one invention to the next.

In 1903 he designed and patented a ratcheting socket set. Marketed to motoring enthusiasts as "L'Auto-Cléf" (the auto-key), it was manufactured in the United States by Motor Parts Co of Plainfield New Jersey, and distributed by the Frank Mossberg Company. Advertisements appeared in early motoring journals, and the sets apparently sold well enough that they still can be found from time to time in online auctions. The interchangeable hexagonal sockets are self-explanatory, but the body of the ratcheting wrench appears somewhat non-intuitive to a modern observer, with its long cylindrical profile and folding handle looking almost like an oversized fountain pen.



*The auto-key ratcheting socket set, and early American advertisement, and an illustration of the device in use.*

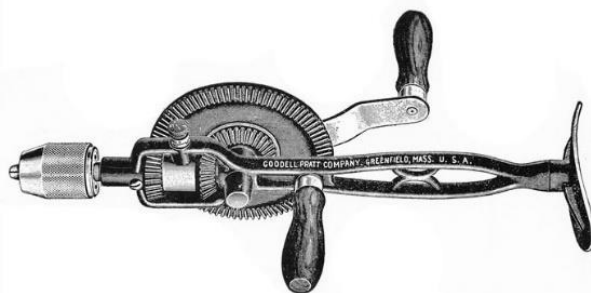
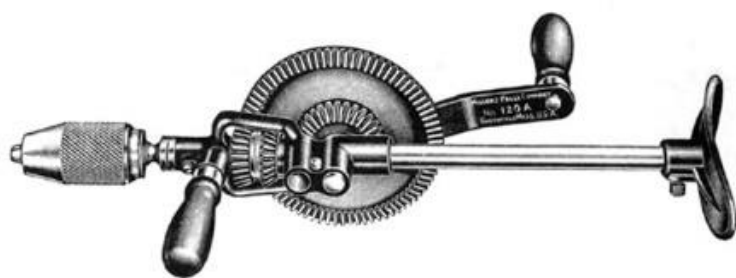
In that same year Contal founded a company to develop and produce a motor tricycle (the Mototri Contal), and by 1907 his three-wheeler was in production. With two wheels up front and the driven wheel in the rear, it bears an uncanny resemblance to the modern Can-Am motorcycle. Between the two front wheels was perched the passenger seat, which could be substituted for a cargo bin for deliveries. A single cylinder water cooled four-stroke engine in either 325cc or 432cc was fitted, generating either 2.75hp or 4hp respectively. To drum up publicity, the Contal Mototri was entered in the 1907 inaugural Peking to Paris rally. At a time when motorcars in general were attempting to prove their worth as more than just playthings of the wealthy, this punishing 16,000km race course through inhospitable terrain posed an audacious undertaking. Of all the auto manufacturers of Europe, on five dared enter the field. Although well-equipped with a clever set of struts that could serve as tent frames for the two man crew, as well as make-shift bridging over rough terrain, the tricar quickly lagged behind the pace of the other racers. Off course in the Gobi desert and running low on fuel, the driver Auguste Pons and mechanic Octave Foucaul were forced to abandon their machine and hike out on foot. They drained the radiator for drinking water, and barely escaped with their lives!



*The Contal tri-car and crew demonstrating the equipment used during the 1907 Peking to Paris rally, and an early sales illustration.*

A hand-powered drill may not naturally evoke the same passion and sense of adventure as an epic motorsports rally, but the Contal four-speed breast drill has a multitude of clever design features to excite the vintage tool collector. While many breast drills of the nineteenth and early twentieth century boast the ability to switch from a low-speed high-torque gearing to a high-speed low-torque setting, few if any are capable of four speed settings! The more common dual speed drills usually require the unpinning of the drive wheel from the frame and reinsertion of the central arbor into another bearing, so as to mesh the drive pinion with one concentric ring of gear teeth or another. More sophisticated models employ a barrel shaped transmission in the frame, with a rotatable selector to couple or uncouple the low and high speed pinions to the larger gear wheel.





*Typical two-speed breast drills, with gearing changed by removing and repositioning the drive wheel (left) or rotating the selector knob on the cylindrical transmission (right)*

The Contal drill however is capable of easily switching between four different gear ratios. It accomplishes these speed changes through an ingenious arrangement of four concentric orbits of holes in the gear wheel disc, which mesh with a sprocket-like pinion on the square drive shaft. A spring-loaded tab opposite the disc serves to lock or unlock the disc's central arbour from its bearing in the body of the casting. Once released, the disc and arbour can be slid half a centimetre outward from the body of the drill, and in doing so the gear disc and pinion are brought out of mesh. With this clutch released the pinion is free to slide along its shaft, then the gear wheel can be locked back into mesh with a new set of drive holes engaged. The pinion is prevented from free-wheeling by the square cross-section of the shaft. In essence, the drive shaft that turns the chuck acts as a keyway for the pinion.



*Sprocket in mesh with tapered holes in gear wheel (left), and out of mesh while gear wheel is released (right)*

Another clever detail is that the sliding pinion is not at risk of coming unmeshed or skipping from one speed to another when the gearing is in motion. At any given time there are at least two of the nine pinion teeth partially engaged in the disc wheel. Furthermore, the pinion teeth are tapered conically to rounded blunt points. These tapered teeth mesh perfectly with the tapered holes in the gear disc, resulting in a natural self-centring effect on the pinion.

The remainder of the drill appears comparatively unremarkable, with a knurled three-jaw chuck, a cast iron body and pad, a round steel shaft between the pad and main casting, and two turned wooden handles. The original finish appears to have been black japanning, with a red pinstripe around the outer gear wheel. A surprise feature can be found by undoing the screw between the crank handle and the outer edge of the gear disc. In doing so, the crank handle is freed to engage a forward ratcheting feature! This unsuspecting ratcheting mechanism is completely hidden beneath the circular brass hub in the centre of the gear disc. Because the screw in the crank handle appears integral to the stability of the handle, many owners may remain unaware of the ratcheting capability of the drill if they have never had reason to remove the screw. Some variants incorporate a knurled screw-head, which more readily invites removal than just a plain machine screw.



*Knurled screw vs plain machine screw, which when removed allow ratcheting of the crank handle*

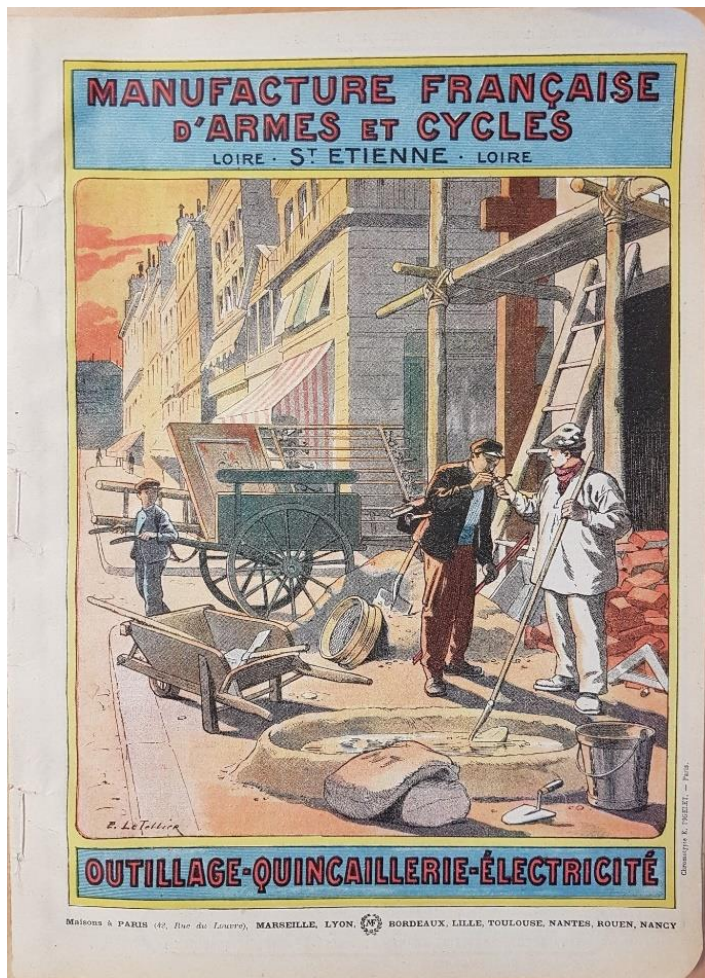
Manufacturer's markings vary, including examples with "La Contal" cast into the bridge of the frame, and others with nothing more than a cryptic "CC" cast into the body of the frame near the gear clutch release. The La Contal variant also displays a French patent marking (Bte S.G.D.G. France et Etranger) on the crank handle, and is individually serialised on the frame casting.



*"La Contal" casting with individually stamped serial number (left) vs "CC" casting without serialisation (right)*

The actual manufacturing of Contal's drill still remains largely shrouded in mystery. The language barrier to accessing original source material and the current COVID-19 pandemic have both stymied progress. Original evidence of the drill's distribution however can be found in a French mail-order catalogue from 1930. The "Manufacture Française D'Armes Et Cycles De Saint-Étienne" was a large manufacturer and distributor of all manner of goods, including not only firearms and bicycles as the name implies, but a wide array of homewares, sports and outdoor equipment, hardware and tools. These beautifully illustrated catalogues have become collectables in their own right, and command hefty prices for a complete tome. The author was able to source this hand tools subset of the catalogue from a bookseller in Italy.





Home > Catalogue de Manufacture Française d'Armes & Cycles de ...

**Catalogue de Manufacture Française d'Armes & Cycles de Saint-Etienne**

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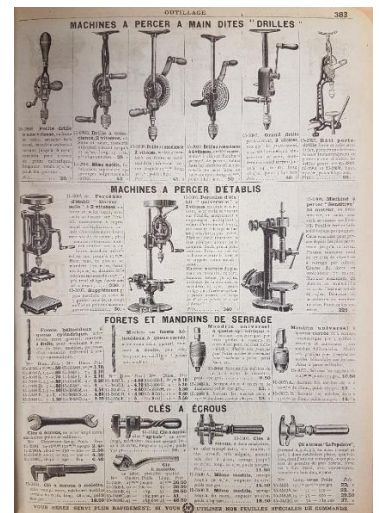
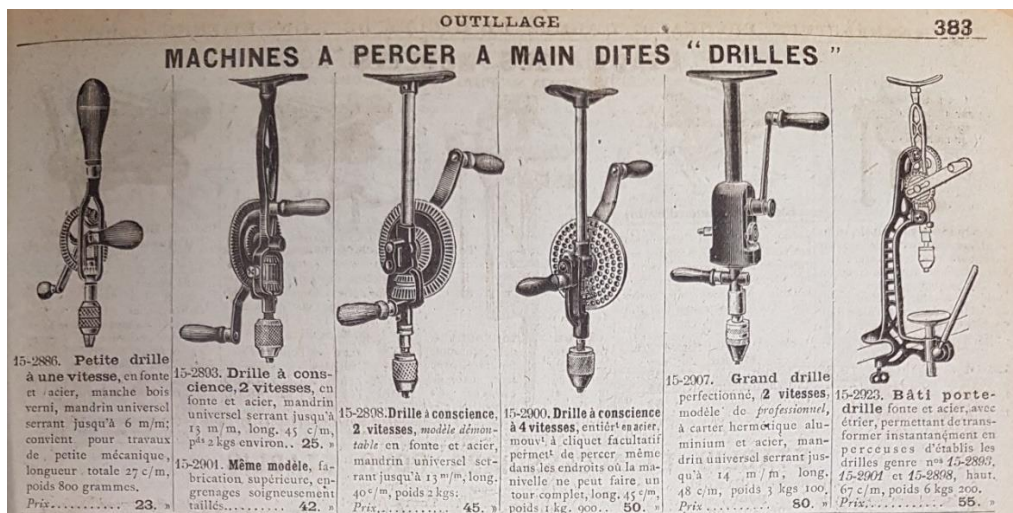
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About this Item

Vers 1912, 1 200 p., 19,5 x 27,5 c. Contient Description de la compagnie et de ses installations (1-30); section armes de chasse et de tir (31-192); section cycles hirondelle (193-230); section machines à coudre et à écrire (231-256); section munitions - articles pour chasseurs (256-328); section articles pour cycles et automobiles (329-364); section articles et engines de pêche (365-426); section sport - jeux - voyage (427-556); section photographie - optique (557-616); section papeterie - librairie (617-688); section habillement de sportsman (689-756); section coutellerie - horlogerie - bijouterie (757-852); section outillage - quincaillerie - électricité (853-940); section la maison (941-1100); section agriculture (1101-1172); section table des matières (1173-1200). Chaque section débute par une illustration couleur avec à l'endos une autre illustration couleur d'un chien ou d'un oiseau. Chaque section contient des centaines d'illustrations. Les pages du début sont pliées, une page d'illustration est détachée et effilochée, une page est déchirée, les dernières pages de la table des matières ont été réparées. Reliure demi-cuir fatiguée. Sinon un bel exemplaire. Bookseller Inventory # 000890

The 1930 tool and hardware section of a leading French mail-order catalogue. As dawn breaks on an urban building site, a brick mason mixes mortar in a mound of sand while a boy with a wooden cart delivers a wrought iron gate (left). Original editions of the unabridged St. Etienne catalogues are now quite valuable and collectable in their own right.



The Contal drill retailed for 50 francs alongside more traditional two-speed breast drills, hand drills, and manual drill presses.

The author is also aware of another variant of Contal's design, offered through the French catalogue of H. Lafond under the name "Argenta". The catalogue illustration specifically identifies the gear wheel release mechanism, as well as the screw to enable ratcheting action. Further English-language information on H. Lafond or the Argenta drill has not been forthcoming, but an example of the drill can be found on a 2011 Internet message board post. The circular hub that conceals the ratcheting mechanism is smaller, and the body of the casting has been revised. The wooden handles appear to be slightly bulkier, less elegant turnings. The overall impression is of a budget version of the Contal design.





incorporates the ratcheting feature, which is likely an adaptation from his earlier work on a ratcheting socket wrench.

N° 24,478



A.D. 1913

Date of Application, 28th Oct., 1913

Complete Specification Left, 28th May, 1914—Accepted, 17th June, 1915

PROVISIONAL SPECIFICATION.

Improvements in or relating to Change Speed Gears.

We, ERNEST CHARLES and JULES GRANDJEAN, of 30, rue Garnier, Neuilly (Seine), in the Republic of France, Engineers, do hereby declare the nature of this invention to be as follows:—

This invention relates to change speed gears and has for its object to provide an improved gear which shall be more efficient in operation than those heretofore constructed.

In accordance with the invention which is applied to the driving of a bit or drill holder with three speeds the main shaft is provided with a square portion upon which a pinion is mounted to slide freely. The driving disc comprising several circular rows of perforations is rotated in the usual manner by means of a crank while the bit holder is supported by means of a fixed handle and a supporting plate fixed to the frame.

A circular groove is arranged in the disc and connects the perforations located in a straight line in the different rows. It will of course be understood that several similar grooves can be provided.

By bringing the groove parallel with the main shaft the pinion can be caused to slide upon this shaft and brought into mesh with any one of the rows of perforations which are of similar pitch. It is unnecessary to provide any fixing device for maintaining the pinion in place during the rotation of the wheel, because the passage of the groove into the position parallel with the shaft is instantaneous and any risk of displacement of the pinion is thereby avoided. However, without departing from the principle of the invention the pinion or the shaft can be provided with any appropriate fixing means either resilient or rigid.

Dated this 28th day of October, 1913.

HASELTINE, LAKE & Co.,  
28, Southampton Buildings, London, England, and  
60, Wall Street, New York City, U.S.A.,  
Agents for the Applicants.

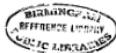
COMPLETE SPECIFICATION.

Improvements in or relating to Change Speed Gears.

We, ERNEST CHARLES and JULES GRANDJEAN, of 30, rue Garnier, Neuilly (Seine), France, Engineers, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

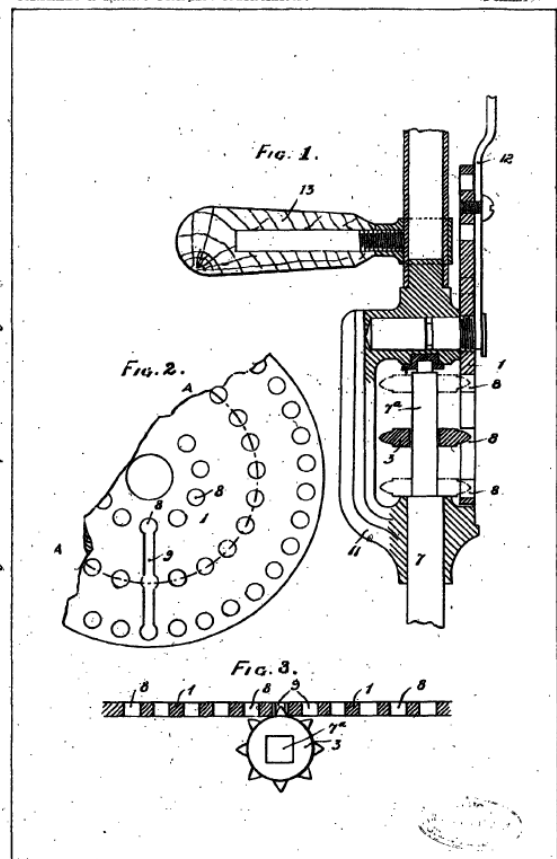
This invention relates to change speed gears of the kind comprising one

[Price 6d.]



A.D. 1913. OCT. 28. N° 24,478.  
CHARLES & another's COMPLETE SPECIFICATION.

(1 SHEET)



[This Drawing is a full-size reproduction of the Original.]

Mellish & Sons, Photo-Litho.

The 1913 Charles and Grandjean British patent illustrating how speed changes require alignment of the milled slot with the sliding pinion.

May 27, 1924.

1,495,885

May 27, 1924.

1,495,885

C. CONTAL

DRILLING DEVICE

Filed Oct. 8, 1920

2 Sheets-Sheet 1

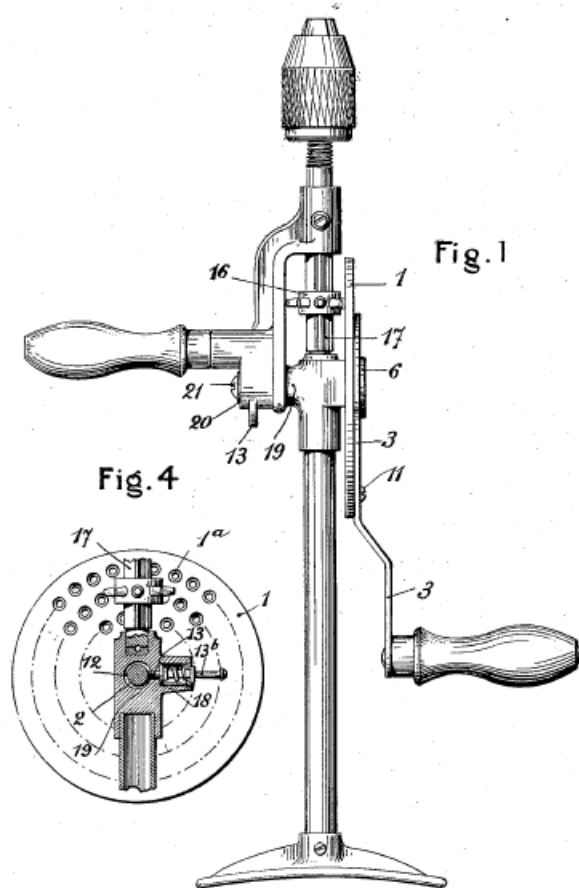
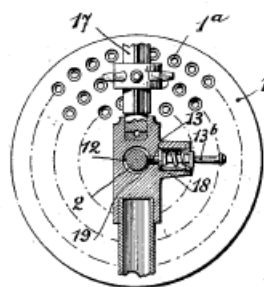


Fig. 1

Fig. 4



INVENTOR  
CAMILLE CONTAL  
BY *Mum & Co.*  
ATTORNEYS

C. CONTAL

DRILLING DEVICE

Filed Oct. 8, 1920

2 Sheets-Sheet 2

Fig. 2

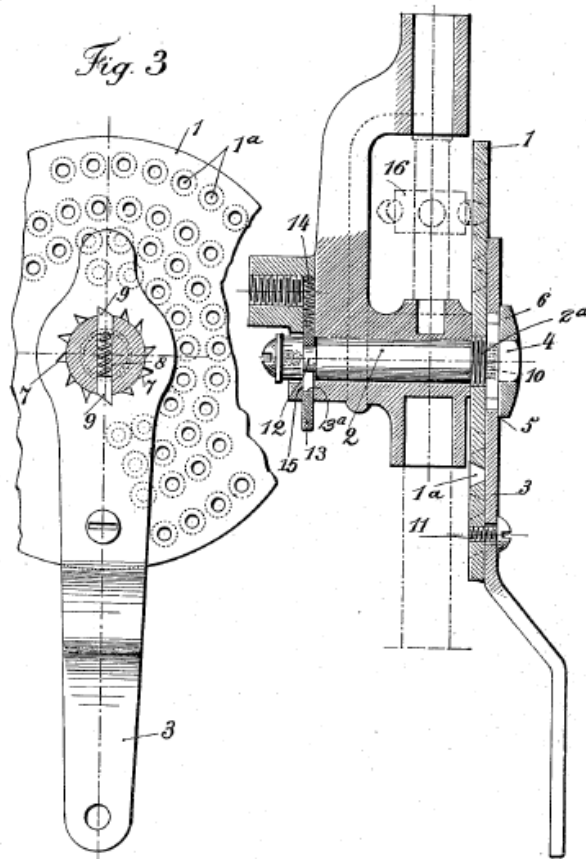
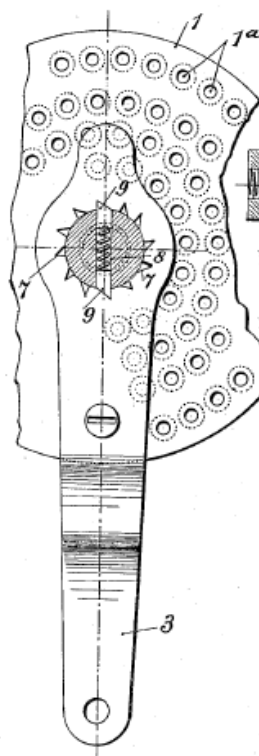


Fig. 3

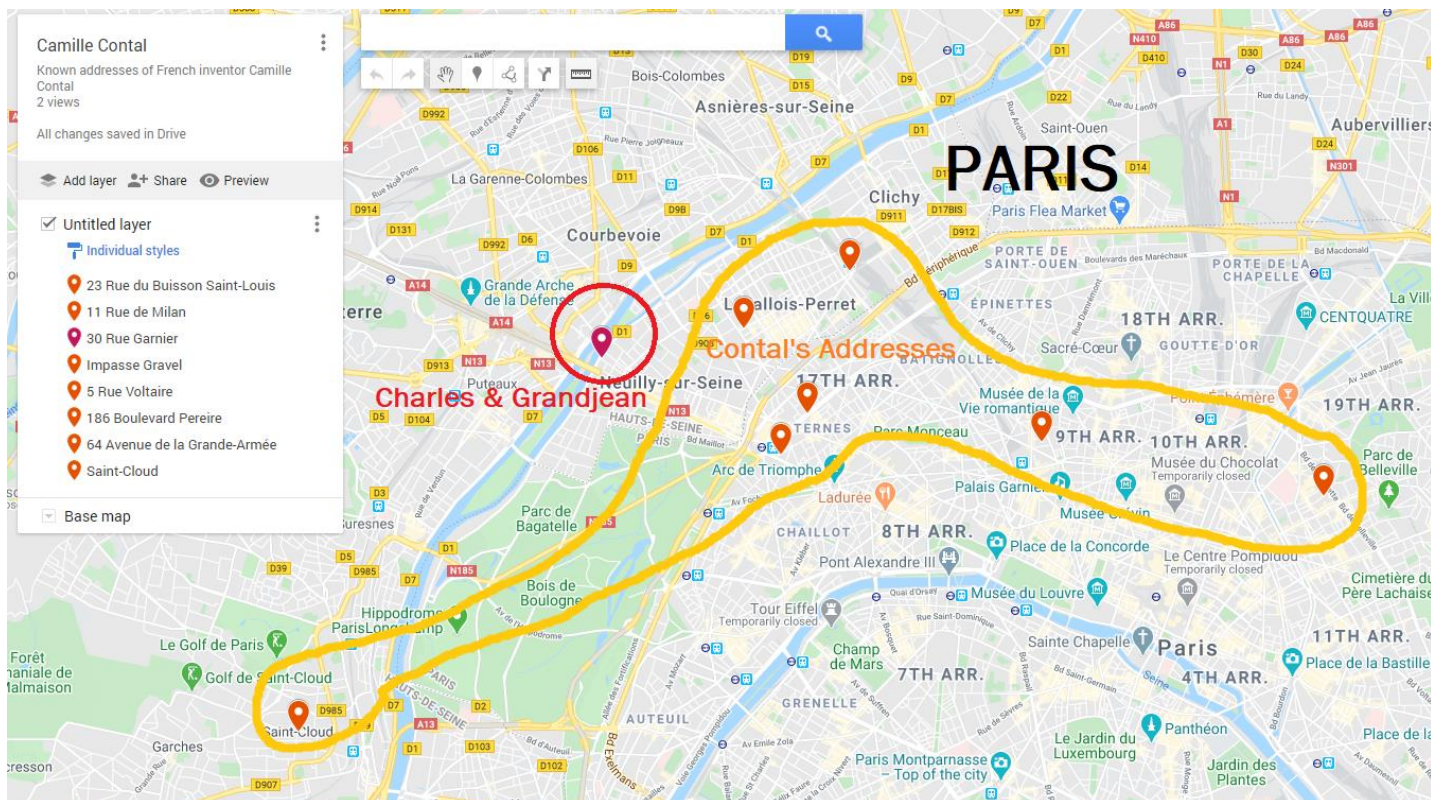


INVENTOR  
CAMILLE CONTAL  
BY *Mum & Co.*  
ATTORNEYS

Contal's 1920 American patent illustrations, clearly showing the tapered pinion teeth and corresponding tapered holes in the gear wheel. The wheel release and ratcheting handle are also evident.

Contal's American patents are now digitised and available online, and from the addresses listed on these documents we can trace his several residences and workshops around Paris, and begin to envision the sphere in which he lived and worked. As the accompanying map illustrates, several of Contal's known addresses would have placed him within walking distance of Charles and Grandjean's address from their 1913 patent application. Without further research we can merely speculate whether these engineers were known to each other and whether they ever willingly collaborated, but the close proximity in time and space of these two very similar multi-speed drills begs the question to what extent did the Charles and Grandjean design influence Contal? While Contal's drill was successfully brought into production, the author is unaware of the Charles and Grandjean design ever progressing beyond the conceptual stage.





Map of Paris showing the close proximity of the workshops of Camille Contal and the address of Charles & Grandjean, whose 1913 patent shares many similarities with the Contal drill.

Aside from the St-Étienne catalogue, another piece of ephemera attesting to the marketing and distribution of the Contal drill is a circa 1930s promotional postcard. Arguably one of the most imaginative representations of a drill, this caricature marries together Contal's dual interests in motoring and tools.



www.delcampe.net

collections et vieux papiers

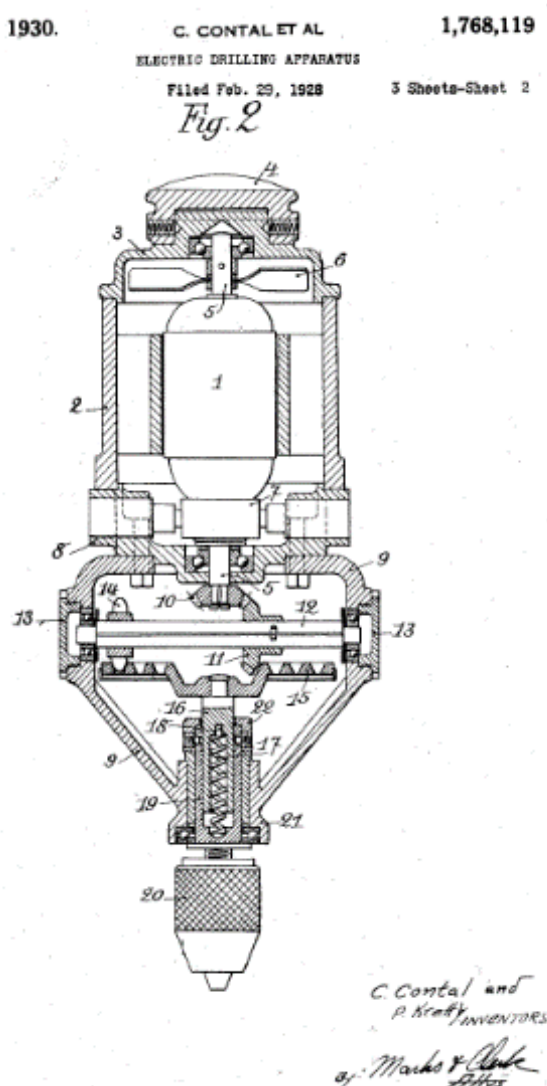
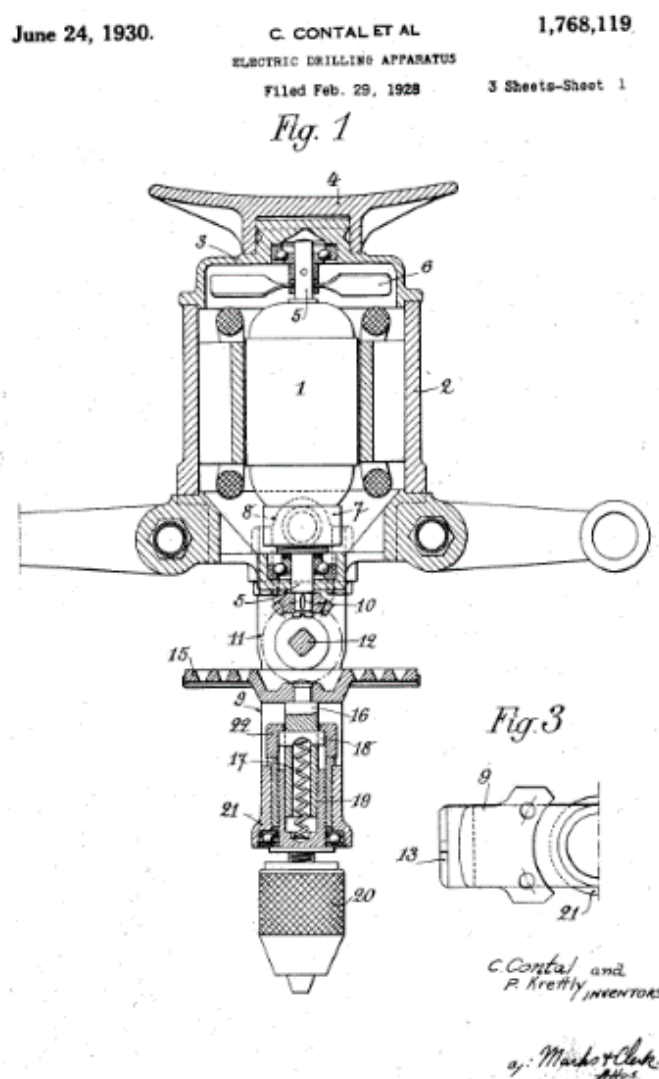


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Obverse (left): "The Contal Drill – In life make your hole quickly and effortlessly... with ratcheting, fours speeds, and reverse." Reverse (right): "Gentlemen, under the conditions of your letter of (date), please send me 6 Contal ratchet drills and 1 Contal electric drill. Agreed gentlemen, my sincere greetings. (Strike out the unnecessary portions.)"

The back of the card acts as a sort of bulk order form for tool merchants to place trial orders not just for the four-speed drill but also for Contal's electric drill which he submitted for patent in 1928. It is also worth noting that Contal appears to be doing his own distribution via "L'Outillage Contal", or the Contal Toolworks. The electric drill referred to in this advertising card is an absolutely fascinating attempt by Contal to propel his drill design from the realm of hand tools to the burgeoning world of power tools. As the US patent application illustrations show, an electric motor drives a pair of bevel gears which turn a *square shaft on which slides a pinion capable of meshing with any of three circles of perforated tapered holes*. It is quite literally the multi-speed breast drill with an electric motor! Whether oddities like this were ever commercially produced is another question, but a design like this followed only a decade after Black & Decker's landmark 1917 patent of a trigger-switch pistol-grip portable electric drill, and would potentially have not been out of place on an industrial assembly line.



Contal's design for an electric multi-speed drill relied on the same sliding pinion and concentric perforated gear wheel as his hand powered breast drill.

Venues for future research on the Contal drills would be to establish the manufacturer of the breast drill: whether Contal himself, Saint-Étienne, or a third party altogether. Establishing how the "Argenta" drill relates to this story would also be of value. Any links confirming collaboration between Contal and Charles & Grandjean should be investigated, as well as establishing whether the 1913 Charles and Grandjean design was ever put into production. Finally, the Contal electric drill of 1928 should be further investigated, and any extant examples reported. Nearly all of the patent information referenced in this article has been drawn from the digitised American database. It stands to reason however that Contal would have made his initial applications in his native France, with possible duplicate filings in Great Britain, Germany, or elsewhere on the continent. Thus, the USA patents may not represent a complete catalogue of Contal's endeavours. Hopefully over time the European archives will become more accessible, which may shed further light on the above subjects.



## References:

<https://lestricars.es.tl/Contal.htm> - French language website about Contal's motor-tricycle

<https://p2p19contal.com/> - Blog detailing the 2019 recreation of the Peking to Paris rally in a Contal Mototri

US Patent No 1,495,885 granted to Camille Contal May 27, 1924 for a four-speed breast drill

British Patent No 24,478 granted to Ernest Charles and Jules Grandjean 17 June, 1915 for a three-speed breast drill

US Patent No 1,768,119 granted to Camille Contal and Pierre Krettly June 24, 1930 for a multi-speed electric breast drill