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UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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*Ex parte* ROBERT HAROLD BATEMAN, KEVIN GILES,
STEVEN DEREK PRINGLE, and
JASON LEE WILDGOOSE[1]

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Appeal 2015-002181
Application 12/514,972
Technology Center 2800

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Before CATHERINE Q. TIMM, BEVERLY A. FRANKLIN, and JULIA HEANEY, *Administrative Patent Judges*.

TIMM, *Administrative Patent Judge*.

DECISION ON APPEAL[2]

STATEMENT OF CASE

Appellants appeal under 35 U.S.C. § 134(a) from the Examiner's decision to reject claims 1, 2, 11, 14, 58, 70, and 75–89 as obvious under 35 U.S.C. § 103(a). We have jurisdiction under 35 U.S.C. § 6(b).

We REVERSE.

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[1] Appellants identify the real party in interest as Micromass UK Limited. Appeal Br. 5.

[2] In our opinion below, we reference the Specification filed May 14, 2009 (Spec.), Final Office Action mailed February 26, 2014 (Final), the Appeal Brief filed August 22, 2014 (Appeal Br.), the Examiner's Answer mailed September 26, 2014 (Ans.), and the Reply Brief filed November 26, 2014 (Reply Br.).

The claims are directed to a mass spectrometer (*see, e.g.*, claims 1, 75, 83) and a method of mass spectrometry (*see, e.g.*, claims 70, 81, 85). An embodiment of the mass spectrometer is depicted in Appellants' Figure 2, reproduced below:

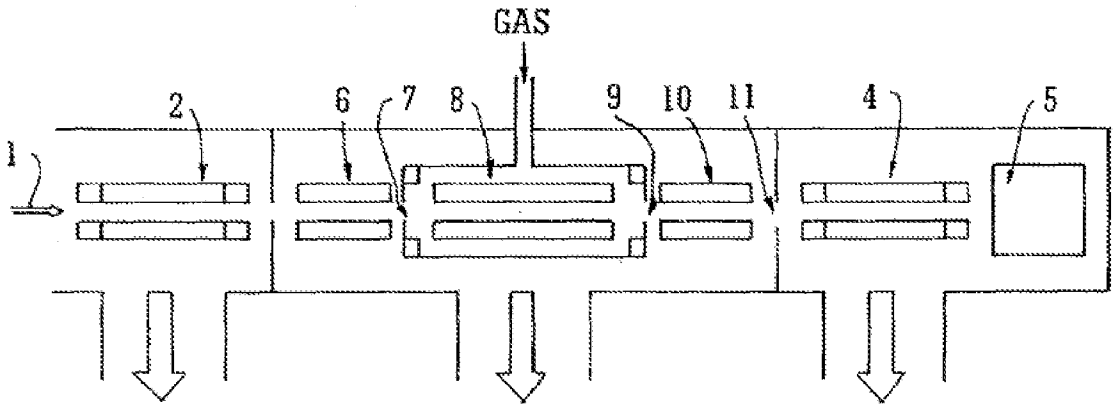


Figure 2 is a cross-sectional representation of a mass spectrometer

Claim 1, with reference numerals inserted from Figure 2, further illustrates the claimed invention:

> 1. A mass spectrometer comprising:
>
> a first mass to charge ratio filter or mass to charge ratio mass analyser [2] arranged and adapted in a first mode of operation to transmit parent or precursor ions having a mass to charge ratio within a first range;
>
> an ion mobility spectrometer or separator [8];
>
> an ion gate or ion barrier [9], arranged downstream of the ion mobility spectrometer or separator, for attenuating ions in a mode of operation;
>
> a collision, fragmentation or reaction device [10]; and
>
> a control device[3] configured to control the operation of said ion gate or ion barrier so that ions from the parent or

[3] Not shown in the Figures.

> precursor ions having mass to charge ratios within said first range but having one or more undesired first charge states are substantially attenuated by the ion gate or ion barrier.

Claims Appendix, Appeal Br. 40.

OPINION

All of the claims require a first mass to charge ratio filter or mass to charge ratio mass analyser either as a component in a mass spectrometer apparatus or as used in a step of transmitting parent or precursor ions having mass to charge ratios within a first range through such a component. *See, e.g.*, claims 1, 70, 75, 81, 83, 85.

The Examiner relies upon Bateman,[4] in combination with other prior art references, to support a conclusion that the mass spectrometer and the method of its use would have been obvious to those of ordinary skill in the art at the time of the invention. Final 12–27. Underpinning all of the rejections is the finding that Bateman's ion trap 2 depicted in Bateman's Figure 6 is a first mass to charge ratio filter as recited in Appellants' claims. Final 12. Appellants contend that the Examiner reversibly erred in finding that Bateman's ion trap 2 is a mass to charge ratio filter. *See, e.g.*, Appeal Br. 13–15; Reply Br. 2–4. A preponderance of the evidence supports Appellants' argument.

The Examiner relies upon Figure 6 of Bateman in combination with a disclosure within paragraph 17 to support the finding. Bateman's Figure 6 is reproduced below:

[4] Bateman et al., US 2003/0001084 A1, pub. Jan. 2, 2003.

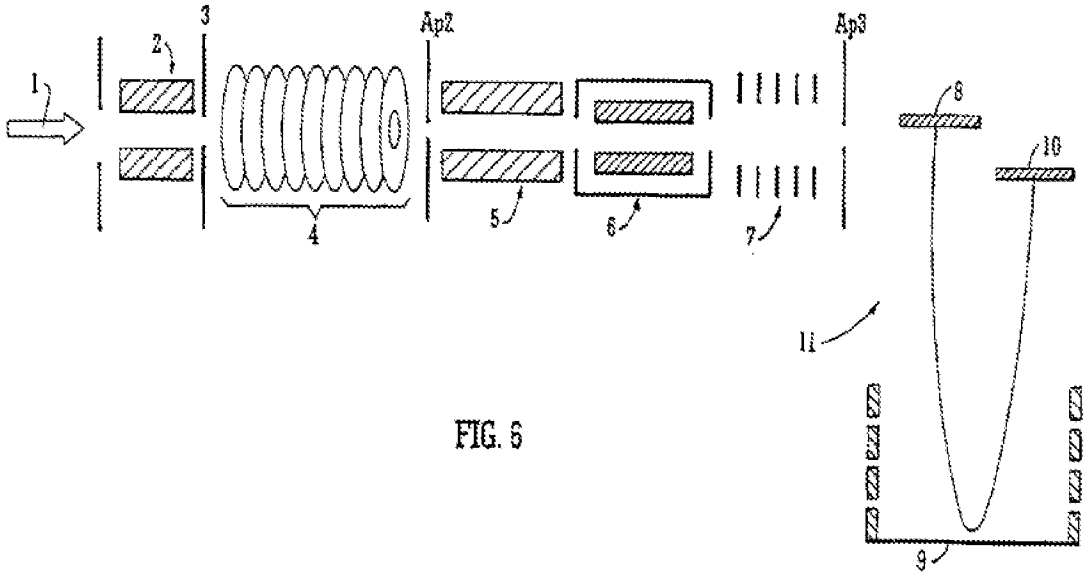


FIG. 6

Figure 6 shows a first main preferred embodiment of Bateman's mass spectrometer

Bateman describes the Figure 6 embodiment as including an ion trap 2, and an ion gate 3 that allows pulses of ions to be ejected from the ion trap 2 into ion mobility spectrometer 4. Bateman ¶¶ 90, 92. The ion mobility spectrometer temporally separates ions based upon their ion mobility. Bateman ¶ 94. Ions then travel through a differential pumping aperture Ap2 to a quadrupole mass filter 5. Bateman ¶ 104. Quadrupole mass filter 5 can be set to transmit (in conjunction with the operation of the ion mobility spectrometer 4) only those ions having a mass to charge ratio that corresponds with the charge state of the ions of interest. Bateman ¶ 108. The ions enter a collision cell 6 where they collide with gas molecules. Bateman ¶ 110. Optical lenses 7 guide ions through a further differential pumping aperture Ap3 and into an analyser chamber containing an orthogonal acceleration time of flight mass analyser 11 having a pusher and/or puller electrode 8 for injecting ions into an orthogonal drift region.

Bateman ¶ 111. A reflectron 9 reflects ions traveling through the orthogonal drift region back towards detector 10. *Id.* Within the orthogonal drift region, ions become temporally separated in a manner dependent upon their mass to charge ratio. *Id.*

In the embodiment of Figure 6, Bateman does not disclose ion trap 2 as a mass to charge ratio filter, but instead describes quadrupole mass filter 5 and the drift region as such filters.

The Examiner finds that Bateman's ion trap 2 is a first mass to charge ratio filter arranged and adapted as required by claim 1 as evidenced by Bateman's paragraph 17. Ans. 4. Paragraph 17 reads:

> A particularly preferred feature is to provide an ion trap upstream of the drift region. This ion trap is separate to an ion trap which may be provided preferably upstream of the ion mobility spectrometer. The ion trap may preferably store and periodically release ions so that a pulsed (rather than a continuous) source of ions is admitted or otherwise inputted in to the drift region. The injection electrode is arranged to inject ions a predetermined period of time after ions have first been released from the ion trap upstream of the drift region. The period of time is set so that only ions having a desired mass to charge ratio or a mass to charge ratio within a desired range are substantially injected by the injection electrode in an orthogonal direction and are hence onwardly transmitted.

Bateman ¶ 17.

First, we agree with Appellants that, although paragraph 17 does not include reference numerals, it is describing the Figure 8 embodiment of Batman's mass spectrometer and not the Figure 6 embodiment. Paragraph 17 describes a mass spectrometer including two ion traps. Bateman ¶ 17. As shown above, Figure 6 has only one ion trap 2. Figure 8 is reproduced below:

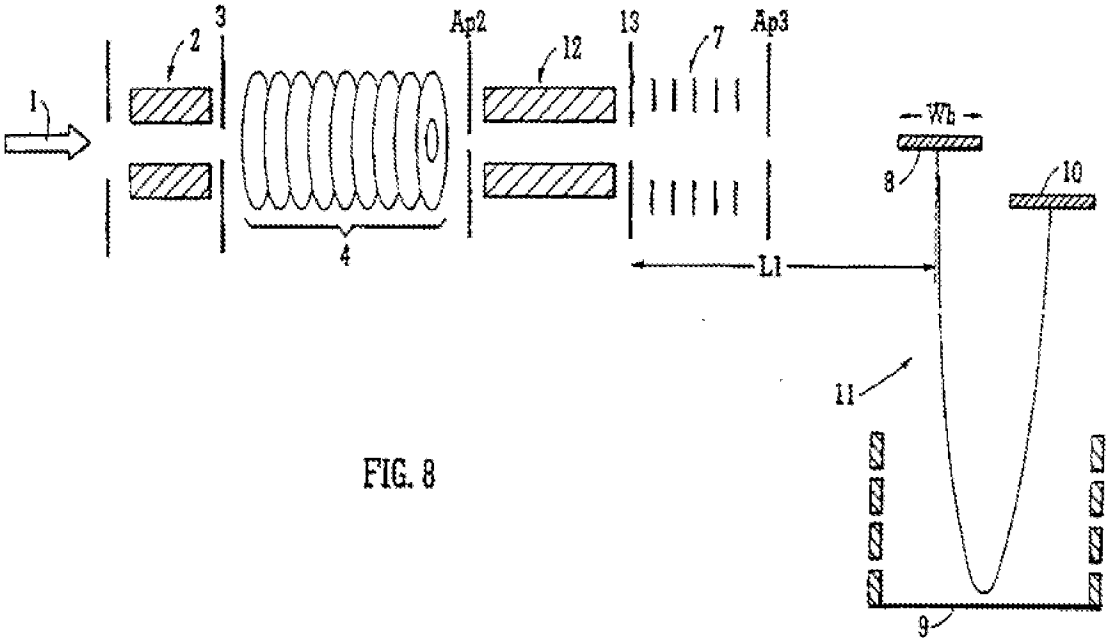


FIG. 8

Figure 8 shows a second main preferred embodiment of Bateman's mass spectrometer

The mass spectrometer of Figure 8 includes ion trap 12 in addition to ion trap 2. Bateman ¶¶ 112, 114.

Second, although we agree with the Examiner there is no evidence that ion trap 12 functions differently than ion trap 2 (Ans. 3), the evidence does not support a finding that either ion trap 2 or 12 is a mass to charge ratio filter as required by the claims. Bateman does not disclose that either ion trap 2 or 12 is a mass to charge ratio filter adapted and arranged as required by claim 1. Nor does Bateman disclose that either ion trap performs the functions of such a filter. Instead, Bateman discloses that it is the *injection electrode* (injection electrode 8) that injects ions a predetermined period of time after ions have first been released from the ion trap up stream of the drift region (ion trap 12 upstream of drift region L1)

with the time period set "so that only ions having a desired mass to charge ratio or a mass to charge ratio within a desired range are substantially injected by the *injection electrode* in an orthogonal direction and are hence onwardly transmitted." Bateman ¶ 17 (emphasis added). Paragraph 13 supports a finding that injection electrode 8, which also termed a pusher and/or puller electrode, in combination with the axial time of flight region L1 performs the filtering function; this function is not performed by ion trap 12. Bateman ¶ 113.

Third, the Examiner has not established that ion trap 2 has the necessary structure able to carry out the filtering function. Neither Bateman, nor Appellants' Specification, provides evidence that an ion trap has the same structure as a mass to charge ratio filter. Bateman discloses other devices such as quadrupole mass filter 5 and axial time of flight or drift region having a length L1 as such filters. Bateman ¶¶ 104, 113. The Specification discloses using a quadrupole rod set mass filter, a time of flight mass filter or mass analyser, a Wein filter, or a magnetic sector mass filter or mass analyser. Spec. 14:16–23. The Examiner has not established that an ion trap has the same or similar structure and is capable of functioning as the required filter.

A preponderance of the evidence fails to support the Examiner's finding that Bateman's ion trap 2 is a mass to charge ratio filter in accordance with the claims. The Examiner does not rely upon any of the other prior art references in a manner that overcomes the above deficiency.

## CONCLUSION

We do not sustain the Examiner's rejections.

DECISION

The Examiner's decision is reversed.

REVERSED