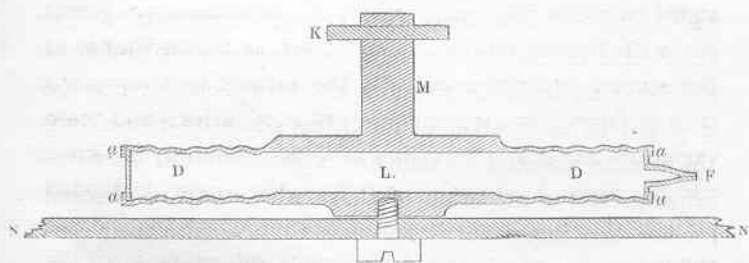


readily suggest itself to any person of mechanical information. The figure he chose as the object of atmospheric compression is, perhaps, of all forms, the worst adapted for that purpose; viz., an *arch*. That he has recorded the principle cannot be disputed; but when we consider what has been stated relative to the form of his vacuum-vase, to say nothing of its inadequately small dimensions, we must be permitted to question if he ever obtained any practical result. The extreme ingenuity of M. Vidi, the inventor of the instrument about to be described, appears, then, to be in no way disparaged by the claims to the invention of the principle, which have been set up for M. Conté by his friends.

A diagram and explanation of M. Conté's vacuum-vase having been given above, it will be proper to detach and exhibit on paper that of M. Vidi, that the difference between the two may be shown more clearly, and that the ingenious means adopted by M. Vidi to correct for varying temperature, may be the better appreciated.

Fig. 6.



At figure 6 the vacuum-vase is represented in the shape which it presents before it is exhausted by the air-pump; *a a a a* show the turning or lapping over of the thin corrugated diaphragms where they are soldered to the rim; *D D* is the vacuum-vase; *M* is the socket, which,

being pulled by the pin K, places the vase in a state of tension, whereby it offers resistance to the pressure of the external atmosphere.

Fig. 7.

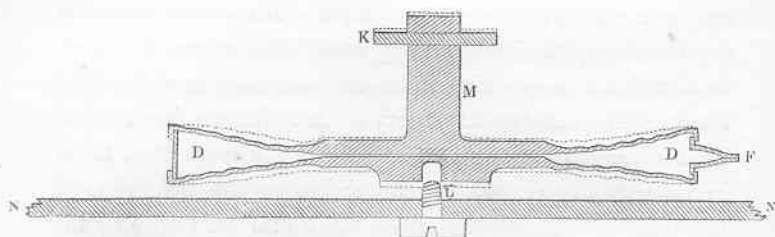


Figure 7 shows the vacuum-vase in a compressed state, after the air has been exhausted by the air-pump, through the tube F. The dotted lines running nearly even with the corrugated surface, are intended to show the position which that surface will assume after the introduction of the gas, which effects a compensation for the results of varying temperature.

From the circumstance of a gas being (perhaps for the first time,) introduced into an instrument, with a view to effect a correction for variable temperatures, and from its being an invisible agent, a short explanation may be required in verification of its being adequate to produce the results asserted. Such an explanation will serve to impress on the attention of those who study mechanical science, how important it becomes to take into their consideration, not only the expansion of metals upon an increase of temperature, but also the loss of elastic force, to which, in a state of tension, they become subject. The student is familiar with tables indicating the expansion of metals; but, even at the present time, no table has been calculated in order to show the loss sustained by elastic

bodies when in a state of tension ; perhaps no instrument, although made for the express purpose, could exhibit an experiment more satisfactory for the proof of this point than the Aneroid. We are enabled to use it as a pyrometer by applying the heat of a lighted taper to the spring S, figure 9, without communicating that heat to the vacuum-vase. A table of direct expansion would cause us to conclude, that as the spring S would, on being heated, become longer, it would raise the lever C higher ; but the experiment above adverted to produces a contrary result, (for the spring S losing its elastic power through heat, is forced down by the atmospheric pressure on the vacuum-vase,) and proves that the loss of elastic force is greater than that of direct expansion. The hand of the Aneroid indicates this, by moving towards the right, or "Set Fair."

We might further suppose that an increase of heat expanding the metal of which the vacuum-vase was made, would proportionately increase its capacity ; whereas, the contrary is actually the case ;—a conclusion which is proved by heating the vacuum-vase alone. It must be admitted that the metal diaphragms have become both larger and weaker by an increase of temperature, whence the capacity of the vacuum-vase would be rendered greater ; but it must be also remembered, that the atmospheric pressure on the surfaces, amounting to a force of 44 lbs., brings the upper and lower diaphragms, thus weakened by heat, closer together, so that the cavity of the vacuum-vase has, in fact, become smaller.

This brings us to the subject of compensation accomplished by gas. On the capacity of the vacuum-vase being diminished by heat, as has been just shown, the gas contained within it is, by the same cause, expanded ; and, resisting the compressing force of the atmospheric weight

upon the diaphragms, keeps them separated at a due distance, and effects the compensation.

As there is no external correction for temperature to be seen in the Aneroid, we will subjoin a convincing proof that the instrument is compensated, and that with no ordinary exactness. The following tables have been made by two gentlemen, after a comparison of the Aneroid with two of the most expensive and perfect mercurial barometers to be found in this country. It should be noticed that, in neither case, did the Aneroid derive any assistance by correction for variable temperature.

TABLE I.

Date. 1848.	Aneroid Barometer.	Mercurial Barometer.	Thermo- meter.	Date. 1848.	Aneroid Barometer.	Mercurial Barometer.	Thermo- meter.
Jan.				Feb.			
6	29.67	29.672	45°	1	29.72	29.702	45°
7	29.52	29.526	45	2	30.11	30.091	42
8	29.53	29.527	46	3	30.33	30.344	46
9	29.94	29.950	44	4	30.12	30.116	45
10	30.14	30.152	42	5	30.07	30.072	50
11	30.31	30.304	41	6	30.02	30.046	54
12	30.39	30.358	42	7	29.97	29.975	54
13	30.26	30.240	45	8	29.83	29.840	52
14	30.18	30.170	47	9	29.04	29.056	51
15	29.86	29.860	48	10	28.93	28.944	50
16	29.91	29.905	41	11	29.84	28.832	48
17	29.59	29.590	45	12	29.83	29.815	50
18	29.39	29.400	44	13	30.02	29.098	51
19	29.34	29.358	44	14	29.81	29.822	52
20	29.74	29.746	41	15	29.43	29.466	52
21	29.98	29.996	42	16	29.66	29.676	49
22	30.00	29.997	42	17	30.18	30.168	48
23	30.03	30.016	41	18	30.38	30.368	46
24	30.29	30.270	41	19	29.69	29.712	42
25	30.32	30.298	40	20	29.28	29.328	48
26	30.03	30.025	38	21	29.72	29.752	45
27	29.98	29.915	34	22	29.40	29.428	50
28	29.79	29.772	35	23	28.92	28.947	49
29	29.87	29.860	36				
30	29.60	29.620	46				
31	29.19	29.190	49				

TABLE II.

Date. 1848.	Aneroid Barometer.	Standard Barometer.	Thermometer. Max. & Min.	Date. 1849.	Aneroid Barometer.	Standard Barometer.	Thermometer Max. & Min.
Dec.				Jan.			
1	29.400	29.444	43° 34°	3	29.450	29.444	23° 14°
2	29.125	29.178	41 31	4	29.475	29.476	31 18
3	29.575	29.624	45 28	5	29.500	29.540	33 28
4	29.025	29.080	47 32	6	29.762	29.780	33 24
5	28.725	28.800	43 35	7	29.800	29.826	33 19
6	29.025	29.100	48 35	8	29.287	29.312	40 28
7	29.250	29.300	50 39	9	29.225	29.250	41 32
8	29.575	29.624	51 40	10	28.887	28.950	44 34
9	29.912	29.920	49 37	11	28.862	28.960	36 32
10	30.100	30.124	49 37	12	29.850	29.900	40 24
11	29.950	29.964	48 36	13	29.487	29.530	49 29
12	29.975	30.004	50 38	14	29.250	29.316	51 45
13	29.875	29.886	51 43	15	29.775	29.834	40 30
14	29.600	29.600	46 37	16	29.712	29.716	45 28
15	29.612	29.620	50 38	17	29.450	29.520	48 31
16	29.575	29.584	47 38	18	29.762	29.800	47 34
17	29.662	29.670	39 34	19	29.675	29.718	43 40
18	29.650	29.650	44 32	20	29.812	29.836	47 39
19	29.575	29.594	45 40	21	30.000	30.050	48 39
20	29.950	29.950	37 36	22	29.712	29.750	43 40
21	30.112	30.114	26 18	23	30.112	30.132	46 34
22	30.112	30.100	29 18	24	30.175	30.176	47 38
23	30.025	30.024	32 19	25	29.887	29.912	49 41
24	29.862	29.850	32 18	26	29.575	29.600	42 43
25	29.662	29.661	35 24	27	29.719	29.750	40 26
26	29.812	29.802	43 38	28	29.100	29.150	39 32
27	29.940	29.942	47 33	29	29.200	29.250	39 29
28	29.815	29.806	47 32	30	29.900	29.904	40 24
29	30.000	30.006	46 32	31	29.900	29.900	40 36
30	29.890	29.896	45 31				
31	29.895	29.922	39 28				

The vacuum-vase is brought into a state of tension by separating the diaphragms, after exhaustion, and placing the pin K on the lever C, as shown in fig. 9. The lever C is then to be placed on its fulcrums, B B, and the other end of the lever C to rest on the top of the spiral spring S. The action of the atmosphere on the vacuum-vase, and the connection of the latter with the spring S, require, as we have before remarked, to be clearly understood, in order to a perfect acquaintance with the principle of the Aneroid. To illustrate this still further, it appears necessary to give a diagram explanatory of the theorem.